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TECHNICAL EVALUATION REPORT

REVIEW OF LICENSEES' RESOLUTION OF OUTSTANDING ISSUES FROM NRC EQUIPMENT ENVIRONMENTAL QUALIFICATION SAFETY EVALUATION REPORTS (F-11 and B-60)

OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION

VOL. 1 OF 2

NRC DOCKET NO. 50-285

FRC PROJECT C5257

NRC TAC NO. 42491

FRC ASSIGNMENT 13

NRC CONTRACT NO. NRC-03-79-118

FRC TASK 504

Prepared by

Franklin Research Center
20th and Race Streets
Philadelphia, PA 19103

FRC Group Leader: G. Toman

Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: P. Shemanski

November 10, 1982

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Franklin Research Center

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FOREWORD

This Technical Evaluation Report was prepared by Franklin Research Center under a contract with the U.S. Nuclear Regulatory Commission (Office of Nuclear Reactor Regulation, Division of Operating Reactors) for technical assistance in support of NRC operating reactor licensing actions. The technical evaluation was conducted in accordance with criteria established by the NRC.

IDENTIFICATION OF PROPRIETARY INFORMATION

Some of the information in this technical evaluation report was obtained from manufacturers' proprietary test reports. All proprietary test reports are identified as such in Section 6, References, of this report. Checksheets in Section 4 containing proprietary information have been replaced with a checksheet page stating that the proprietary information has been removed.

1. INTRODUCTION

1.1 PURPOSE OF THE EVALUATION

The purpose of this report is to:

- o evaluate licensees' resolutions of outstanding issues related to safety-related electrical equipment environmental qualification (EEQ) discussed in the Nuclear Regulatory Commission (NRC) Safety Evaluation Reports (SERs) in accordance with NRC criteria. The objective is to identify all cases where a licensee's response has not resolved the significant qualification issues.
- o evaluate licensees' qualification documentation of safety-related electrical equipment located in harsh environments in accordance with criteria established by the NRC and to identify (1) equipment for which qualification documentation is adequate, i.e., substantiates that the equipment is capable of performing its specified design basis safety function when it is exposed to a harsh environment and (2) equipment for which qualification documentation is deficient, i.e., does not give reasonable assurance that the equipment is capable of performing its specified safety function.
- o evaluate licensees' qualification documentation of safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. The objective is to evaluate qualification documentation of equipment within the scope of IE Bulletin 79-012, Supplement 3 (item 2) [53],* in accordance with criteria established by the NRC in a manner identical to the evaluation of all other safety-related electrical equipment.

1.2 SCOPE OF THE EVALUATION

The scope of this report is limited to the evaluation of environmental qualification of electrical 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.

*For References, see Section 6. Note that reference numbers are not presented in sequential order.

With respect to TMI Action Plan Implementation, the scope of this report is limited to those sections of NUREG-0737 [2] applicable to equipment having an installation implementation date of January 1, 1981. Where applicable, a review is to be performed on installed equipment with implementation dates after January 1, 1981 if adequately identified by the Licensee.

The NRC has determined that the evaluation of environmental qualification of equipment items (1) located in plant areas whose environment is not adversely affected by the design basis event (DBE) (e.g., equipment located in "mild" environments) or (2) required to achieve and maintain cold shutdown, is not to be included within the scope of this report. However, where the Licensee has identified these equipment items in the EEQ submittals to the NRC, these items have been listed in NRC evaluation Category III.b in this report (see Section 3 of this report for definition of NRC evaluation categories).

Qualification aspects not included within the scope of this evaluation are:

- o seismic and dynamic qualification
- o equipment protection against natural phenomena
- o equipment operational service conditions (e.g., vibration, voltage, and frequency deviations)
- o equipment located where it is subjected to the outdoor environment
- o equipment protection against fire hazards
- o equipment protection against missiles
- o equipment located in plant areas whose environment is not adversely affected by the design basis event
- o equipment required to achieve and maintain cold shutdown.

1.3 GENERIC ISSUE BACKGROUND

Safety-related electrical equipment must be capable of performing design safety functions under all normal, abnormal, and accident conditions. 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.

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 LOCA, main steam line break (MSLB) inside the reactor containment, or a HELB outside the reactor containment (such as a main steam or feedwater line break). In addition, depending on specific plant design features, other postulated HELB locations may be associated with:

- o the chemical and volume control system (CVCS) letdown line
- o the steam supply piping to
 - the auxiliary feedwater (AFW) pump turbine
 - the reactor core isolation cooling (RCIC) pump turbine
 - the high pressure core injection (HPCI) pump turbine
 - the isolation condenser
- o steam generator blowdown.

The NRC criteria for reviewing the safety of nuclear power generating stations include the requirement that the qualification of safety-related electrical equipment be substantiated by auditable documentation of the program that establishes the ability of the equipment to function as specified in the station design. This report is restricted to a technical evaluation of the equipment's ability to function in harsh environments resulting from DBEs.

Qualification criteria applied during the licensing of the older nuclear power plants have been modified over the years, and specific 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 IEEE Standards 279-71, 323-74, 383-74, 317-76, 334-80, 381-77, 382-80, 535-79, 627-80, 649-80, and 650-79. NRC NUREG documents 0413 and 0588 have been developed to address this topic. In particular, NUREG-0588 (published for comment in December 1979 and reissued as Revision 1 in July 1981) 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, Criterion 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."

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

The NRC staff has evaluated the licensees' equipment qualification programs 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 plant, qualification was based on the fact that electrical components were of high industrial quality. After 1971, qualification was judged on the basis of IEEE Std 323-71; however, no regulatory guide was issued adopting this standard. For plants whose SERs were issued after July 1, 1974, the Commission issued Regulatory Guide 1.89, which in most respects adopted the most recent standard, IEEE Std 323-74.

In November 1977, the Union of Concerned Scientists petitioned the NRC Commissioners to upgrade current standards for the environmental qualification of safety-related electrical equipment in operating plants. Subsequently, the NRC staff instituted the Systematic Evaluation Program (SEP) to determine the degree to which the older operating nuclear power 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.

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) 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 threshold 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 licensees' 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 for evaluating 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 IE Electrical Equipment in Operating Reactors" [49]. (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. It was originally intended that the licensees 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 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 qualification documentation under SEP Topic III-12. The assignment was to review equipment environmental qualification documentation and to present the results in the form of a Technical Evaluation Report for the 11 oldest plants (included in the SEP review). The plants included within the assignment were the Palisades, Oyster Creek, Ginna, Haddam Neck, Yankee Rowe, LaCrosse, and Big Rock Point plants and Zion Station Units 1 and 2, Indian Point Units 2 and 3, Millstone Unit 1, Dresden Unit 2, and San Onofre Unit 1. (This assignment was completed in April 1981.)

On January 14, 1980, the NRC Office of Inspection and Enforcement issued the DOR Guidelines and IE Bulletin 79-01E, 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 cited the DOR Guidelines as the criteria to be used in evaluating the adequacy of the safety-related electrical equipment qualification. The scope of the review was expanded to include HELBs (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; NUREG-0588 would be used as a guide in cases where the DOR Guidelines do not provide sufficient detail.

In early February 1980, the NRC decided that Indian Point Units 2 and 3 and Zion Station 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 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 which included a second document, "Guidelines for Identification of That Safety Equipment of SEP Operating Reactors for Which Environmental Qualification Is To Be Addressed" [49], 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 were assigned responsibility for the technical review of the licensees' responses to IE Bulletin 79-01B, and the task leader was assigned responsibility for the overall coordination of the review effort with NRC staff 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 23, 1980, the NRC issued Memorandum and Order CLI-80-21 [54], 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 satisfy 10CFR50, Appendix A, General Design Criteria, Section I, Criterion 4. This Order also established that the SERs 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 Guidelines or NUREG-0588 must be completed no later than June 30, 1982. The Memorandum and Order established the DOR Guidelines and NUREG-0588 as acceptable interpretations of the General

Design Criteria for an interim period. Rulemaking was proposed for the purpose of establishing a permanent interpretation of the General Design Criteria.

The staff held regional meetings with the licensees and interested parties during the week of July 13, 1980. The staff issued a second supplement to IE Bulletin 79-01B, 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 on September 29 and October 24, 1980, respectively.

In October 1980, EG&G Idaho, Inc., awarded Franklin Research Center a contract to provide assistance in the equipment environmental qualification review for 13 of the plants whose licensees responded to IE Bulletin 79-01B. The assignment was to evaluate the licensees' equipment environmental qualification submittals and to present the results in the form of a Technical Evaluation Report for each plant. The objective of this Technical Evaluation Report was to review the licensees' submittals to determine if safety-related electrical equipment was reviewed for environmental qualification in accordance with the DOR Guidelines and NUREG-0588 as required by IE Bulletin 79-01B. The NRC was to perform an audit of the qualification documentation references as part of its Safety Evaluation Program. If discrepancies were found, the audit was to be extended. The plants included within this assignment were Nine Mile Point Unit 1, Millstone Unit 2, Salem Unit 1, Browns Ferry Units 1, 2, and 3, Brunswick Units 1 and 2, Hatch Units 1 and 2, Dresden Unit 3, and Quad Cities Units 1 and 2. (This assignment was completed in June 1981.)

In mid-1981, the NRC issued SERs on environmental qualification of safety-related electrical equipment to licensees of all operating plants.

Where additional qualification information was required, the licensees were directed to respond to the NRC within 90 days of receipt of the SER.

In May 1981, under the licensing action assistance contract, NRC authorized Franklin Research Center to proceed with the review and evaluation of the environmental qualification of safety-related electrical equipment located in harsh environments, required for TMI Lessons Learned Implementation on 71 operating plants.

In July 1981, the NRC conducted extensive meetings with the nuclear industry to address concerns and questions regarding qualification of safety-related equipment. In addition, the NRC provided licensees with detailed information with respect to the format and expected content of the licensees' 90-day responses to the NRC SERs. Draft outlines of the following proposed programs were also presented to the industry: environmental qualification of equipment located in "mild" environments, seismic and dynamic qualification, and environmental qualification of mechanical equipment.

On September 23, 1981, the NRC Commissioners considered a petition (SECY-81-486) to extend the deadline for actions to be taken by licensees to achieve environmental qualification of all safety-related equipment. On September 30, 1981, the NRC Commissioners extended this deadline to the second refueling outage after March 31, 1982.

In October 1981, the NRC authorized Franklin Research Center to include within the scope of the existing EEQ assignment (TMI Lessons Learned Implementation Equipment) the evaluation of licensees' resolutions of outstanding issues related to equipment environmental qualification discussed in the NRC SERs in accordance with NRC criteria. The assignment was to review the qualification documentation and to present the results in the form of a Technical Evaluation Report for 71 operating plants. (This report was developed within the scope of this assignment.)

On January 7, 1982, the NRC Commissioners approved the issuance of the proposed rule, "Environmental Qualification of Electric Equipment for Nuclear Power Plants," for public comment. The proposed rule was published in the Federal Register (Volume 47, No. 13) dated January 20, 1982.

In February 1982, Proposed Revision 1 to Regulatory Guide 1.89, "Environmental Qualification of Electric Equipment for Nuclear Power Plants," was issued for public comment. This regulatory guide was issued to (1) reflect current NRC positions on equipment qualification and (2) provide guidelines for meeting the NRC Commissioners proposed rule on equipment qualification.

The final rule, "Environmental Qualification of Electric Equipment for Nuclear Power Plants," was subsequently issued on April 16, 1982 by the NRC (to be published in the Federal Register) to clarify and strengthen the criteria for environmental qualification of electrical equipment. The final rule is to be incorporated into 10CFR50 as Section 50.49, "Environmental Qualification of Electric Equipment for Nuclear Power Plants." The significant features of the rule are:

- o Requalification of electrical equipment in accordance with the rule will not be required for equipment qualified or being qualified in accordance with the DOR Guidelines and IE Bulletin 79-01B or NUREG-0588, provided the qualification program commenced within 90 days after the effective date of the rule.
- o The requirement to qualify equipment needed to complete one path of achieving and maintaining a cold shutdown condition has been deleted.
- o A new section has been added, covering the qualification of equipment located in mild environments.
- o The Commission deadline for actions to be taken by licensees to achieve environmental qualification of all safety-related equipment is extended to the second refueling outage after March 31, 1982.

On April 20, 1982, the NRC staff issued Generic Letter No. 82-09 [55] to all licensees, presenting the NRC's position and clarification of certain aspects of the environmental qualification requirements.

1.4 SPECIFIC ISSUE BACKGROUND

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 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 threshold 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.

On January 14, 1980, the NRC Office of Inspection and Enforcement issued the DOR 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. This Bulletin cited the DOR Guidelines as the criteria to be used in evaluating the adequacy of the safety-related electrical equipment qualification.

The NRC staff held regional meetings with the licensees and interested parties during the week of July 13, 1980. The staff issued a second supplement to IE Bulletin 79-01B, 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 on September 29 and October 24, 1980, respectively.

The NRC Office of Inspection and Enforcement performed (1) a preliminary evaluation of the Licensee's response, documented in a technical evaluation report (TER) and (2) an onsite verification inspection (March 13-14, 1980) of selected safety-related electrical equipment. The low-pressure safety injection system was inspected. The inspection verified proper installation of equipment, overall interface integrity, and manufacturer's nameplate data. The manufacturer's name and model number from the name plate data were compared to information given in the Component Evaluation Work Sheets (CES) of

the Licensee's report. The site inspection is documented in a report dated March 26, 1980. No deficiencies were noted.

On October 31, 1980 [1], Omaha Public Power District provided the NRC with an equipment environmental qualification submittal in response to IE Bulletin 79-01B for the Fort Calhoun Station.

On January 30, 1981 [3], Omaha Public Power District submitted to the NRC a revision to the previous response to IE Bulletin 79-01B.

The NRC issued a Safety Evaluation Report (SER) to Omaha Public Power District on May 29, 1981 [4].

Requests for information [57, 58, 59, 60, 61, 62] were transmitted to the NRC by FRC to obtain qualification documentation referenced by the Licensee in its submittals, TMI Action Plan information, and correlations to NUREG-0737 [2].

By letter dated August 26, 1981 [5], Omaha Public Power District transmitted to the NRC a response to the SER.

By References 8, 32, 37, and 43, Omaha Public Power District provided information requested in the FRC requests for additional information.

The Licensee provided additional qualification information in References 6, 7, 31, 35, 36, and 42.

2. NRC CRITERIA FOR ENVIRONMENTAL QUALIFICATION

2.1 CRITERIA PROVIDED BY THE NRC

The screening guidelines used to evaluate the electrical equipment environmental qualification program were:

- o DOR Guidelines, "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," November 1979 [49]
- o NUREG-0588, Revision 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981 [56].

Other appropriate references used in the review of the licensees' electrical equipment environmental qualification submittals are:

- o IE Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment," January 14, 1980; Supplement No. 1, February 29, 1980; Supplement No. 2, September 29, 1980; and Supplement No. 3, October 24, 1980 [50, 51, 52, 53]
- o NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980 [2]. This document is applicable for the selection of equipment for the evaluation of the environmental qualification of safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. The scope of the review is limited to equipment associated with specific sections of NUREG-0737 which have an installation implementation date of January 1, 1981. Where applicable, a review is to be performed on installed equipment with implementation dates after January 1, 1981 if adequately identified by the licensee.

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 screening guidelines.

2.2.1 Requirements and Applicable Criteria

Items 3 and 17 of Supplement 2 to IE Bulletin 79-01B [52] describe the application of the DOR Guidelines and NUREG-0588 to operating reactors (ORs),

near term operating license applicants (NTOLs), and construction permit applicants (CPs). The qualification requirements and applicable criteria are stated as follows:

[Question 3]

"Define the requirements and applicable criteria for ORs, NTOLs, and OLs. Specifically address the NTOLs whose CP SER is prior to July 1974 and after July 1974. Can a CP whose SER is prior to 1974 use the DOR guidelines?"

[NRC Answer to Question 3]

"Table 1 describes the application of each document. All operating reactors as of May 23, 1980, will be evaluated against the DOR guidelines. In cases where the DOR guidelines do not provide sufficient detail, but NUREG-0588 Category II does, NUREG-0588 will be used.

TABLE 1

REQUIREMENTS

ORs	OLs		CPs
	CP SER Before 7/1/74	CP SER After 7/1/74	
DOR GUIDELINES			
USE NUREG-0588 AS NECESSARY	NUREG-0588 (CAT. II)	NUREG-0588 (CAT. I)	NUREG-0588 (CAT. I) or NEW RULE WHEN IN EFFECT

REPLACEMENT COMPONENTS

USE NUREG-0588 (CAT. I)

All plants licensed after May 23, 1980, shall conform to NUREG-0588. In accordance with Regulatory Guide 1.89, all such operating licenses for facilities whose construction permit SER is dated July 1, 1974 or later, are to be reviewed against IEEE Std. 323-1974. Thus, for these licensees, the operating license applicant is to qualify equipment to the Category I column in NUREG-0588. For operating licenses issued after May 23, 1980, whose construction permit SER is dated before July 1, 1974, the operating license applicant is to qualify equipment to at least Category II column of NUREG-0588; unless the licensee made commitment in the construction permit record to use the 1974 standard, or unless the operating licensee application record indicates that the 1974 standard is to be used, in such cases Column I of NUREG-0588 is to be used.

While there are differences between the Category II column of NUREG-0588 and the DOR guidelines, the differences are in details and in the

optional part of the documents. The minimum requirements set forth by these documents are general and compatible. Thus, the minimum standards set by either of the two documents are equally applicable to ORs and NTOLs."

[Question 17]

"Define the requirements for 'replacement parts.' Are they the same for 'spare' parts? Clearly discuss the alternatives for existing inventories of parts/components. If equipment is ordered to meet IEEE Std. 323-1974 standard but lead time exceeds June 1982, can we use IEEE Std. 323-1971 qualified components in the interim?"

[NRC Answer to Question 17]

"The requirements for 'replacement' and 'spare' parts are the same for the purposes of complying with the Commission order and memorandum. After May 1980, all parts used to replace presently installed parts shall be qualified to Category I of NUREG-0588 'unless there are sound reasons to the contrary.' Nonavailability and/or the fact that the part to be used as a replacement is a spare part purchased prior to May 23, 1980, and is in stock are among the factors to be considered in weighing whether there are 'sound reasons to the contrary.' All replacement parts shall as a minimum conform to the requirements described in the answer to question 3. Justification for deviation from Category I of NUREG-0588 shall be documented by the licensee and records shall be available for audit, upon request by the NRC."

2.2.2 Application of Requirements and Criteria to TMI Lessons Learned Implementation Equipment

The NRC requested an evaluation of the environmental qualification of safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation in accordance with criteria established by the NRC in a manner identical to the evaluation of all other safety-related electrical equipment. Additionally, Item 21 of Supplement 2 to IE Bulletin 79-01B [52] states:

"TMI Lessons Learned instrumentation will be considered in the February 1, 1981 SER. This equipment is subject to the same requirements as other safety-related electrical equipment. The guidance and requirements of NUREG-0588 referenced daughter standards, and Reg Guides will be used by the staff in assessing the adequacy of the qualification information."

Item 2 of Supplement 3 to IE Bulletin 79-01B [53] states:

"IEB 79-01B required a 90 day response which was due in mid-April 1980. Supplement 1 (Feb. 1980) informed licensees that equipment which was

'planned' to be installed as a result of lessons learned need not be addressed in that response. Some of this equipment has since been installed. Supplement #2 (Q.5, Q.21) identified that the staff position was that equipment which is installed should be treated in a manner similar to all other safety-related electrical equipment and be addressed in the November 1, 1980 submittal. This position represents no change in staff position regarding the scope of the review. However, since the staff position on this issue was unclear the following will apply:

- a. Qualification information for installed TMI Action Plan equipment must be submitted by February 1, 1981.
- b. Qualification information for future TMI Action Plan equipment (ref. NUREG-0737, when issued), which requires NRC pre-implementation review, must be submitted with the pre-implementation review data.
- c. Qualification information for TMI Action Plan equipment currently under NRC review should be submitted as soon as possible.
- d. Qualification information for TMI Action Plan equipment not yet installed which does not require pre-implementation review should be submitted to NRC for review by the implementation date."

2.2.3 Equipment Not in the Scope of the Qualification Review

Supplement 2 of IE Bulletin 79-01B [52] 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 high energy line break (HELB) or to nuclear radiation emanating from circulation of fluids containing radioactive substances. Supplement 3 of IE Bulletin 79-01B [53] permits deferment of the review of environmental qualification for all equipment required to achieve and maintain the plant in a cold shutdown condition. Supplements 2 and 3 of 79-01B originally permitted deferment until after February 1, 1981 of the qualification review of equipment located in a mild environment or required to achieve and maintain the plant in a cold shutdown condition. Since the issuance of Supplements 2 and 3, the NRC has determined that the review of environmental qualification for this equipment is not within the scope of the present review program.

2.2.4 Clarification of Qualification Requirements

2.2.4.1 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 [52], "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, the peak temperature, and subsequent temperature/pressure profiles as functions of time. If containment spray is to be used, the impact of the spray on required equipment should be assessed.

The adequacy of a plant-specific profile depends 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 loss-of-coolant accident (LOCA) and HELB accidents inside containment.

2.2.4.2 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 IE Bulletin 79-01B [52] 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.

2.2.4.3 Simulated Service Conditions and Test Duration (DOR Guidelines Section 5.2.1)

The Guidelines require that the test chamber environment envelop the required service conditions for a time equal to the period from the initiation of the accident until the service conditions return to normal. Supplement 2 to IE Bulletin 79-01B [52] 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."

2.2.4.4 Test Sequence (DOR Guidelines Section 5.2.3)

Supplement 2 to IE Bulletin 79-01B [52] provides the following additional criteria:

"Sequential testing requirements are specified in NUREG-0588 and the DOR Guidelines. Licensees must follow the test requirements of the applicable document.

1. If the test has been completed without aging in sequence, justification for such a deviation must be submitted.
2. If testing of a given component has been scheduled but not initiated, the test sequence/program should be modified to include aging.
3. 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."

2.2.4.5 Radiation

(DOR Guidelines Sections 4.1.2, 4.2.2, and 4.3.2, Subitem 2)

Supplement 2 to IE Bulletin 79-01B [52] provides the following additional criteria:

"Both the DOR Guidelines and NUREG-0588 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 of 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 licensee must ensure consideration is given to those events which provide the most bounding conditions. The following table summarizes these considerations:

	<u>LOCA</u>	<u>Non-LOCA HELB</u>
Outside Containment	NUREG-0578 (100/50/1 in RCS) [*]	NUREG-0588 (10/10/0 in RCS)
Inside Containment	<u>Larger of</u> NUREG-0588 (100/50/1 in containment)	NUREG-0588 (10/10/0 in RCS)
	or NUREG-0578 (100/50/1 in RCS)	

*The numbers in parentheses represent % noble gases/% iodine/% particulates. RCS means reactor coolant system.

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 qualification of safety-related equipment. Cesium 137 may also be used."

2.2.5 Additional Clarification of Qualification Requirements

The NRC has worked with a number of licensees, at their requests, to provide further clarification on environmental qualification requirements. On January 20, 1982, the NRC issued Generic Letter No. 82-09 [55] presenting staff positions on certain aspects of the qualification requirements. Generic Letter No. 82-09 states:

"1. Operator Display Instrumentation

- Q. Given the interrelated activities associated with display instrumentation (e.g., NUREG-0700, NUREG-0799, proposed Regulatory Guide 1.97 and Equipment Qualification efforts), what display instrumentation referenced in emergency operating procedures must be identified in licensee submittal to the NRC?
- A. All display instrumentation referenced in the emergency procedures need not be identified. The NRC requires that licensees need only identify and have available qualification documentation on those operator display instruments which are safety-related (see Question 2). If licensees have previously supplied a listing of all display instrumentation referenced in emergency procedures, licensees may identify (such as by the use of an *) which of those instruments are safety-related. The staff will defer review of the basis for this safety-related classification until other NRC activities¹ have been implemented. When these other activities are implemented, additional instruments presently not requiring qualification may require upgrading to a safety-related status and/or may require qualification. Licensees will be required at that time to qualify this instrumentation in accordance with the following criteria:
 - o For new or upgraded instrumentation with a required operation date prior to the equipment qualification deadline, qualification must be accomplished by the equipment qualification deadline.

¹Such activities include preparation of new emergency procedures (NUREG-0799), control room design reviews (NUREG-0700), and upgrading of accident monitoring instrumentation (Reg. Guide 1.97 and NUREG-0737).

- o For new or upgraded instrumentation with a required operation date after the equipment qualification deadline, qualification must be accomplished prior to equipment operation and plant acceptance.

2. Safety-Related Equipment

- Q. For Equipment Qualification purposes, what constitutes all safety-related electrical equipment?
- A. The Commission, in CLI-80-21, required the environmental qualification of only safety-related electrical equipment. Identification of the safety-related equipment installed at specific plants can be obtained from FSARs, Technical Specifications and other docketed correspondence setting forth NRC requirements or licensee commitments. Identification of safety-related equipment installed in harsh environments at specific plants must be supplied by the licensee. The necessity for upgrading nonsafety-related system to safety-related status will be the subject of other NRC reviews.

3. Replacement Parts

- Q. Please clarify the NRC requirements on replacement parts.
- A. In CLI-80-21, the Commission stated that unless there were sound reasons to the contrary, replacement equipment should be qualified to the standards set forth in Category I of NUREG-0588. The Commission's position was designed to promote the policy of upgrading the environmental qualification and reliability of installed safety-related electrical equipment. To meet this overall goal, licensees must institute internal policy practices consistent with the Commission's statement.

Situations may arise in which upgrading to NUREG-0588, Category I of replacement equipment qualified to NUREG-0588, Category II or the DOR Guidelines will not be compatible with overall station safety and performance goals. Licensees must review such situations on a case-by-case basis and determine that 'sound reasons to the contrary' do, in fact, exist which warrant the use of replacement equipment (not necessarily in-kind) qualified to the DOR Guidelines or NUREG-0588, Category II. For equipment located in a harsh environment, licensees' procedures must provide for documentation and substantiation of such determinations.

Conditions which reflect sound reasons why qualification standards for replacement of equipment in a harsh environment need not be upgraded to NUREG-0588, Category I include the following:

1. The licensee has replacement equipment in stock that meets the DOR Guidelines or NUREG-0588, Category II, and procurement actions regarding such replacement equipment had commenced prior to May 23, 1980.
2. Replacement equipment qualified to the NUREG-0588, Category I standards does not exist.
3. Replacement equipment qualified to the NUREG-0588, Category I standards is not available to meet installation and operation schedules. Equipment qualified to the DOR Guidelines or NUREG-0588, Category II may be used for an interim period until Category I equipment is obtained and an outage of sufficient duration is available for replacement. Justification for use of the non-Category I qualified replacement equipment beyond this interim period must be submitted to the NRC for approval prior to the end of the interim period and in sufficient time for reasonable NRC review.
4. Replacement equipment qualified to NUREG-0588, Category I standards would require significant plant modifications to accommodate its use.
5. Operating performance and reliability data for the Category I equipment indicates poor overall equipment performance. For example, mean time to failure is significantly shorter for the Category I replacement equipment.
6. The use of replacement equipment qualified to NUREG-0588, Category I standards has a significant probability of creating human factor problems that will negatively affect plant safety and performance, e.g., (1) knowledge, skills and ability of existing plant staff require significant upgrading to operate or maintain the specific Category I replacement equipment; (2) the use of equipment qualified to Category I standards creates a one-of-a-kind application; or (3) maintenance, surveillance or calibration activities are unnecessarily complex.

5. Submergence Outside Containment

- Q. For equipment qualification purposes, what are the staff requirements concerning submergence of equipment outside containment?

- A. The Staff requires that the licensee submit documentation on the qualification of safety-related equipment that could be submerged due to a high energy line break outside containment.

6. Radiation

- Q. Is the staff screening value of 4×10^7 rads applicable to all operating reactors?
- A. No. This screening value is applicable only to PWRs with dry type containments. However, for PWRs with dry type containments, the licensee may choose to use plant specific analysis instead of the screening value. For plants with other containment types, the licensee must use plant specific analysis.

Acceptable to the Staff for equipment qualification purposes are radiation values developed as part of the plant licensing process provided that they are based on the TID14844 source terms and are conservatively performed. In order to assure that the methodologies are appropriate, the Staff requests two component specific sample calculations (one for inside and one for outside containment), and a brief written description of each of the methodologies used, their application and associated conservatism. Such sample calculations and a statement by the licensee that the values of radiation exposure of components so derived are appropriate for environmental qualification of equipment will satisfy the Staff's concern on the 'Radiation Specification Value' used during the qualification reviews.

7. Containment Service Conditions

- Q. Must the Staff value (identified in the SERs) of T_{SAT} for PWRs and $T_{SAT} + 20^\circ F$ for BWRs be used as the maximum in-containment temperature for the purpose of equipment qualification?
- A. No. The Staff will accept the use of these values. However, an acceptable alternative to the NRC staff's temperature criterion used for the service conditions must base that service condition on the FSAR analysis or other NRC approved analysis, provided that the specific analysis, or a summary of that analysis, together with reference to the previous NRC acceptance of the analysis is submitted by the licensee. In addition, some of the information in the associated safety evaluation may require clarification.

8. One Hour Minimum Operating Time

- Q. The Staff has previously indicated that certain exceptions to the one hour minimum operating time rule are permitted. Can further clarification be provided?

- A. With regard to plants subject to the qualification requirements of the DOR Guidelines or Category II of NUREG-0588, for those pieces of equipment tested prior to May 23, 1980, the test data and analysis may be used to qualify the equipment to the required operating time plus an appropriate margin. The one hour margin requirement need not be applied. However, subsequent failures should be shown not to be detrimental to plant safety.

The one hour time margin rule is not applicable to equipment whose safety function is performed prior to significant changes in the environment at the equipment location.

9. Aging

- Q. Must a qualified life be developed for all safety-related electrical equipment located in harsh environments?
- A. Section 7 of the DOR Guidelines and Section 4.2, Category II of NUREG-0588, do not require a qualified life to be established for all safety-related electrical equipment located in harsh environments. A qualified life, in accordance with the provisions in IEEE 323-1974, is required for equipment, including replacement parts, qualified to Category I of NUREG-0588 that is located in a harsh environment.

An acceptable method for addressing in-service degradation is through a preventive maintenance/surveillance program with equipment and component refurbishment and/or replacement based on known susceptibility to aging degradation, the results of inspections, or manufacturers recommendations. These elements of the program lead to an understanding on a device specific basis of the nature and extent of the increased stress levels encountered during Design Basis Accidents and resultant degradation (if any) which may occur. Arrhenius or other appropriate accelerated aging methodologies may be used to establish replacement and refurbishment schedules if the component's design and materials application are sufficiently simple and the necessary data are available to allow a meaningful application.

In plants subject to the qualification requirements of either the DOR Guidelines or NUREG-0588 Category II, for equipment that has been identified as being susceptible to significant degradation due to thermal and radiation aging, the schedule for inspection of and/or replacement of the susceptible components in that equipment must be incorporated into the preventive maintenance and surveillance programs, and that information should be incorporated into the system component evaluation worksheets (SCEWS). For other equipment, the aging column in the SCEWS should be marked 'No Known Susceptibility'."

3. METHODOLOGY USED FOR THE EVALUATION

3.1 INTRODUCTION

As discussed in Section 1.3 of this report, the NRC issued Safety Evaluation Reports (SERs) on environmental qualification of safety-related equipment to licensees of all operating plants in mid-1981.

The SERs identified various equipment qualification deficiencies as indicated below:

LEGEND: DESIGNATION FOR DEFICIENCY

R - Radiation	M - Margin
T - Temperature	I - HELB Evaluation Outside Containment Not Completed
QT - Qualification Time	QM - Qualification Method
RT - Required Time	RPN - Equipment Relocation or Replacement, Adequate Schedule Not Provided
P - Pressure	EXN - Exempted Equipment Justification Inadequate
H - Humidity	SEN - Separate Effects Qualification Justification Inadequate
CS - Chemical Spray	QI - Qualification Information Being Developed
A - Material Aging Evaluation, Replacement Schedule, Ongoing Equipment Surveillance	RPS - Equipment Relocation or Replacement Schedule Provided
S - Submergence	
(R) - Licensee has committed to replace equipment	

The SERs directed licensees to "either provide documentation of the missing qualification information which demonstrates that safety-related equipment meets the DOR Guidelines or NUREG-0588 requirements or commit to a corrective action (re-qualification, replacement [etc.]) to establish qualification by June 30, 1982." Licensees were required to respond to the NRC within 90 days of receipt of the SER.

As stated in Section 1.1, the purpose of this report is (1) to evaluate licensees' resolutions of outstanding issues related to safety-related electrical equipment environmental qualification (EEQ) discussed in the NRC's SERs in accordance with NRC criteria, and (2) to evaluate licensees' qualification documentation of safety-related electrical equipment, including

TMI Lessons Learned Implementation equipment, located in harsh environments in accordance with criteria established by the NRC (see Section 2 of this report). The methodology used to evaluate (1) the Licensee's response to the NRC SER and (2) the equipment environmental qualification is presented herein.

3.2 METHODOLOGY

The Licensee, Omaha Public Power District, provided a response to the SER and additional qualification information in its submittals [5, 6, 7, 8, 31, 32, 35, 36, 37, 42, 43] to the NRC for the Fort Calhoun Station.

The following bases provided by the NRC were used to determine the relative completeness of the Licensee's submittals:

- o Determine whether the Licensee provided specific responses to the SER concerns.
- o Determine whether the Licensee proposed corrective actions and a schedule for completion of the actions.
- o Determine whether the Licensee addressed the NRC's concern for margin with respect to the containment environmental conditions.
- o Determine whether the Licensee revised the environmental parameters.
- o Determine whether the Licensee's System Component Evaluation Work Sheets (SCEWS) were updated to correct deficiencies and add supplemental information.
- o Determine whether the Licensee provided justifications for interim operation for all unqualified equipment.
- o Determine whether the Licensee addressed aging and incorporated the results into the equipment maintenance program.

The extensive list of safety-related electrical equipment* in various locations of the plant identified by the Licensee was analyzed, and all identical equipment located within plant areas that are exposed to the same environmental service conditions was grouped together and designated an

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

"equipment item." In this report, the term "equipment item" refers to a specific type of electrical equipment, designated by manufacturer and model, which is representative of all identical equipment in a plant area exposed to the same environmental service conditions (e.g., Flow Transmitter, Fischer & Porter, Model 10B2496, located within containment). This analysis resulted in a reduced listing of equipment (equipment items) that formed the basis for the review.

Appendix A contains the environmental service conditions for each location. Appendix B contains the tabulation of the equipment items, locations, function, plant identification numbers, required operating time, and applicable qualification documentation references. Appendix C lists the plant systems identified by the Licensee and the NRC as being essential to safety.

Each item in the list of safety-related electrical equipment items was reviewed in relation to:

- o the Licensee's response to the SER concerns
- o technical information received from the Licensee as a result of requests for additional information (Appendix E)
- o technical data derived from the Licensee's submittal
- o NRC DOR Guidelines or NUREG-0588 Revision 1 criteria
- o the Licensee's definition of harsh service environments (Appendix A)
- o documentation cited by the Licensee as evidence of qualification
- o applicable and available qualification documentation associated with the overall equipment environmental qualification program
- o the Licensee's analysis and/or justification of qualification
- o Licensee-proposed corrective action for qualification deficiencies
- o the Licensee's equipment/part replacement schedules
- o the Licensee's technical arguments concerning the adequacy of equipment, based on system operational considerations
- o the Licensee's rationale concerning exemption of equipment from qualification.

Topics not within the scope of the evaluation are:

- o completeness of the Licensee's listing of safety-related equipment
- o acceptability of Licensee-provided environmental service conditions.

The NRC requested an evaluation of the environmental qualification of safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. The objective is to evaluate qualification documentation of equipment within the scope of IE Bulletin 79-01B, Supplement 3 (item 2), in accordance with criteria established by the NRC (see Section 2 of this report) in a manner identical to the evaluation of all other safety-related electrical equipment. The scope of this review is limited to TMI Action Plan equipment associated with those sections of NUREG-0737 which have an equipment installation implementation date of January 1, 1982 (sections are identified below). Where applicable, a review was to be performed on installed equipment with implementation dates after January 1, 1981 if adequately identified by the licensee.

II.B.3 (ALL/1-1-81) Post-Accident Sampling Capability of Reactor Coolant and Containment

II.D.3 (ALL/1-1-81) Direct Indication of Relief and Safety Valve Position

II.E.1.2 (PWR/1-1-81) Auxiliary Feedwater System Automatic Initiation and Flow Indication

II.E.3.1 (PWR/1-1-81) Emergency Power Supply for Pressurizer Heaters (Safety-Grade Interfaces)

II.E.4.1 (ALL/7-1/81) Dedicated Hydrogen Penetrations

II.E.4.2 (ALL/1-1-81) Containment Isolation Dependability

II.F.2 (PWR/1-1-81) Instrumentation for Detection of Inadequate Core Cooling

II.G.1 (PWR/1-1-81) Emergency Power for Pressurizer Equipment (Safety-Grade Interfaces)

II.K.2.10 (PWR/B&W/7-1-81) Safety-Grade Anticipatory Reactor Trip

II.K.3.9 (PWR/W/1-1-81) PID Controller Modification (If Hardware Change Involved)

- II.K.3.12 (PWR/W/1-1-81) Anticipatory Reactor Trip upon Turbine Trip
- II.K.3.13 (PWR/GE/7-1-81) Separation of HPCI and RCIC Initiation Signals
- II.K.3.15 (BWR/GE/7-1-81) Prevention of Spurious Isolation of HPCI and RCIC Systems
- II.K.3.19 (BWR/GE/7-1-81) Interlock on Recirculation Pump Loop
- II.K.3.21 (BWR/GE/7-1-18) Restart of Core Spray and LPCI Systems (If Hardware Changed Out)
- II.K.3.27 (BWR/GE/7-1-81) Provide Common Reference Level for Vessel Level Instrumentation (If Hardware Changed Out)

Licensees whose plants were included within the NRC Systematic Evaluation Program received a Technical Evaluation Report (TER) in addition to the SER. The TER was based on a review of equipment environmental qualification documentation associated with the Licensee's EEQ submittals. The qualification deficiencies identified in the SER were derived from the TER. Plants included within this program were the Palisades, Oyster Creek, Ginna, Haddam Neck, Yankee Rowe, LaCrosse, and Big Rock Point plants and Zion Station Units 1 and 2, Indian Point Units 2 and 3, Millstone Unit 1, Dresden Unit 2, and San Onofre Unit 1. For these plants, the evaluation presented herein is based on (1) the result of the initial TER, (2) the Licensee's response to the NRC SER and the TER, and (3) the Licensee's updated EEQ submittal(s).

TERs were also developed for the following plants: Nine Mile Point Unit 1, Millstone Unit 2, Salem Unit 1, Browns Ferry Units 1, 2, and 3, Brunswick Units 1 and 2, Hatch Units 1 and 2, Dresden Unit 3, and Quad Cities Units 1 and 2. The objective of those TERs was to review the Licensee's submittals to determine if safety-related electrical equipment was reviewed for environmental qualification by the Licensee in accordance with the DOR Guidelines and NUREG-0588 as required by IE Bulletin 79-01B. For these 13 plants and all other plants, excluding the 14 plants associated with the Systematic Evaluation Program, the evaluation presented herein is based solely on (1) the Licensee's response to the NRC SER and (2) the Licensee's revised EEQ submittal(s).

This technical evaluation was conducted to identify (1) whether the Licensee provided an adequate response to the SER concerns (and TER concerns,


where applicable), (2) major deficiencies within the equipment qualification program, and (3) whether the Licensee proposed adequate corrective actions to resolve qualification deficiencies and provided a schedule for completion of the corrective actions. The TER was written primarily to address deviations from the NRC criteria and requirements. Technical data or test results that satisfy the qualification criteria are not discussed herein.

The evaluation presented in Section 4 of this report includes completed equipment environmental qualification review checksheets (partially handwritten) which compile both the technical information necessary to conduct the review and the results of the evaluation. Parameters listed on these checksheets were derived from the appropriate NRC screening criteria. The evaluation of each equipment item includes several checksheet pages. Only those checksheet pages necessary to complete the evaluation for each equipment item are included in this report. A complete listing of the checksheet pages is shown on the bottom of Checksheet 1a, reproduced here as Figure 3-1.

The checksheets contain the following information:

- o Equipment item information (see Figure 3-1), for example:
 Solenoid Valve Located in Turbine Building (Area #7)
 Automatic Switch Co. (ASCO) Model LB8300B61U
 Actuates Feedwater Control Valves (V-4269, V-4270)
 Licensee Reference 839
 Required Operating Time: Short term (SI signal)
 TER Checksheet No. 1
 Reference 59, Section 4.5.2.6
 Licensee Submittal: Page 9 [62]; Table 3, Page 1 [1]; SCEW 1
- o Qualification deficiencies identified in the SER (see Figure 3-1)
- o Licensee's response to the SER
- o Licensee's statements and rationale for qualification
- o Licensee's corrective action and replacement schedule
- o Evaluation of qualification including identification of all deficiencies
- o Evaluation of system considerations presented by the Licensee as a rationale for excluding equipment from qualification.

The results of the evaluation are summarized on Checksheet 2 (Equipment Environmental Qualification Summary Form) for each equipment item. Checksheet

 <p>Franklin Research Center A Division of The Franklin Institute 20th and Race Streets, Phila., Pa. 19103 (215) 448-1000</p>	<p>NRC Contract No. NRC-03-79-118 FRC Project No. C5257 FRC Assignment No. 13 FRC Task No. _____</p>	<p>Page 1a</p>
<p>EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. ____</p>		

Equipment Item No. 1
Solenoid Valves Located in Turbine Building (Area #7)
Automatic Switch Co. (ASCO) Model LB8300B61U
Actuates Feedwater Control Valves (V-4269, V-4270)
Licensee Reference 1617
Required Operating Time: Short term (SI signal)
TER Checksheet No. 1
Reference 59, Section 4.5.2.6
Licensee Submittal: Page 9 [62]; Table 3, Page 1 [1]; FRC SCEW 1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, Q1, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c

Figure 3-1. Sample Checksheet Page 1a
"Equipment Item"

2 specifically identifies any qualification deficiencies determined by the evaluation and identifies the NRC qualification category to which the equipment item was assigned. A sample Checksheet 2 is presented in Figure 3-2.

All information was reviewed for conformance to the NRC criteria referenced in Section 2 of this report. As requested by the NRC, all applicable and available qualification documentation associated with the overall Equipment Environmental Qualification (EEQ) program was used by the reviewers, whether referenced by the Licensee or not.

Upon completion of the review for each equipment item, an overall evaluation of the component and a specific conclusion with respect to its qualification was developed. Based on the evaluation, each equipment item was assigned to one of the generic qualification categories provided by the NRC. The NRC category descriptions are presented in Section 3.3 of this report.

3.3 NRC QUALIFICATION CATEGORIES AND DEFINITIONS

o NRC Category I.a


EQUIPMENT THAT SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES OR NUREG-0588, OR HAS ACCEPTABLE DEVIATIONS FROM THE DOR/NUREG CRITERIA

This category includes equipment items which are fully acceptable on the basis that all applicable criteria defined in the DOR Guidelines or NUREG-0588 are (1) satisfied and the equipment has been found to be qualified or (2) sufficient information has been presented to determine that deviations from the criteria are acceptable or insignificant.

o NRC Category I.b

EQUIPMENT FOR WHICH DEVIATIONS FROM THE DOR GUIDELINES OR NUREG-0588 ARE JUDGED CONDITIONALLY ACCEPTABLE PROVIDED THAT SPECIFIC MODIFICATIONS ARE MADE

This category includes equipment items that do not satisfy one or more of the applicable criteria defined in the DOR Guidelines or NUREG-0588; however, the Licensee has stated that specific modifications will be made on or before a designated date. This equipment is considered by NRC to be conditionally acceptable provided that the specific modifications are made by the Licensee. When the modifications are completed as proposed, the Licensee states that the equipment will satisfy all applicable NRC requirements. Examples of specific modifications are (1) replacement of unqualified equipment with qualified equipment, (2) equipment hardware

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<p>EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. ____</p>		

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
 Adequate Similarity Between Equipment and Test Specimen Established _____
 Aging Degradation Evaluated Adequately _____
 Qualified Life or Replacement Schedule Established (If Required) _____
 Program Established to Identify Aging Degradation _____
 Criteria Regarding Aging Simulation Satisfied (If Required) _____
 Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
 Criteria Regarding Spray Satisfied _____
 Criteria Regarding Submergence Satisfied _____
 Criteria Regarding Radiation Satisfied _____
 Criteria Regarding Test Sequence Satisfied _____
 Criteria Regarding Test Failures or Severe Anomalies
 (If Any) Satisfied _____
 Criteria Regarding Functional Testing Satisfied _____
 Criteria Regarding Instrument Accuracy Satisfied _____
 Test Duration Margin (1 hour + Function Time) Satisfied _____
 Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
 I.b Equipment Qualification Pending Modification _____
 II.a Equipment Qualification Not Established _____
 II.b Equipment Not Qualified _____
 II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
 III.a Equipment Exempt From Qualification _____
 III.b Equipment Not in the Scope of the Qualification Review _____
 IV Documentation Not Made Available _____

Figure 3-2. Sample Checksheet Page 2

"Equipment Environmental Qualification Summary Form"

modification, (3) equipment relocation above submergence level, (4) relocation or shielding of equipment from radiation source, (5) verification of qualification by additional testing, (6) equipment relocation to a mild environment, and (7) qualification testing of equipment in progress.

o NRC Category II.a

EQUIPMENT FOR WHICH QUALIFICATION DOCUMENTATION IS INSUFFICIENT TO ESTABLISH THAT THE EQUIPMENT IS OR IS NOT QUALIFIED IN ACCORDANCE WITH THE DOR GUIDELINES OR NUREG-0588

The qualification of equipment items in this category, in accordance with the requirements of the DOR Guidelines or NUREG-0588, is significantly deficient or inconclusive based upon review of (1) the documentation provided by the Licensee or (2) applicable and available qualification documentation associated with the overall equipment environmental qualification program. The qualification documentation indicates significant deficiencies, which can be categorized as follows: (1) appropriate documentation reflecting qualification has not been cited and made available for review by the Licensee and there is no knowledge of applicable documentation; (2) the Licensee is awaiting qualification from the equipment vendor; or (3) the qualification documentation indicates significant deficiencies; however, where testing was conducted, no reported failures or severe anomalies were observed which would unquestionably affect the ability of the equipment to perform its design basis safety function(s).

o NRC Category II.b

EQUIPMENT THAT IS UNQUALIFIED

This category includes equipment items whose qualification documentation has been judged to be seriously deficient based upon review of (1) the documentation provided by the Licensee, or (2) applicable and available qualification documentation associated with the overall equipment environmental qualification program. The qualification documentation indicates serious deficiencies reported during testing; for example, severe anomalies or failure of the test specimen, which could affect the ability of the equipment to perform its safety function. NRC has requested immediate written notification when an equipment item is placed in this category during the course of the review.

o NRC Category II.c

EQUIPMENT THAT SATISFIES ALL APPLICABLE REQUIREMENTS OF THE DOR GUIDELINES OR NUREG-0588 WITH THE EXCEPTION OF QUALIFIED LIFE

This category includes equipment items that are acceptable on the basis that all applicable criteria defined in the DOR Guidelines or NUREG-0588 are satisfied with the exception of the qualified life criterion. The Licensee (1) has not evaluated qualified life or replacement schedule, (2) has not adequately evaluated qualified life or replacement schedule, or (3) has not adequately interpreted qualified life in terms of calendar time. [Note: The component replacement schedule discussed in Section 7.0 of the

DOR Guidelines is, in effect, a qualified life. It is not essential to use the term "qualified life," but the replacement schedule must be justified.]

o NRC Category III.a
EQUIPMENT THAT IS EXEMPT FROM QUALIFICATION

This category includes equipment items that are exempt from qualification on the basis that (1) the equipment does not provide a safety function (i.e., should not have been included in the equipment list submitted by the Licensee), or (2) the specific safety-related function of the equipment can be accomplished by some other designated equipment that is fully qualified and satisfies the single failure criterion. In addition, any failure of the exempt equipment must not mislead the operator or degrade the ability of qualified equipment to perform its required safety-related function.

o NRC Category III.b
EQUIPMENT NOT IN THE SCOPE OF THE QUALIFICATION REVIEW

This category includes equipment items addressed by the Licensee in the equipment environmental qualification submittals which are (1) required to achieve and maintain the plant in a cold shutdown condition or (2) located in a mild environment. Supplement 2 of IE Bulletin 79-01B 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 high energy line break (HELB) or to nuclear radiation emanating from circulation of fluids containing radioactive substances. Supplement 3 of IE Bulletin 79-01B permits deferment of the review of environmental qualification for all equipment required to achieve and maintain the plant in a cold shutdown condition. Supplements 2 and 3 of IE Bulletin 79-01B originally permitted deferment until after February 1, 1981 of the qualification review of equipment located in a mild environment or required to achieve and maintain the plant in a cold shutdown condition. Since the issuance of Supplements 2 and 3, the NRC has determined that the review of environmental qualification for this equipment is not within the scope of this report.

o NRC Category IV
EQUIPMENT FOR WHICH QUALIFICATION DOCUMENTATION HAS NOT BEEN MADE AVAILABLE FOR REVIEW

This category includes equipment items for which qualification documentation in accordance with the requirements of the DOR Guidelines or NUREG-0588 has been cited by the Licensee as evidence of qualification; however, this documentation has not been made available for review. Therefore, a conclusion cannot be reached with respect to qualification of this equipment.

3.4 IMPLEMENTATION GUIDE FOR FULFILLING NRC CRITERIA

The NRC has requested that a detailed implementation guide for fulfilling NRC criteria be prepared as part of this assignment. The implementation guide will present a fully detailed discussion of the principal qualification criteria presented in the DOR Guidelines and NUREG-0588. The primary emphasis will be to clarify technical points, eliminate possible misconceptions, and clearly provide definitive guidance to enable licensees to understand and resolve, in an expeditious manner, qualification deficiencies identified as a result of this TER. The implementation guide (TER-C5257-532) has been prepared and issued to the NRC. The implementation guide is either appended to this TER or will be forwarded to the Licensee by the NRC under a separate letter. The Licensee is encouraged to review that document.

4. TECHNICAL EVALUATION

4.1 INTRODUCTION

The technical evaluation presented in this section represents the equipment environmental qualification (EEQ) assessment for each equipment item listed in Appendix B in accordance with the methodology presented in Section 3 of this report. The evaluations were conducted to identify any major deficiencies within the Licensee's equipment qualification program and to determine whether the Licensee (1) provided an adequate response to the SER concerns, (2) proposed adequate corrective actions to resolve qualification deficiencies, and (3) provided a schedule for completion of the corrective actions.

The evaluations are based on the available qualification documentation provided by the Licensee, complemented in several cases by other relevant technical information. The major qualification deficiencies that have been identified and the results of the evaluation are shown in the Equipment Environmental Qualification Summary Forms (Tables 4-1, 4-2, 4-3, and 4-4) presented in Section 4.2.

Observations concerning the Licensee's qualification methodology presented in response to the NRC SER are presented in Section 4.3.

Technical evaluations of the environmental qualification of the equipment items are presented in Section 4.4.

4.2 SUMMARY OF THE EVALUATION

The following tabulations represent a summary of the results of the equipment environmental qualification evaluation conducted in accordance with the methodology presented in Section 3.

Table 4-1 summarizes the number of equipment items assigned to each NRC qualification category as a result of the evaluation.

Table 4-2 summarizes the number of equipment items found to have a specific qualification deficiency.

Table 4-3 summarizes the number of equipment items for which the Licensee has proposed a specific corrective action to resolve a qualification deficiency.

Table 4-4 consists of Equipment Environmental Qualification Summary Forms for the equipment items, identifying (1) compliance with the qualification requirements defined in Section 2, (2) the resultant NRC qualification category, and (3) the Licensee-proposed corrective action.

TABLE 4-1

NUMBER OF EQUIPMENT ITEMS IN EACH QUALIFICATION CATEGORY

NRC CATEGORY	CATEGORY DESCRIPTION	NUMBER OF EQUIPMENT ITEMS
I.A	EQUIPMENT QUALIFIED----- [EQUIPMENT ITEM NO(S).: 7, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 30, 49, 52, 79, 90, 93,101,102,105,114]	23
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION----- [EQUIPMENT ITEM NO(S).: 5, 6, 72, 73, 75, 76, 81, 95]	8
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED----- [EQUIPMENT ITEM NO(S).: 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 20, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 48, 53, 63, 82, 85, 87, 88, 89, 91, 92, 96, 97, 99, 100,103,106,108]	40
II.B	EQUIPMENT NOT QUALIFIED-----	0
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED----- [EQUIPMENT ITEM NO(S).: 50, 51, 54, 55, 56, 57, 58, 59, 60, 61, 66, 67, 68, 69, 70, 71, 74, 77, 78, 80, 86,104,107,109,110,111,112,113]	28
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION----- [EQUIPMENT ITEM NO(S).: 46, 47, 62, 64, 65, 83, 98, 98]	7
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW----- [EQUIPMENT ITEM NO(S).: 94]	1
IV	DOCUMENTATION NOT MADE AVAILABLE----- [EQUIPMENT ITEM NO(S).: 84]	1
TOTAL		114

TABLE 4-2

QUALIFICATION DEFICIENCY SUMMARY

NRC REQUIREMENT	NUMBER OF DEFICIENT EQUIPMENT ITEMS
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE----- [EQUIPMENT ITEM NO(S).: 6, 8, 9, 10, 11, 12, 13, 14, 20, 32, 33, 48, 63, 72, 73, 75, 76, 81, 84, 91, 95, 96, 97]	23
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED----- [EQUIPMENT ITEM NO(S).: 3, 4, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 45, 53, 54, 82, 97, 100, 103, 106, 108]	24
3. AGING DEGRADATION EVALUATED ADEQUATELY----- [EQUIPMENT ITEM NO(S).: 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 85, 86, 87, 88, 89, 92, 99, 104]	25
4. QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)----- [EQUIPMENT ITEM NO(S).: 1, 2, 3, 4, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 85, 86, 87, 88, 89, 92, 99, 104]	29
5. PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION-----	0
6. CRITERIA REGARDING AGING SIMULATION (IF REQUIRED)----- [EQUIPMENT ITEM NO(S).: 41, 42, 43, 104]	4
7. CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:	
A. - PEAK TEMPERATURE ADEQUATE-----	0
B. - PEAK PRESSURE ADEQUATE-----	0
C. - DURATION ADEQUATE----- [EQUIPMENT ITEM NO(S).: 1, 2, 4, 44, 45, 45]	5

Table 4-2 (Cont.)

TABLE 4-2
 QUALIFICATION DEFICIENCY SUMMARY

NRC REQUIREMENT	NUMBER OF DEFICIENT EQUIPMENT ITEMS
D. - REQUIRED PROFILE ENVELOPED ADEQUATELY----- [EQUIPMENT ITEM NO(S).: 44, 45]	2
E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE----- [EQUIPMENT ITEM NO(S).: 14]	1
8. CRITERIA REGARDING SPRAY SATISFIED----- [EQUIPMENT ITEM NO(S).: 44, 45]	2
9. CRITERIA REGARDING SUBMERGENCE SATISFIED----- [EQUIPMENT ITEM NO(S).: 1]	1
10. CRITERIA REGARDING RADIATION SATISFIED----- [EQUIPMENT ITEM NO(S).: 1, 8, 9, 10, 11, 12, 13, 20, 41, 42, 43, 44, 45, 85, 87, 88, 89, 92, 99]	19
11. CRITERIA REGARDING TEST SEQUENCE SATISFIED----- [EQUIPMENT ITEM NO(S).: 92, 99]	2
12. CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED-----	0
13. CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED-----	0
14. CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED-----	0
15. TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED---	0
16. CRITERIA REGARDING MARGINS SATISFIED (NUREG-0548, CAT. 1)-	0

TABLE 4-3

LICENSEE CORRECTIVE ACTION SUMMARY

CORRECTIVE ACTION DESCRIPTION	NUMBER OF EQUIPMENT ITEMS
1. EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT----- [EQUIPMENT ITEM NO(S).: 6, 72, 73, 75, 76, 81]	0
2. EQUIPMENT MODIFICATION-----	0
3. EQUIPMENT RELOCATION ABOVE SUBMERGENCE LEVEL-----	0
4. RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE-----	0
5. VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS----- [EQUIPMENT ITEM NO(S).: 8, 9, 10, 11, 12, 13, 14, 20, 91, 97]	10
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT-----	0
7. QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS-----	0
8. OTHER (FOR DETAILED DESCRIPTION SEE SPECIFIC EQUIPMENT ITEMS)-- [EQUIPMENT ITEM NO(S).: 8, 9, 10, 11, 12, 13, 14, 20, 28, 31, 91, 95, 97]	13
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN PROVIDED (SEE SPECIFIC EQUIPMENT ITEM FOR COMPLETION DATE)----- [EQUIPMENT ITEM NO(S).: 8, 9, 10, 11, 12, 13, 14, 20, 28, 31, 72, 73, 75, 76, 81, 91, 97]	17

Table 4-4

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

		EPC EQUIPMENT ITEM NUMBER															
		1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	
I. NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1.	DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE					X		X	X	X	X	X	X	X	X	X	
2.	ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED			X	X												
3.	AGING DEGRADATION EVALUATED ADEQUATELY																
4.	QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)	X	X	X	X												
5.	PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION																
6.	CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)																
7.	CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:																
	A. - PEAK TEMPERATURE ADEQUATE																
	B. - PEAK PRESSURE ADEQUATE																
	C. - DURATION ADEQUATE	X	X		X												
	D. - REQUIRED PROFILE ENVELOPED ADEQUATELY																
	E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE																
8.	CRITERIA REGARDING SPRAY SATISFIED																
9.	CRITERIA REGARDING SUBMERGENCE SATISFIED	X															
10.	CRITERIA REGARDING RADIATION SATISFIED	X							X	X	X	X	X	X	X	X	
11.	CRITERIA REGARDING TEST SEQUENCE SATISFIED																
12.	CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED																
13.	CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED																
14.	CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED																
15.	TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED																
16.	CRITERIA REGARDING MARGINS SATISFIED (NRC-0588, CAT. 1)																
II. NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I.A.	EQUIPMENT QUALIFIED							X									
I.B.	EQUIPMENT QUALIFICATION PENDING MODIFICATION					X	X										
II.A.	EQUIPMENT QUALIFICATION NOT ESTABLISHED	X	X	X	X				X	X	X	X	X	X	X	X	
II.B.	EQUIPMENT NOT QUALIFIED																
II.C.	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED																
III.A.	EQUIPMENT EXEMPT FROM QUALIFICATION																
III.B.	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW																
IV.	DOCUMENTATION NOT MADE AVAILABLE																
III. CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1.	EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT					X											
2.	EQUIPMENT MODIFICATION																
3.	EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL																
4.	RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE																
5.	VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS								X	X	X	X	X	X	X	X	
6.	EQUIPMENT RELOCATION TO A WILD ENVIRONMENT																
7.	QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS																
8.	OTHER (____ SEE SPECIFIC EQUIPMENT ITEM IF CHECKED ____)								X	X	X	X	X	X	X	X	

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Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM
=====

		FRC EQUIPMENT ITEM NUMBERS															
		1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	
NEC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1.	DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE-----					X											
2.	ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED-----													X	X		
3.	AGING DEGRADATION EVALUATED ADEQUATELY-----													X	X		
4.	QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)-----													X	X		
5.	PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION-----																
6.	CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)-----																
7.	CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:																
	A. - PEAK TEMPERATURE ADEQUATE-----																
	B. - PEAK PRESSURE ADEQUATE-----																
	C. - DURATION ADEQUATE-----																
	D. - REQUIRED PROFILE ENVELOPED ADEQUATELY-----																
	E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE-----																
8.	CRITERIA REGARDING SPRAY SATISFIED-----																
9.	CRITERIA REGARDING SUBMERGENCE SATISFIED-----																
10.	CRITERIA REGARDING RADIATION SATISFIED-----					X											
11.	CRITERIA REGARDING TEST SEQUENCE SATISFIED-----																
12.	CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED-----																
13.	CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED-----																
14.	CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED-----																
15.	TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED-----																
16.	CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. 1)-----																
NEC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I.A	EQUIPMENT QUALIFIED-----	X	X	X	X		X	X	X	X	X	X	X	X		X	
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION-----						X							X	X		
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED-----																
II.B	EQUIPMENT NOT QUALIFIED-----																
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED-----																
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION-----																
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW-----																
IV	DOCUMENTATION NOT MADE AVAILABLE-----																
CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1.	EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT-----																
2.	EQUIPMENT MODIFICATION-----																
3.	EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL-----																
4.	RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE-----																
5.	VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS-----						X										
6.	EQUIPMENT RELOCATION TO A MILD ENVIRONMENT-----																
7.	QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS-----						X							X			
8.	OTHER (---SEE SPECIFIC EQUIPMENT ITEM IF CHECKED---)																

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Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM
=====

		E&C EQUIPMENT ITEM NUMBER															
		1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046
NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE-----		X															
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED-----		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3. AGING DEGRADATION EVALUATED ADEQUATELY-----		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4. QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)-----		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5. PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION-----																	
6. CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)-----																	
7. CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:-----																	
A. - PEAK TEMPERATURE ADEQUATE-----																	
B. - PEAK PRESSURE ADEQUATE-----																	
C. - DURATION ADEQUATE-----																	
D. - REQUIRED PROFILE ENVELOPED ADEQUATELY-----																	
E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE-----																	
8. CRITERIA REGARDING SPRAY SATISFIED-----																	
9. CRITERIA REGARDING SUBMERGENCE SATISFIED-----																	
10. CRITERIA REGARDING RADIATION SATISFIED-----																	
11. CRITERIA REGARDING TEST SEQUENCE SATISFIED-----																	
12. CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED-----																	
13. CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED-----																	
14. CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED-----																	
15. TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED-----																	
16. CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. 1)-----																	
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I.A. EQUIPMENT QUALIFIED-----																	
I.B. EQUIPMENT QUALIFICATION PENDING MODIFICATION-----																	
II.A. EQUIPMENT QUALIFICATION NOT ESTABLISHED-----		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
II.B. EQUIPMENT NOT QUALIFIED-----																	
II.C. EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED-----																	
III.A. EQUIPMENT EXEMPT FROM QUALIFICATION-----																	
III.B. EQUIPMENT NOT IN THE SCOPE OF THE REVIEW-----																	
IV. DOCUMENTATION NOT MADE AVAILABLE-----																	
CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1. EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT-----																	
2. EQUIPMENT MODIFICATION-----																	
3. EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL-----																	
4. RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE-----																	
5. VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS-----																	
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT-----																	
7. QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS-----																	
8. OTHER (_____) SEE SPECIFIC EQUIPMENT ITEM IF CHECKED-----		X															

Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM
=====

		FOR EQUIPMENT ITEM NUMBERS															
		1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	
NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1.	DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE-----		X														
2.	ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED-----								X	X							
3.	AGING/DEGRADATION EVALUATED ADEQUATELY-----																
4.	QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)-----																
5.	PROGRAM ESTABLISHED TO IDENTIFY AGING/DEGRADATION-----																
6.	CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)-----																
7.	CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:-----																
	A. - PEAK TEMPERATURE ADEQUATE-----																
	B. - PEAK PRESSURE ADEQUATE-----																
	C. - DURATION ADEQUATE-----																
	D. - REQUIRED PROFILE ENVELOPED ADEQUATELY-----																
	E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE-----																
8.	CRITERIA REGARDING SPRAY SATISFIED-----																
9.	CRITERIA REGARDING SUBMERGENCE SATISFIED-----																
10.	CRITERIA REGARDING RADIATION SATISFIED-----																
11.	CRITERIA REGARDING TEST SEQUENCE SATISFIED-----																
12.	CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED-----																
13.	CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED-----																
14.	CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED-----																
15.	TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED-----																
16.	CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. 1)-----																
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I.A	EQUIPMENT QUALIFIED-----			X					X								
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION-----																
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED-----	X								X							
II.B	EQUIPMENT NOT QUALIFIED-----																
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED-----					X	X			X	X	X	X	X	X	X	
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION-----	X	X														
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW-----																
IV	DOCUMENTATION NOT MADE AVAILABLE-----																
CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1.	EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT-----																
2.	EQUIPMENT MODIFICATION-----																
3.	EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL-----																
4.	RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE-----																
5.	VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS-----																
6.	EQUIPMENT RELOCATION TO A MILD ENVIRONMENT-----																
7.	QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS-----																
8.	OTHER (_____) SEE SPECIFIC EQUIPMENT ITEM IN CATEGORY (_____)-----																

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Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY REPORT
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		FRC EQUIPMENT ITEM NUMBERS															
		106110621063106410651066106710681069107010711072107310741075															
I. SRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE-----																	
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED-----		X													X	X	X
3. AGING DEGRADATION EVALUATED ADEQUATELY-----																	
4. QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)-----																	
5. PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION-----																	
6. CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)-----																	
7. CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:																	
A. - PEAK TEMPERATURE ADEQUATE-----																	
B. - PEAK PRESSURE ADEQUATE-----																	
C. - DURATION ADEQUATE-----																	
D. - REQUIRED PROFILE ENVELOPED ADEQUATELY-----																	
E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE-----																	
8. CRITERIA REGARDING SPRAY SATISFIED-----																	
9. CRITERIA REGARDING SUBMERGENCE SATISFIED-----																	
10. CRITERIA REGARDING RADIATION SATISFIED-----																	
11. CRITERIA REGARDING TEST SEQUENCE SATISFIED-----																	
12. CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED-----																	
13. CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED-----																	
14. CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED-----																	
15. TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED-----																	
16. CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. 1)-----																	
II. SRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I. A. EQUIPMENT QUALIFIED-----																	
I. B. EQUIPMENT QUALIFICATION PENDING MODIFICATION-----																	
II. A. EQUIPMENT QUALIFICATION NOT ESTABLISHED-----		X													X	X	X
II. B. EQUIPMENT NOT QUALIFIED-----																	
II. C. EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED-----		X					X	X	X	X	X	X	X	X		X	X
III. A. EQUIPMENT EXEMPT FROM QUALIFICATION-----		X	X		X	X	X	X	X	X	X	X	X	X			
III. B. EQUIPMENT NOT IN THE SCOPE OF THE REVIEW-----																	
IV. DOCUMENTATION NOT MADE AVAILABLE-----																	
III. CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1. EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT-----															X	X	X
2. EQUIPMENT MODIFICATION-----																	
3. EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL-----																	
4. RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE-----																	
5. VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS-----																	
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT-----																	
7. QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS-----																	
8. OTHER (_____) SEE SPECIFIC EQUIPMENT ITEM IF CHECKED-----																	

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Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

		FEC EQUIPMENT TEST RUNNERS															
		1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	
NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1.	DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE-----	X					X			X							
2.	ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED-----						X										
3.	AGING DEGRADATION EVALUATED ADEQUATELY-----									X	X	X	X	X	X		
4.	QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)-----									X	X	X	X	X	X		
5.	PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION-----																
6.	CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)-----																
7.	CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:																
	A. - PEAK TEMPERATURE ADEQUATE-----																
	B. - PEAK PRESSURE ADEQUATE-----																
	C. - DURATION ADEQUATE-----																
	D. - REQUIRED PROFILE ENVELOPED ADEQUATELY-----																
	E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE-----																
8.	CRITERIA REGARDING SPRAY SATISFIED-----																
9.	CRITERIA REGARDING SUBMERGENCE SATISFIED-----																
10.	CRITERIA REGARDING RADIATION SATISFIED-----									X		X	X	X	X		
11.	CRITERIA REGARDING TEST SEQUENCE SATISFIED-----																
12.	CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED-----																
13.	CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED-----																
14.	CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED-----																
15.	TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED-----																
16.	CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. 1)-----																
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I.A	EQUIPMENT QUALIFIED-----				X											X	
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION-----	X					X										
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED-----						X				X		X	X	X		
II.B	EQUIPMENT NOT QUALIFIED-----																
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED-----		X	X		X						X					
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION-----										X						
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW-----										X						
IV	DOCUMENTATION NOT MADE AVAILABLE-----																
CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1.	EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT-----	X					X										
2.	EQUIPMENT MODIFICATION-----																
3.	EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL-----																
4.	RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE-----																
5.	VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS-----																
6.	EQUIPMENT RELOCATION TO A MILD ENVIRONMENT-----																
7.	QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS-----																
8.	OTHER (---SEE SPECIFIC EQUIPMENT ITEM IF CHECKED---)																

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Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM
=====

		FAC EQUIPMENT ITEM NUMBERS															
		1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	
NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)																	
1.	DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE	X				X	X	X									
2.	ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED							X			X				X		
3.	AGING DEGRADATION EVALUATED ADEQUATELY		X							X						X	
4.	QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)		X							X						X	
5.	PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION															X	
6.	CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)																
7.	CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:																
	A. - PEAK TEMPERATURE ADEQUATE																
	B. - PEAK PRESSURE ADEQUATE																
	C. - DURATION ADEQUATE																
	D. - REQUIRED PROFILE ENVELOPED ADEQUATELY																
	E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE																
8.	CRITERIA REGARDING SPRAY SATISFIED																
9.	CRITERIA REGARDING SUBMERGENCE SATISFIED																
10.	CRITERIA REGARDING RADIATION SATISFIED		X							X							
11.	CRITERIA REGARDING TEST SEQUENCE SATISFIED		X							X							
12.	CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED																
13.	CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED																
14.	CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED																
15.	TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED																
16.	CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. 1)																
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)																	
I.A	EQUIPMENT QUALIFIED			X								X	X			X	
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION					X											
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED	X	X				X	X		X	X			X			
II.B	EQUIPMENT NOT QUALIFIED																
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED															X	
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION									X							
III.E	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW					X											
IV	DOCUMENTATION NOT MADE AVAILABLE																
CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)																	
1.	EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT																
2.	EQUIPMENT MODIFICATION																
3.	EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL																
4.	RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE																
5.	VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS	X						X									
6.	EQUIPMENT RELOCATION TO A MILD ENVIRONMENT																
7.	QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS																
8.	OTHER (SEE SPECIFIC EQUIPMENT ITEM IF CHECKED)	X				X		X									

Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

		EQUIPMENT ITEM NUMBERS										
		1	2	3	4	5	6	7	8	9	10	11
		1106	1107	1108	1109	1110	1111	1112	1113	1114		
NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)												
1.	DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE											
2.	ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED	X		X								
3.	AGING DEGRADATION EVALUATED ADEQUATELY											
4.	QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)											
5.	PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION											
6.	CRITERIA REGARDING AGING SIMULATION SATISFIED (IF REQUIRED)											
7.	CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:											
	A. - PEAK TEMPERATURE ADEQUATE											
	B. - PEAK PRESSURE ADEQUATE											
	C. - DURATION ADEQUATE											
	D. - REQUIRED PROFILE ENVELOPED ADEQUATELY											
	E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE											
9.	CRITERIA REGARDING SPRAY SATISFIED											
9.	CRITERIA REGARDING SUBMERGENCE SATISFIED											
10.	CRITERIA REGARDING RADIATION SATISFIED											
11.	CRITERIA REGARDING TEST SEQUENCE SATISFIED											
12.	CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED											
13.	CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED											
14.	CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED											
15.	TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED											
16.	CRITERIA REGARDING MARGINS SATISFIED (NUREG-0586, CAT. 1)											
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)												
I.A	EQUIPMENT QUALIFIED											X
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION											
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED	X		X								
II.B	EQUIPMENT NOT QUALIFIED											
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED	X			X	X	X	X	X	X		
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION											
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW											
IV	DOCUMENTATION NOT MADE AVAILABLE											
CORRECTIVE ACTION SPECIFIED (DESIGNATION: X = ACTION SPECIFIED)												
1.	EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT											
2.	EQUIPMENT MODIFICATION											
3.	EQUIPMENT RELOCATION ABOVE THE SUBMERGENCE LEVEL											
4.	RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE											
5.	VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS											
6.	EQUIPMENT RELOCATION TO A MILD ENVIRONMENT											
7.	QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS											
8.	OTHER (SEE SPECIFIC EQUIPMENT ITEM IF CHECKED)											

4.3 METHODOLOGY USED BY THE LICENSEE

This section includes observations concerning the Licensee's qualification methodology presented in the response [5] to the NRC SER.

4.3.1 Completeness of Safety-Related Equipment List

Section 3.1 of the NRC SER [4] identified the following concern:

"Based on the licensee's submittal, the staff has concluded that the information on safety-related systems included in the submittal is insufficient to verify that those systems are all the systems required to achieve or support: (1) emergency reactor shutdown, (2) containment isolation, (3) reactor core cooling, (4) containment heat removal, (5) core residual heat removal, and (6) prevention of significant release of radioactive material to the environment. The staff acknowledges the licensee's effort to include only those safety-related systems located in a potentially harsh environment. However, this review requires the listing of all safety-related systems, both inside and outside potentially harsh environments. As noted in Appendix D, additional information on core residual heat removal and supporting systems is required to verify the completeness of safety-related systems. Exceptions to the requirements are discussed in Section 5 of this report.

Display instrumentation which provides information for the reactor operators to aid them in the safe handling of the plant was not specifically identified by the licensee. A complete list of all display instrumentation mentioned in the LOCA and HELB emergency procedures must be provided. Equipment qualification information in the form of summary sheets should be provided for all components of the display instrumentation exposed to harsh environments. Instrumentation which is not considered to be safety related but which is mentioned in the emergency procedure should appear on the list. For these instruments, (1) justification should be provided for not considering the instrument safety related and (2) assurance should be provided that its subsequent failure will not mislead the operator or adversely affect the mitigation of the consequences of the accident. The environmental qualification of post-accident sampling and monitoring and radiation monitoring equipment is closely related to the review of the TMI Lessons-Learned modifications and will be performed in conjunction with that review.

The licensee identified 129 items of equipment which were assessed by the staff."

In response to this concern, the Licensee stated [5]:

"The required information is provided in attachment 2, the section entitled 'Report on Bulletin 79-01B'. This section has been updated to provide the necessary information.

The necessary information is detailed in enclosure 18 of attachment 2. Please note that enclosure 18 has also been updated to reflect information discussed in enclosure 19.

The District has also updated Enclosure 3 - Master List References to include justification for exclusion of instrumentation from qualification and assurance that failure will not lead to misinformation to the operator. In addition, the following Table 1 identifies the display instruments and systems in the master list to expedite the review process. This did not affect the submittal significantly.

Table 1

<u>Channel Number</u>	<u>Indication/System</u>
LCS-218	VCT Level
LT-219	VCT Level
FT-212	Letdown Flow
PT-103X	Pressurizer Pressure
PT-103Y	Pressurizer Pressure
LT-101X	Pressurizer Level
LT-101Y	Pressurizer Level
FT-236	Charging Pump Flow
FT-416	CCW Flow Out of Containment Air Cooling Units
FT-417	CCW Flow Out of Containment Air Cooling Units
FT-418	CCW Flow Out of Containment Air Cooling Units
FT-419	CCW Flow Out of Containment Air Cooling Units
TE 866	Charcoal Filter Temperature
TE 867	Charcoal Filter Temperature
A/PC 765	RPS Containment Pressure Trip
B/PC-765	RPS Containment Pressure Trip
C/PC-765	RPS Containment Pressure Trip
D/PC-765	RPS Containment Pressure Trip
A/PC742-1,2	ESF Containment Pressure Initiation
B/PC 742-1, 2	ESF Containment Pressure Initiation
C/PC742-1,2	ESF Containment Pressure Initiation
D/PC 742-1,2	ESF Containment Pressure Initiation
FT-342	Containment Spray Flow
FT-343	Containment Spray Flow
PT-309	HPSI Discharge Pressure
PT-310	HPSI Discharge Pressure
FT-313	HPSI Flow
FT-316	HPSI Flow
FT-391	HPSI Flow

Table 1 (Continued)

<u>Channel Number</u>	<u>Indication/System</u>
FT-322	HPSI Flow
FT-328	LPSI Flow
FT-330	LPSI Flow
FT-332	LPSI Flow
FT-332	LPSI Flow
FT-334	LPSI Flow
A/LC-383-1	SIRWT Level Switch
B/LC-383-1	SIRWT Level Switch
C/LC-383-1	SIRWT Level Switch
D/LC-383-1	SIRWT Level Switch
A/LC-383-1	SIRWT Level Switch
A/LC-383-2	SIRWT Level Switch
B/LC-383-2	SIRWT Level Switch
C/LC-383-2	SIRWT Level Switch
D/LC-383-2	SIRWT Level Switch
PC-1849	Instrument Air Pressure Switch
A/T-112-C	RCS Cold Leg Temp.
B/T-112C	RCS Cold Leg Temp.
C/T-112C	RCS Cold Leg Temp.
D/T-112D	RCS Cold Leg Temp.
A/T-112H	RCS Hot Leg Temp.
B/T-112H	RCS Hot Leg Temp.
D/T-112H	RCS Hot Leg Temp.
A/T-122C	RCS Cold Leg Temp.
B/F122C	RCS Cold Leg Temp.
C/T-122C	RCS Cold Leg Temp.
D/T-122C	RCS Cold Leg Temp.
A/T-122H	RCS Hot Leg Temp.
C/T-122H	RCS Hot Leg Temp.
D/T-122H	RCS Hot Leg Temp.
PT-105	Wide Range Pressurizer Pressure
PT-115	Wide Range Pressurizer Pressure
A/PT-102	Pressurizer Pressure
B/PT-102	Pressurizer Pressure
C/PT-102	Pressurizer Pressure
D/PT-102	Pressurizer Pressure
LT-132	Pressurizer Quench Tank Level
TE-133	Pressurizer Quench Tank Temp.
A/LT 901	S G A Level
B/LT 901	S G A Level
C/LT 901	S G A Level
D/LT 901	S G A Level
A/PT 902	S G A Pressure
B/PT 902	S G A Pressure



Table 1 (Continued)

<u>Channel Number</u>	<u>Indication/System</u>
C/PT 902	S G A Pressure
D/PT 902	S G A Pressure
A/LT 904	S G B Level
B/LT 904	S G B Level
C/LT 904	S G B Level
D/LT 904	S G B Level
A/PT 905	S G B Pressure
B/PT 905	S G B Pressure
C/PT 905	S G B Pressure
D/PT 905	S G B Pressure
FT 1109	S C A Aux Feed Flow
FT1110	S G B Aux Feed Flow
LT-504	Containment Sump Level
LC-505	Containment Sump Level
LC-568	SI Pump Room Sump Level
LC-569	SI Pump Room Sump Level
LC-570	SI Pump Room Sump Level
LC-571	SI Pump Room Sump Level
LT-384	Containment Wide Range Sump Level
YE-861	Containment Dew Point Initiation

During the course of review of the master list to prepare Table 1, several updates and corrections were made to the master list to reflect the station emergency procedures, and correct certain errors discovered. These changes, additions, or corrections are tabulated below:

1. The containment dew point sensor YE-861 was excluded. This is used to help in accident identification, and is not required to be LOCA qualified.
2. Flow transmitters FT 416, 417, 418, and 419 were identified in the wrong area. These transmitters are used to monitor component cooling water flow out of each of the four containment cooling, filtering, and iodine units. Should the flow be below set point the unit would be isolated. These transmitters were identified as being in a normal room environment. The transmitters are in an area which will be in a normal room environment until recirculation occurs. At that time the transmitters may be subjected to a high radiation field. In its initial review no safety concerns were identified. The District is continuing its qualification investigation.
3. Temperature indicators T420, 421, 422, 423, 493, 494, 495, 496, 486, 487, and 479 help monitor the performance of the CCW system. These are not required as part of the emergency procedures and have been deleted.

4. The District believes TE866 and 867 would survive a LOCA as discussed in section 3.0 of Attachment 1, however complete test documentation is not available. The District has elected to replace these with fully qualified and documented components.
5. FT-326 has been deleted. It is not required by the station emergency procedures.
6. LT 1188, the auxiliary feedwater tank level indication will have a redundant channel installed. Safety grade (IE) was not required. No qualification work sheet will be submitted.
7. Main feedwater flow FT1395 and FT1398 are not required and are being deleted.
8. SCEW sheets on HVC-01107B and 1108B have been deleted as TMI items.
9. The ASCO solenoids, NAMCO Limit switches and Valcor replaced by ASCO solenoids have been factored into section 6 for containment equipment. The replacement of these is scheduled for completion by the end of the next refueling scheduled to begin September 18, 1981.

In order to assure that instrumentation cannot mislead the operator, the District plans to mark control board indicators or control switches with an orange dot to identify qualified equipment. This coupled with a training program will insure that the operators are aware of the qualification status and will insure proper use of the available information."

It is concluded that the Licensee has provided a satisfactory response to the NRC concern.

4.3.2 Containment Spray System

Section 3.2 of the NRC SAR [4] stated the following:

"On this basis, the staff has assumed, unless otherwise noted, that the analysis for developing the environmental envelopes, relative to the temperature, pressure, and the containment spray caustics, has been performed in accordance with the requirements stated above. The staff has reviewed the qualification documentation to ensure that the qualification specifications envelope the conditions established by the licensee. During this review, the staff assumed that for plants designed and equipped with an automatic containment spray system which satisfies the single-failure criterion, the main-steam-line-break (MSLB) environmental conditions are enveloped by the large-break-LOCA environmental conditions. The staff evaluated the design of the containment spray and found that the system is not subjected to a disabling single-component failure and therefore satisfies the requirements of Section 4.2.1 of the DOR guidelines.

Equipment submergence has also been addressed where the possibility exists that flooding of equipment may result from HELBs."

4.3.3 Environmental Service Conditions

4.3.3.1 Temperature, Pressure, and Humidity Conditions Inside Containment

Section 3.3 of the NRC SER [4] identified the following concern:

"The licensee has provided the results of accident analyses as follows:

	<u>Max Temp (°F)</u>	<u>Max Press (psig)</u>	<u>Humidity (%)</u>
LOCA	285	57	100
MSLB	401	(Not Provided)	100

The staff has concluded that the minimum temperature profile for equipment qualification purposes should include a margin to account for higher-than-average temperatures in the upper regions of the containment that can exist due to stratification, especially following a postulated MSLB. Use of the steam saturation temperature corresponding to the total building pressure (partial pressure of steam plus partial pressure of air) versus time will provide an acceptable margin for either a postulated LOCA or MSLB, whichever is controlling, as to potential adverse environmental effects on equipment.

The licensee's specified temperature (service condition) of 285°F does not satisfy the above requirement. A saturation temperature corresponding to the peak profile (305°F peak temperature at 57 psig) should be used instead. The licensee should update his equipment summary tables to reflect this change. If there is any equipment that does not meet the staff position, the licensee must provide either justification that the equipment will perform its intended function under the specified conditions or propose corrective action.

The staff notes that for the EEQ review the accidents which were used to evaluate equipment were LOCAs inside containment. As stated in Section 3.2 of this report, this plant is equipped with an automatic containment spray system. However, the temperature for the MSLB inside containment exceeds the LOCA profile by 115°F for a short time (about two minutes). The licensee should provide the analysis to verify that the effects of this short-term peak temperature do not affect the environmental qualification of the safety-related equipment which was qualified using the LOCA profile."

The Licensee responded to the NRC concern as follows [5]:

"The District has updated the System Component Evaluation Work Sheet to reflect the 305°F. This increase in qualification temperature did not raise any safety concerns. The updated system component work sheets are provided for review.

The District provided an analysis (Enclosure 16) as part of its November 1, 1980 submittal on IE Bulletin 79-01B. This enclosure has been updated to factor the containment spray system into the analysis. Based upon the analysis findings, the District feels that instrument qualification to LOCA temperature profiles adequately qualifies equipment for the MSLB."

It appears that the Licensee has not resolved the NRC concern. Since the Licensee is responsible for identifying the environments, the parameters identified by the Licensee have been used in the evaluations contained in this Technical Evaluation Report. These parameters are reproduced in Appendix A.

4.3.3.2 Temperature, Pressure, and Humidity Conditions Outside Containment

Section 3.4 of the NRC SER [4] stated the following:

"The licensee has provided the temperature, pressure, humidity and applicable environment associated with an HELB outside containment. The following areas outside containment have been addressed:

- (1) ECCS pump rooms (HPSI, LPSI, and containment spray) Rooms 21 and 22
- (2) Main steam and main feedwater piping areas (Room 81)
- (3) Ventilation areas containing safety-related equipment

The staff has verified that the parameters identified by the licensee for the MSLB are acceptable."

4.3.3.3 Nuclear Radiation Dose (Inside and Outside Containment)

Section 3.8 of the NRC SER [4] identified the following concern:

"The licensee has provided values for the radiation levels postulated to exist following a LOCA. The application and methodology employed to determine these values were presented to the licensee as part of the NRC staff criteria contained in the DOR guidelines, in NUREG-0588, and in the guidance provided in IEB-79-01B, Supplement 2. Therefore, for this review, the staff has assumed that, unless otherwise noted, the values provided have been determined in accordance with the prescribed criteria. The staff review determined that the values to which equipment was qualified enveloped the requirements identified by the licensee.

The value required by the licensee inside containment is an integrated dose of 3×10^6 rads. This value does not envelope the DOR guideline

requirements (4×10^7 rads) and therefore is not acceptable. The radiation service condition provided by the licensee is lower than provided in the guidelines for gamma and beta radiation. The licensee is requested to either provide justification for using the lower service condition or use the guidelines for both gamma and beta radiation. If the former option is chosen, then the analysis--including the basis, assumptions, and a sample calculation--should be provided.

A required value outside containment of 4×10^6 rads has been used by the licensee to specify limiting radiation levels within the low- and high-pressure safety injection ECCS system pump rooms of the auxiliary building (Room 13). This value appears to consider the radiation levels influenced by the source term methodology associated with post-LOCA recirculation fluid lines and is therefore acceptable."

In response to this concern, the Licensee stated [5]:

"The District determined radiation levels for containment using the method provided in Appendix B of the DOR Guidelines. This served as the basis for the values supplied in Enclosure 11 of attachment 2. The calculations have been included in Enclosure 11. The 3×10^6 R was also the original design basis level used in the FSAR. The SCEWS have been updated to reflect this calculated radiation level.

Normal plant background radiation for equipment was assumed to be the FSAR value of 1R/Hour for 40 years or 3.5×10^5 R. This was not considered to be insignificant compared to the 10^6 to 10^7 R accident doses.

As required by bulletin 79-01B specific calculations were made for submergence. For these a plant specific geometry was established and the code, 'ISOSHL'D' was run using the NUREG 0588 source terms. These calculations are presently being reviewed to verify all assumptions and values."

It is concluded that the Licensee has provided a satisfactory response to the NRC concern.

4.3.4 Chemical Spray

Section 3.6 of the NRC SER [4] identified the following concern:

"The licensee's FSAR value for the chemical concentration is 1700 ppm boric acid solution. The licensee identified that some of the equipment was tested using different spray solutions ranging between 1000 ppm and 3000 ppm boric acid. Based on a review of the information submitted by the licensee, the staff concludes that the justification provided in using less severe solutions is incomplete in part. The staff requires that the licensee amend his response and justify the qualification

adequacy of all the equipment that was subjected to less severe caustic sprays expected at the plant site. The staff will review the licensee's response when it is submitted and discuss the resolution in a supplemental report."

In response to this concern, the Licensee stated [5]:

"The District has reviewed the subject of chemical spray and has determined no safety concern exists. Please note that during the review it was discovered that an error had been made and that the FS&R chemical spray concentration is 1700 ppm boron in a boric acid solution. This represents a boric acid solution of 9760 ppm or approximately a 1% solution.

The following table lists the equipment in containment by manufacturer and identifies the chemical spray concentration to which it was tested.

<u>MANUFACTURER</u>	<u>EQUIPMENT</u>	<u>BORON TESTING</u>
NAMCO	Limit Switch	PH 10-11
ASCO	Solenoid	3000 ppm Boron PH 10
Joy	Vent Fan	1700 ppm Boric Acid (See Enclosure 7, Footnote 4)
Conax	Penetrations	1900 ppm Boric Acid (See Enclosure 7, Footnote 5)
Dow Corning	RTV	Letter that chemical spray has no effect to PH of 10
Splices (GHRD)	Heat Shrink Tubing	1% solution PH 9.5
Hoffman	Junction Boxes	Paint prevents corrosion - Not an active device
Rockbestos	Cable	1900 ppm Boron
Anaconda	Cable	1900 ppm Boron
Foxboro	MCA Transmitters	No Test (See Enclosure 7, Footnote 2)
	EIO Transmitters	1.5% Solution
Limitorque	Valve Operations	1.5% Solution

<u>MANUFACTURER</u>	<u>EQUIPMENT</u>	<u>BORON TESTING</u>
States	Terminal Blocks	No Test (See Enclosure 10)
	Vent Fan Splices	No Test (See Enclosure 9 and SCEWS)
Allison Controls	Temperature Sensor	No test but imbedded in stainless steel tube. Chemical spray should not cause a problem.

The only types of equipment which do not have a complete test for chemical spray are the Joy fans, Conax penetrations, Hoffman junction boxes, Foxboro transmitters, vent fan splices and States terminal blocks. The concerns on Joy vent fans, Conax penetrations, and Foxboro transmitters are addressed in Enclosure 7 of attachment 2. The vent fan splices are addressed in Enclosure 9. The terminal blocks are coated with RTV and are not considered a problem as discussed in Enclosure 10. The Hoffmann junction boxes serve only to protect the terminal blocks. It should also be noted that the manufacturer of the Joy vent fans has addressed corrosion effects and has indicated there would be no problem in a 10% caustic solution.

The Fort Calhoun spray system is initially an acid solution and becomes buffered upon recirculation. The acid and basic solution are mild, with no problem expected."

It is concluded that the Licensee has provided a satisfactory response to the NRC concern.

4.3.5 Submergence

Section 3.5 of the NRC SER [4] identified the following concern:

"The maximum submergence levels have been established and assessed by the licensee. Unless otherwise noted, the staff assumed for this review that the methodology employed by the licensee is in accordance with the appropriate criteria as established by Commission Memorandum and Order CLI-80-21.

The licensee's value for maximum submergence is at the 1000.9 ft level. Equipment below this level has been identified by the licensee, along with the proposed corrective action. The licensee identified eight safety-related electrical components as having the potential for becoming submerged after a postulated event.

The licensee stated that the equipment required to function under submerged conditions has been qualified by test or analysis or by design modifications using qualified sealer material. Therefore, conditioned only on the satisfactory resolution and review of the supporting documentation discussed in Section 4 of this report, the staff concludes that the licensee's response satisfies the Commission requirements and is acceptable.

It is not clear from the information submitted that submergence of safety-related electrical equipment outside of containment was addressed. The licensee should address this area more specifically in the 90-day response and upgrade the CES as appropriate."

In response to this concern, the Licensee stated [5]:

"In the Fort Calhoun Station the only area outside containment which is subject to flooding in a post-accident situation is Room 81, which will flood to approximately 1.4 feet (1037.4 feet building elevation). This was addressed on the System Component Evaluation Work Sheets. For equipment labeled N/A, flooding is 'Not Applicable' since flooding is not expected to occur in that room or a break in that room will affect the ability to safely shutdown the reactor. No further action should be required on this item."

It is concluded that the Licensee has provided a satisfactory response to the NRC concern.

4.3.6 Aging and Qualified Life

Section 3.7 of the NRC SER [4] identified the following concern:

"The DOR Guidelines, section 7, does not require a qualified life to be established for all safety related electrical equipment, however the following actions are required:

1. Detailed comparison of existing equipment to the materials identified in Appendix C of the DOR guidelines. The first supplement to IEB-79-01B requires the licensees to utilize the table and identify any additional materials as a result of their effort.
2. Establish an ongoing program to review surveillance and maintenance records to identify potential age related degradations.
3. Establish component maintenance and replacement schedules which include considerations of aging characteristics of the installed components.

The licensee identified a number of equipment items for which a specified qualified life was established (for examples, 5 years, 15 years, or 40 years). In its assessment of these submittals, the staff did not review the adequacy of the methodology nor the basis used to arrive at these values; the staff has assumed that the established values are based on state-of-the-art technology and are acceptable.

For this review, however, the staff requires that the licensee submit supplemental information to verify and identify the degree of conformance to the above requirements. The response should include all the equipment identified as required to maintain functional operability in harsh environments.

The licensee indicated that this phase of the response is outstanding and that the review is in progress. The staff will review the licensee's response when it is submitted and discuss its evaluation in a supplemental report."

In response to this concern, the Licensee stated [5]:

"As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to 'new' condition and establish a preventative maintenance program to insure that subcomponent replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's 'Aging Program' will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its 'new' or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule."

It is concluded that the Licensee has provided a satisfactory response to the NRC concern.

4.4 EQUIPMENT ENVIRONMENTAL QUALIFICATION EVALUATION

The evaluation presented in this section of the report includes, for each equipment item, completed equipment environmental qualification review checksheets (partially handwritten) which present both the technical information necessary to conduct the review and the results of the evaluation.

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! EQUIPMENT ENVIRONMENTAL QUALIFICATION !

! EQUIPMENT ITEM CHECKSHEET INDEX !

! FORT CALHOUN 1 !

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FRC ITEM NO.	COMPONENT	MANUFACTURER	MODEL NUMBER	LOCATION
1	FLUX TRANSMITTER	FOXBORO	E13DH	CONTAINMENT
2	PRESSURE TRANSMITTER	FOXBORO	E11GM	CONTAINMENT
3	LEVEL TRANSMITTER	FOXBORO	NE13AH	CONTAINMENT
4	LEVEL TRANSMITTER	FOXBORO	NE13DM/NE13DH	CONTAINMENT
5	PRESSURE SWITCH	BARKSDALE	B2M15055	CONTAINMENT
6	TEMPERATURE DETECTOR	ALISON CONTROL	AST60SS	CONTAINMENT
7	LIMIT SWITCH	NAMCO	EA1R011302	CONTAINMENT
8	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 13
9	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 21
10	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 22
11	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 59
12	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 60
13	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 69
14	LIMIT SWITCH	FISHER CONTROLS	304	ROOM 81
15	LIMIT SWITCH	NAMCO	EA1R0	ROOM 69
16	LIMIT SWITCH	NAMCO	EA1R0	ROOM 21
17	LIMIT SWITCH	NAMCO	EA1R0	ROOM 21
18	LIMIT SWITCH	NAMCO	EA1R0	ROOM 22
19	LIMIT SWITCH	NAMCO	EA1R0	ROOM 13
20	LIMIT SWITCH	NAMCO	D2400X	ROOM 21
21	LIMIT SWITCH	NAMCO	EA1R0	ROOM 60
22	LIMIT SWITCH	NAMCO	EA1R0	CONTAINMENT
23	LIMIT SWITCH	NAMCO	EA1R0	CONTAINMENT
24	LIMIT SWITCH	NAMCO	EA1R0	ROOM 69
25	LIMIT SWITCH	NAMCO	EA1R0	ROOM 21
26	LIMIT SWITCH	NAMCO	EA1R0	ROOM 22
27	LIMIT SWITCH	NAMCO	EA1R0	ROOM 59
28	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM8	ROOM 81
29	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM8	ROOM 81
30	SOLENOID VALVE	VALCOR	V5266052956R	ROOM 59
31	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM8000	ROOM 81
32	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM8000	ROOM 13
33	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM82	ROOM 13
34	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM80	OUTSIDE CONTAINMENT
35	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM80	CONTAINMENT
36	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM80	CONTAINMENT
37	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM80	CONTAINMENT
38	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM800	CONTAINMENT
39	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM83	CONTAINMENT
40	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SM83	ROOM 7
41	ELECTRIC MOTOR	GENERAL ELECTRIC	5K818R37A38	ROOM 21, 22
42	ELECTRIC MOTOR	GENERAL ELECTRIC	5K815524A51	ROOM 21, 22
43	ELECTRIC MOTOR	GENERAL ELECTRIC	5K815526A35	ROOM 21, 22
44	ELECTRIC MOTOR	RELIANCE ELECTRIC	60301200	CONTAINMENT
45	ELECTRIC MOTOR	RELIANCE ELECTRIC	4R392084	CONTAINMENT
46	ELECTRIC MOTOR	YAPAC	AC17304	ROOM 81

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! EQUIPMENT ENVIRONMENTAL QUALIFICATION !
! EQUIPMENT ITEM CHECKSHEET INDEX !
! FORT CALHOUN 1 !
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FRC ITEM NO.	COMPONENT	MANUFACTURER	MODEL NUMBER	LOCATION
50	SOLENOID VALVE	ASCO	NP8316E37E	ROOM 81
51	SOLENOID VALVE	ASCO	NP8316A77E	ROOM 81
52	SOLENOID VALVE	ASCO	NP831655E	CONTAINMENT
53	SOLENOID VALVE	ASCO	8320A175E	CONTAINMENT
54	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 59
55	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 81
56	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 13
57	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 59
58	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 69
59	SOLENOID VALVE	ASCO	NP8320A175E	ROOM 81
60	SOLENOID VALVE	ASCO	NP8320A185E	CONTAINMENT
61	SOLENOID VALVE	ASCO	NP8320A185E	CONTAINMENT
62	SOLENOID VALVE	ASCO	NP8320A185E	CONTAINMENT
63	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 13
64	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 21
65	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 22
66	SOLENOID VALVE	ASCO	NP SERIES	ROOM 69
67	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 81
68	SOLENOID VALVE	ASCO	NP SERIES	ROOM 13
69	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 21
70	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 59
71	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 69
72	SOLENOID VALVE	ASCO	LR8316C44	ROOM 21
73	SOLENOID VALVE	ASCO	LR8316C44	ROOM 22
74	SOLENOID VALVE	ASCO	NP831655E	ROOM 69
75	SOLENOID VALVE	ASCO	HT8321A5	ROOM 21
76	SOLENOID VALVE	ASCO	HT8321A5	ROOM 22
77	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 13
78	SOLENOID VALVE	ASCO	NP8320A189E	ROOM 69
79	SOLENOID VALVE	ASCO	NP SERIES	CONTAINMENT
80	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 81
81	SOLENOID VALVE	VALCOR	V70900213	CONTAINMENT
82	SOLENOID VALVE	TARGET ROCK	RO80017	CONTAINMENT
83	PANEL, I AND C	JOHNSON CONTROLS	ND	ROOM 81
84	TRANSDUCER, E/P	FISHER CONTROLS	546	ROOM 13
85	ELECTRICAL CABLE, INSTRUMENT	CERRO WIRE AND CABLE	ND	CONTAINMENT AND AUXILIARY BUILDINGS
86	ELECTRICAL CABLE, POWER	CERRO WIRE AND CABLE	ND	ROOM 69
87	ELECTRICAL CABLE, POWER	CERRO WIRE AND CABLE	ND	CONTAINMENT
88	ELECTRICAL CABLE, POWER	CERRO WIRE AND CABLE	ND	CONTAINMENT AND AUXILIARY BUILDINGS
89	ELECTRICAL CABLE, CONTROL	CERRO WIRE AND CABLE	ND	CONTAINMENT AND AUXILIARY BUILDINGS
90	ELECTRICAL CABLE, POWER	ANACONDA WIRE AND CABLE	5KV TRIPLEXED	AUXILIARY BUILDING
91	ELECTRICAL CABLE SPLICER	AMP	321260	CONTAINMENT
92	ELECTRICAL CABLE SPLICER	AMP	ND	CONTAINMENT
93	ELECTRICAL SEALANT	BOE-CORNING	RTV3144	CONTAINMENT
94	TERMINAL LUGS	BOBPHY	HYLUG/INSULUG	CONTAINMENT AND AUXILIARY BUILDINGS
95	ELECTRICAL CABLE SPLICER	AMP	ND	CONTAINMENT
96	ELECTRICAL CABLE SPLICER	AMP	ND	CONTAINMENT

TER-C5257-504

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! EQUIPMENT ENVIRONMENTAL QUALIFICATION !

! EQUIPMENT ITEM CHECKSHEET INDEX !

! FORT CALHOUN I !

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FRC ITEM NO.	COMPONENT	MANUFACTURER	MODEL NUMBER	LOCATION
99	ELECTRICAL PENETRATION	CONAX	ND	CONTAINMENT
100	CONDUCTOR SEAL ASSEMBLY	CONAX	ND	CONTAINMENT
101	LIMIT SWITCH	NAMCO	EA1R011302	ROOM 81
102	LIMIT SWITCH	DAICO	EA1R0	ROOM 21
103	ELECTRICAL CABLE SPLICE	RAYCHEM	"BREAKOUT KITS"	ROOM 81
104	HYDROGEN ANALYZER	COMSIP DELPHI	IV	ROOM 59
105	ELECTRICAL CABLE	ROCKHESTOS	FIREWALL III	ROOM 81
106	RADIATION DETECTOR	VICTOREEN	878	CONTAINMENT
107	SOLENOID VALVE	ASCO	X2063R16RF	CONTAINMENT
108	SOLENOID VALVE	ASCO	ND	CONTAINMENT
109	SOLENOID VALVE	ASCO	NP8320A185E	ROOM 22
110	SOLENOID VALVE	ASCO	NP8320A185V	ROOM 81
111	SOLENOID VALVE	ASCO	NP8314C29E	ROOM 81
112	SOLENOID VALVE	ASCO	NP8321A185E	CONTAINMENT
113	SOLENOID VALVE	ASCO	NP8320A175E	CONTAINMENT
114	SOLENOID VALVE	VALCOR	V5265R9115	CONTAINMENT



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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

EQUIPMENT ITEM NO. 1
FLOW TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL E13DH
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 1
LICENSEE REFERENCE(S): 2115, 919, 1157, 711, 26, 27, 7
FUNCTION (PLANT ID): HPSI FLOW INDICATION (FT 313, FT 316, FT 319, FT 322)
LICENSEE SUBMITTAL: SCEW(S): C-0

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R) T, QT, RT, P, H, CS, A, (S) (R), M, I, QM, RPN, EXN, (SEN), QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW
- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u> _____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	<u>X</u> _____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	<u>X</u> _____
Criteria Regarding Radiation Satisfied	<u>X</u> _____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

LICENSEE RESPONSE TO NRC SER

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that subcomponent replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

LICENSEE RESPONSE TO NRC SER (Continued)

ENCLOSURE #7

EVALUATION WORKSHEET FOOTNOTES

2. The pressure transmitters listed were described as having cast aluminum top covers. Corrosion of aluminum in a slightly caustic and boric acid spray environment will occur and has been addressed in the FSAR under hydrogen generation in containment (Section 14.17). The location of these transmitters provides them with shielding from the sprays by the 1045' elevation and the 1013' elevation floor slabs. For similarly located aluminum, i.e., ductwork, mounting brackets, etc., the FSAR assumed negligible corrosion for hydrogen generation. Even though this type of transmitter was not subjected to a boric acid spray during the environmental type tests done prior to installation, later tests done on similar transmitters (see test report Foxboro T3-1013) proved the transmitters capability to withstand a boric acid spray with a 100% air/steam MCA atmosphere for at least a 24 hour duration.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

Checksheets 5a thru 5f have been removed due to the
proprietary nature of information contained therein.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

NOTES:

Note 2. Licensee did not specify the accuracy level required nor did he analyze the level determined by the qualification report for acceptability.

Note 3: The test lasted a total of 13 hours. No indication of the device's ability to operate for an indefinitely long period following the onset of the accident can be determined from the test data.

Note 4. The Foxboro Company letter to the Licensee dated 4-18-79 (R.J. Breen to R.J. Mueller) states that Reports T2-1075 and T3-1091 apply for radiation withstand capability. However, this letter also states that the models used were not modified for radiation resistance and are not qualified beyond 1.0×10^7 rads T.I.D.

Note 5: Licensee stated in his enclosure 12 (see page 3a) that an aging evaluation and maintenance program



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

NOTES:

Note 5 (Continued)

is under preparation but has not supplied any material for evaluation. The scheduled full implementation date was 6-30-82.

Note 6: Licensees SCEW sheet Lists Reports

Q 9-6005, T3-1013, T3-1068, T4-6061

Of these Q 9-6005 and T3-1013 directly relate to the device. The remainder provide limited information. The manufacturers letter noted in Note 4 above states that T2-1075 and T3-1097 are also applicable.

Note 7: Licensee states that report T4-6061

qualifies the device for submergence; however, this report was not a submergence test. The test used a silicon oil bath as a heat source for MCH simulation but makes no claim, nor provides evaluation concerning submergence.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

EQUIPMENT ITEM NO. 2

PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT

FOXBORO MODEL E11GM

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 2

LICENSEE REFERENCE(S): 2115, 919, 1157, 26, 7

FUNCTION (PLANT ID): PRESSURIZER PRESSURE TRANSMITTER (PT-102 A, B, C, D;
PT-103-X; PT-103-Y)

LICENSEE SUBMITTAL: SCEW(S): C-21, -22

FUNCTION (PLANT ID): STEAM GENERATOR PRESSURE TRANSMITTERS (PT-902 A, B, C,
D; PT-905 A, B, C, D)

LICENSEE SUBMITTAL: SCEW(S): C-20

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, (SEN), QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, 3b, ~~3c~~, ~~3d~~

System Consideration Review

~~4a~~, ~~4b~~, ~~4c~~, ~~4d~~, ~~4e~~, ~~4f~~

Equipment Environmental Qualification Review

5a, 5b, ~~5c~~, 5d, 5e, 5f,
5g, ~~5h~~, ~~5i~~, ~~5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a~~, ~~6b~~

Maintenance and Replacement Schedule Summary

~~7a~~, ~~7b~~, ~~7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u> _____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	<u>X</u> _____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

LICENSEE RESPONSE TO NRC SER

Enclosure 12

AGING

As directed by IE Bulletin 79-016 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that subcomponent replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or "near" condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 10, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

LICENSEE RESPONSE TO NRC SER (Continued)

ENCLOSURE #7

EVALUATION WORKSHEET FOOTNOTES

2. The pressure transmitters listed were described as having cast aluminum top covers. Corrosion of aluminum in a slightly caustic and boric acid spray environment will occur and has been addressed in the FSAR under hydrogen generation in containment (Section 14.17). The location of these transmitters provides them with shielding from the sprays by the 1045' elevation and the 1013' elevation floor slabs. For similarly located aluminum, i.e., ductwork, mounting brackets, etc., the FSAR assumed negligible corrosion for hydrogen generation. Even though this type of transmitter was not subjected to a boric acid spray during the environmental type tests done prior to installation, later tests done on similar transmitters (see test report Foxboro T3-1013) proved the transmitters capability to withstand a boric acid spray with a 100% air/steam MCA atmosphere for at least a 24 hour duration.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

Checksheets 5a, 5b, 5d thru 5g have been removed due to the proprietary nature of information contained therein.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ITEM NO. 3
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL NE13AH
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 3
LICENSEE REFERENCE(S): 1157, 919, 1171
FUNCTION (PLANT ID): PRESSURIZER LEVEL (101X & Y)
LICENSEE SUBMITTAL: SCEW(S): C-35A

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b , 3c , 3d
System Consideration Review	4a , 4b , 4c , 4d , 4e , 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5aa through 5ga, 5ab through 5hb
Installed TMI Lessons Learned Implementation Equipment Summary	6a , 6b
Maintenance and Replacement Schedule Summary	7a , 7b , 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other ()
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u> </u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> X </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> X </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	<u> </u>
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
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II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

LICENSEE RESPONSE TO NRC SER.

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

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It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Level Transmitter	Differential and Gauge Pressure Transmitter	
Manufacturer's Name (5.2.2/-/-)	Foxboro	Foxboro	
Model Number (5.2.2/-/-)	N-E 13AH	E10 Series (See Note 1 Page 5)	Note 4
Serial Number	Not stated		
Features/Mounting (5.2.6/-/-)	Not stated		
Connections/Interfaces (5.2.6/-/-)	Not stated		
Location/Elevation	Containment 100.9 ft	N/A	
Equipment ID No.	101.X & Y	N/A	
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	T3-1013	T 3-1013	
Report Date	Not stated	May 1975	
Issued by		Foxboro (Performed by Franklin Institute Research center)	
Prepared for		Foxboro	
Referenced Reports		None	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)	-	Monitoring and Calibration	
Operating Conditions (-/2.2.10/2.2.10)	Not stated	Not Stated.	
Load/Cycles/Voltage/ Current/Freq.			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	Not stated	Ability to operate without loss of function when submitted to MCA	Note 2
Accuracy (5.2.5/-/-)	Not stated	Not stated	
Number of Specimens	-	4	
Test Instruments Calibrated	-	Not stated	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Pressurizer level	Active	
Test Duration (5.2.1/-/-)	-	24 hours	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	More than 10000 seconds	24 hours	
Required Function Time	Continuous	-	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	Radiation testing done separately	Only MCA Exposure per- formed with pretest and post-test calibration with monitoring during test.	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	Not performed	Not performed	Note 3
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)			
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type	Not performed	Not performed	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	-		
Radiation Aging, Dose Rate	-		
Radiation Aging, Method	-		
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	-	Not stated	
Operational Aging (-/4.2/-)	-	Not performed	
Other Age Conditioning (-/4.2/-)	-	None	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	See Note 3	Not stated	
Normal Ambient Temperature	Not stated	Not stated	
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	-	-	
On-Going Analysis of Failures and Degradation (7.0/-/-)	-	-	
Margin (General) (6.0/3.0/3.0)	-	-	
Margin (NUREG-0588, Cat. I) (-/3.2/-)	-	N/A	
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA	LOCA (MCA)	
Radiation Type	Gamma	Not performed.	
Radiation Dose (rd) (4.1.2/1.4/1.4)	9.49×10^6		
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	Not stated		
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)			
Equipment Susceptible to Beta Radiation (4.1.2/-/-)			
Radiation Dose (Normal + Accident) (4.1.2/-/-)			
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		6.3°F/1.7psig/Seconds	
Peak: °F/psig/RH/Time	288/60/100/25m	300/60/100/2 hours	
Decrease To: °F/psig/RH/Time	180/15/100/22m	244/20/100/2 hours	
Decrease To: °F/psig/RH/Time		Ambient	
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	-	Not stated	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)		Test	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700ppm Boric Acid	1.5% Boric Acid by Weight NaOH to adjust pH to 9.25-10	
Spray Density (gpm/ft ²)	Not stated	4	
Spray Duration	Not stated	2 hours @ pH of 9.5-10 22 hours @ pH of 8.5	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	-	
In-Leakage Considered (5.2.6, 5.3.2/-/-)	-	-	
Time to Submergence	-	-	
Dust Environment (-/2.2.11/2.2.11)	Not stated	-	



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EQ JIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

Note 1:

E11GH-IIM2 Electronic Gauge Pressure Transmitter

S/N 2692435, 2713116, Style B
Calibrated Input Range: 0-2000 lbf/in²
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Amplifier - NO148ND

E11GM-ISA2-2 Electronic Gauge Pressure Transmitter

S/N 2692434, 2713115, Style B
Calibrated Input Range: 0-1000 lbf/in²
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Amplifier - NO148ND

E13DH-ISAM2 Electronic d/p Transmitter

S/N 2692441, 42, Style B
Calibrated Input Range: 0-100"H₂O
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Capsule Fill - DC 710
Amplifier - NO148NL

E13DM-ISAM2 Electronic d/p Transmitter

S/N 2692438, 39, Style B
Calibrated Input Range: 0-100"H₂O
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Capsule Fill - DC 710
Amplifier - NO148ND

Revision - Addition of Style designation, May, 1975.

3-XJB-1/25 MCA Cast Iron Junction Box Assembly & Pressure Seal
Assembly Construction:

Terminal Block - NO148PQ
Pressure Seal Assembly - NO148PF



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

Note 2: Licensee does not state the required accuracy for the pressurizer level transmitter, nor does he provide an evaluation of the acceptability of the accuracies demonstrated by the test.

Note 3. The Licensee's SCEW sheet refers to Enclosure 12 (see page 3a) for aging. This enclosure describes the plan to evaluate aging and replacement schedules. No results from the program were included for evaluation. This program was scheduled for complete implementation by June 30, 1982.

Note 4: No information was given showing model used to be similar to that tested.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

Checksheets 5a thru 5g have been removed due to the
proprietary nature of information contained therein.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Level Transmitter	Differential Pressure Transmitters	
Manufacturer's Name (5.2.2/-/-)	Foxboro	Foxboro	
Model Number (5.2.2/-/-)	NE13AH	E10 Series See Note 1 Page 5fh	Note 3 Page 5hb
Serial Number	Not stated	E10 Series See Note 1 Page 5fh	
Features/Mounting (5.2.6/-/-)	Not stated	Horizontal	
Connections/Interfaces (5.2.6/-/-)	Not stated	Not stated	
Location/Elevation	Containment 1000.9'	N/A	
Equipment ID No.	101X4Y	N/A	
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	T3-1068	T3-1068	
Report Date	Not stated	August 1973	
Issued by		Foxboro (Performed by) Iso medix	
Prepared for		Foxboro	
Referenced Reports		None	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)	-	Monitoring and Calibration	
Operating Conditions (-/2.2.10/2.2.10)	Not stated	Not stated	
Load/Cycles/Voltage/ Current/Freq.			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	Not stated	Not stated	
Accuracy (5.2.5/-/-)	Not stated	≈ 5% output shift max.	Note 2 Page 59
Number of Specimens		8	
Test Instruments Calibrated		Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Pressurizer Level	Active	
Test Duration (5.2.1/-/-)	-	N/A, governed by dose received.	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	-	Applicable for items S/N 2692438 and 2692441 which were also tested under Test report T3-1013	
Required Function Time	-		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	-		
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	-	Radiation exposure followed MCA Test for above items.	
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	-	Not performed.	
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)	-	Not performed	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	-		
Radiation Aging, Type	-	Not performed	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	-	N/A	
Radiation Aging, Dose Rate	-		
Radiation Aging, Method	-		
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	-	Not stated	
Operational Aging (-/4.2/-)	-	Not performed	
Other Age Conditioning (-/4.2/-)	-		
Qualified Life Claimed/ Established (5.2.4/4.10/-)	Not stated	Not stated.	
Normal Ambient Temperature	Not stated	Not stated	
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	-	-	
On-Going Analysis of Failures and Degradation (7.0/-/-)	-	-	
Margin (General) (6.0/3.0/3.0)	-	-	
Margin (NUREG-0588, Cat. I) (-/3.2/-)	-	-	
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA	See T3-1013 for items S/N 2692438 and 2692441 All others not performed	X Note 2 page 64
Radiation Type	Gamma	Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	9.49×10^6	$7.6 E 7$	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	Not stated	1E6	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	-	N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	-	Not stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	-	$7.6 E 7$ rads	
Plateout Dose Considered (-/1.48/1.48)	-	Not stated	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	Not stated	$7.6 E 7$ rads.	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		For S/N 2692438 and 2692441 see T3-1013 All others not performed.	
Peak: °F/psig/RH/Time	See sheet 5e		
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	-	N/A	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	-	-	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	-	-	
Spray Density (gpm/ft ²)	-	-	
Spray Duration	-	-	
Submergence Duration (4.1.3/2.2.5/2.2.5)	-	Not performed	
In-Leakage Considered (5.2.6, 5.3.2/-/-)	-	-	
Time to Submergence	-		
Dust Environment (-/2.2.11/2.2.11)	-	Not stated	



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

Note 1.

Description of Test Items

4-20 mA dc Output Transmitters MCA/RRW* Modified

E13DM-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 2,000 lbf/in ²
S/N 2652438		Amplifier: NO148ND

Unit was previously tested in a MCA-Steam-Air Chemical Spray environment.

Report T3-1013

E13DM-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 2,000 lbf/in ²
S/N 2692439		Amplifier: NO148ND

E13DM-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 2,000 lbf/in ²
S/N 2713117		Amplifier: NO148NL

E13DH-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 6,000 lbf/in ²
S/N 2692441		Amplifier: NO148NL

Unit was previously tested in a MCA-Steam-Air-Chemical Spray environment.

Report T3-1013

E13DH-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 6,000 lbf/in ²
S/N 2692442		Amplifier: NO148NL

Amplifier remote-mounted during irradiation test.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

Note 1 continued:

E13DH-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 6,000 lbf/in ²
S/N 2713120		Amplifier: N0148NL

10-50 mA dc Output Transmitters MCA/RRW** Modified

E13DM-HSAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	75 V dc	Output Load: 600Ω
Output Current:	10-50 mA dc	MWP: 2,000 lbf/in ²
S/N 2650649		Amplifier: N0148PD

E13DM-HSAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	75 V dc	Output Load: 600Ω
Output Current:	10-50 mA dc	MWP: 2,000 lbf/in ²
S/N 2650650		Amplifier: N0148PD

*MCA/RRW Modifications

MCA - Maximum Credible Accident
RRW - Radiation Resistant Wiring
Capsule Fill - DC710 silicone fluid
4-20 mA dc output units utilize either amplifier assembly N0148ND or N0148NL. Assembly N0148ND consists of the standard E10 series 4-20 mA amplifier with radiation-resistant wiring harness. Assembly N0148NL consists of an amplifier designed for nuclear service with the radiation-resistant wiring harness. N0148NL units used in this test were prototype assemblies.

**MCA/RRW Modifications

MCA - Maximum Credible Accident
RRW - Radiation Resistant Wiring
Capsule Fill - DC710 silicone fluid
10-50 mA dc output units have standard E10 series amplifier construction with radiation-resistant wiring harness and radiation-resistant insulating sleeving. Assigned part number is N0148PD.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

Note 2: Previous MCA tests were performed on Items
S/N .2642438 and 2642441. No reason
was given for not performing similar tests
on other items, nor was any similarity
analyses performed between tested models.

Note 3: Traceability from model used to model tested
not provided.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

EQUIPMENT ITEM NO. 4
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL NE13DM, NE13DH
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 4
LICENSEE REFERENCE(S): 1171, 1157, 919, 7
FUNCTION (PLANT ID): STEAM GENERATOR LEVEL INDICATION (LT-901 A, B, C, D;
LT-904 A, B, C, D)
LICENSEE SUBMITTAL: SCEW(S): C-35

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b , 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5a through 5ha, 5ab, 5bb, 5db through 5gb
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other ()
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action .)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	X_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	X_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	X_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	X_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

LICENSEE RESPONSE TO NRC SER

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end or qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Level Transmitter	Differential and Gauge Pressure Transmitter	
Manufacturer's Name (5.2.2/-/-)	Foxboro	Foxboro	
Model Number (5.2.2/-/-)	NE13DM, NE13DH	E10 Series (See Note 1 Page 4)	
Serial Number	Not Stated	-	
Features/Mounting (5.2.6/-/-)	Not stated		
Connections/Interfaces (5.2.6/-/-)	Not stated		
Location/Elevation	Containment 1000.9 ft	N/A N/A	
Equipment ID No.	See page 1a		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	T 3-1013	T 3-1013	
Report Date	Not Stated	May 1975	
Issued by	-	Foxboro (Performed by Franklin Institute Research center)	
Prepared for	-	Foxboro	
Referenced Reports	-	None	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)	-	Monitoring and Calibration	
Operating Conditions (-/2.2.10/2.2.10)	Not stated	Not Stated.	
Load/Cycles/Voltage/ Current/Freq.			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	Not stated	Ability to operate without loss of function when submitted to MCA	Note 2
Accuracy (5.2.5/-/-)	Not stated	Not stated	
Number of Specimens	-	4	
Test Instruments Calibrated	-	Not stated	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Steam Generator Level Indication	Active	
Test Duration (5.2.1/-/-)	-	24 hours	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	> 10000 seconds	24 hours	
Required Function Time	Continuous	-	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	See other reports for additional tests	Only MCA Exposure per- formed with pretest and post-test calibration with monitoring during test.	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	Not performed	Not performed	Note 3
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)			
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type	-	Not performed	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	:	:	:
Radiation Aging, Dose Rate	:	:	:
Radiation Aging, Method	:	:	:
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	-	Not stated	:
Operational Aging (-/4.2/-)	:	Not performed	:
Other Age Conditioning (-/4.2/-)	:	None	:
Qualified Life Claimed/ Established (5.2.4/4.10/-)	Not stated see note 3	Not stated	:
Normal Ambient Temperature	:	Not stated	:
Normal Ambient Radiation	:	:	:
Normal Ambient Humidity	:	:	:
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	:	-	:
On-Going Analysis of Failures and Degradation (7.0/-/-)	:	-	:
Margin (General) (6.0/3.0/3.0)	:	-	:
Margin (NUREG-0588, Cat. I) (-/3.2/-)	:	N/A	:
1. Temperature (+15°F)	:	:	:
2. Pressure (+10%, 10 psig max)	:	:	:
3. Radiation (not required)	:	:	:
4. Time (+10%, +1 hour + function time minimum)	:	:	:



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA	LOCA (MCA)	
Radiation Type	Gamma	Not performed.	
Radiation Dose (rd) (4.1.2/1.4/1.4)	4.87 to 9.49 x 10 ⁶ R		
Radiation Dose Rate (rd/hr)	-		
Radiation Qual. Method (5.3.1/-/-)			
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	-		
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	-		
Radiation Dose (Normal + Accident) (4.1.2/-/-)	-		
Plateout Dose Considered (-/1.48/1.48)	-		
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	-		



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		6.3°F/1.7psig/Seconds	
Peak: °F/psig/RH/Time	288/60/100/2.15min	300/60/100/2 hours	Note 4
Decrease To: °F/psig/RH/Time	180/15/100/32min	244/20/100/22 hours	
Decrease To: °F/psig/RH/Time		Ambient	
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	-	Not stated	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)		Test	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700 ppm Boron	1.5% Boric Acid by Weight NaOH to adjust pH to 9.25-10	
Spray Density (gpm/ft ²)	Not stated	4	
Spray Duration	Not stated	2 hours @ pH of 9.5-10 22 hours @ pH of 8.5	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	-	
In-Leakage Considered (5.2.6, 5.3.2/-/-)	-	-	
Time to Submergence		-	
Dust Environment (-/2.2.11/2.2.11)		-	



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EQ JIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NOTES:

Note.1

Items Tested

E11GH-IINM2 Electronic Gauge Pressure Transmitter

S/N 2692435, 2713116, Style B
Calibrated Input Range: 0-2000 lbf/in²
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650 Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Amplifier - N0148ND

E11GM-ISAE-2 Electronic Gauge Pressure Transmitter

S/N 2692434, 2713115, Style B
Calibrated Input Range: 0-1000 lbf/in²
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650 Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Amplifier - N0148ND

E13DH-ISAM2 Electronic d/p Transmitter

S/N 2692441, 42, Style B
Calibrated Input Range: 0-100"H₂O
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650 Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Capsule Fill - DC 710
Amplifier - N0148NL

E13DN-ISAM2 Electronic d/p Transmitter

S/N 2692438, 39, Style B
Calibrated Input Range: 0-100"H₂O
Output: 4-20 mA dc
Supply Voltage: 30 V dc
Output Load: 650 Ω
Construction and Modifications:
MCA/Cast Iron - Base & Cover
MCA/RRW - Radiation Resistant Wiring
Paint - Americoat # 66
Capsule Fill - DC 710
Amplifier - N0148ND

Revision - Addition of Style designation, May, 1975.

3-XJB-1/25 MCA Cast Iron Junction Box Assembly & Pressure Seal
Assembly Construction:

Terminal Block - N0148PQ
Pressure Seal Assembly - N0148PF

NOTES:

Note 2: Licensee has not provided the required accuracy nor has he evaluated the as tested level for adequacy.

Notes Licensee's enclosure 12 states that an aging evaluation and maintenance program will be implemented by June 30, 1982; however, no data or program description has been provided for evaluation.

Note 4 Licensee's accident profile shows only first 10,000 seconds of accident. The test duration is 24 hours. The operating time is listed as continuous. Therefore, insufficient information has been provided to show operability for the duration of the accident and post accident period.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Level Transmitter	Differential Pressure Transmitters	
Manufacturer's Name (5.2.2/-/-)	Foxboro	Foxboro	
Model Number (5.2.2/-/-)	NE13DM, NE13DH	E10 Series See Note 1 Page 5 fa	
Serial Number	-	E10 Series See Note 1 Page 5 fa	
Features/Mounting (5.2.6/-/-)	-	Horizontal	
Connections/Interfaces (5.2.6/-/-)	-	Not stated	
Location/Elevation	Containment 1000.9ft	N/A	
Equipment ID No.	See Page 1a	N/A	
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	T3-1068	T3-1068	
Report Date		August 1973	
Issued by		Foxboro (Performed by Isomedix)	
Prepared for		Foxboro	
Referenced Reports		None	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)	-	Monitoring and Calibration	
Operating Conditions (-/2.2.10/2.2.10)	-	Not stated.	
Load/Cycles/Voltage/ Current/Freq.			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	Not stated	Not Stated	
Accuracy (5.2.5/-/-)	Not stated	± 5% output Shift max.	Note 2 Page 5f
Number of Specimens	-	3	
Test Instruments Calibrated	-	Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Steam Generator Level Indicator	Active	
Test Duration (5.2.1/-/-)	-	N/A, governed by dose received	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	>10,000 Sec	Applicable for items S/N 2692438 and 2692441 which were also tested under Test report T3-1013	
Required Function Time	Continuous		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	-		
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	-	Radiation exposure followed MCA Test for above items	
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	-	Not performed	
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)		Not performed	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type	-	Not performed	



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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	-	N/A	
Radiation Aging, Dose Rate	-		
Radiation Aging, Method	-		
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	-	Not stated	
Operational Aging (-/4.2/-)	-	Not performed	
Other Age Conditioning (-/4.2/-)	-		
Qualified Life Claimed/ Established (5.2.4/4.10/-)	Not stated	Not stated	Notes Page 5f
Normal Ambient Temperature		Not stated	
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	-	-	
On-Going Analysis of Failures and Degradation (7.0/-/-)	-	-	
Margin (General) (6.0/3.0/3.0)	-	-	
Margin (NUREG-0588, Cat. I) (-/3.2/-)		-	
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	—	See T3-1013 for items S/N 269243 and 269244 All others not performed	X Note 2 page 4a
Radiation Type	Gamma	Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	$4.87 \pm 0.19 \times 10^7$	$7.6 E 7$	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	—	$1 E 6$	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	—	N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	—	Not stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	—	$7.6 E 7$ rads	
Plateout Dose Considered (-/1.48/1.48)	—	Not stated	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	—	$7.6 E 7$ rads.	



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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		For S/N 2692438 and 2692441 see T3-1013 All others not performed	
Peak: °F/psig/RH/Time	see sheet 5e		
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)		N/A	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	see sheet 5e	-	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)		-	
Spray Density (gpm/ft ²)		-	
Spray Duration		-	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	Not performed	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		-	
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)		Not stated	



EQ JIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NOTES:

Note 1

Description of Test Items

4-20 mA dc Output Transmitters MCA/PRW* Modified

E13DM-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 2,000 lbf/in ²
S/N 2692438		Amplifier: N0148ND

Unit was previously tested in a MCA-Steam-Air Chemical Spray environment.

Report T3-1013

E13DM-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 2,000 lbf/in ²
S/N 2692439		Amplifier: N0148ND

E13DM-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 2,000 lbf/in ²
S/N 2713117		Amplifier: N0148NL

E13DH-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 6,000 lbf/in ²
S/N 2692441		Amplifier: N0148NL

Unit was previously tested in a MCA-Steam-Air-Chemical Spray environment.

Report T3-1013

E13DH-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 6,000 lbf/in ²
S/N 2692442		Amplifier: N0148NL

Amplifier remote-mounted during irradiation test.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NOTES:

Note 1 continued:

E13DH-ISAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	30 V dc	Output Load: 650Ω
Output Current:	4-20 mA dc	MWP: 6,000 lbf/in ²
S/N 2713120		Amplifier: N0148NL

10-50 mA dc Output Transmitters MCA/RRW** Modified

E13DM-HSAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	75 V dc	Output Load: 600Ω
Output Current:	10-50 mA dc	MWP: 2,000 lbf/in ²
S/N 2650649		Amplifier: N0148PD

E13DM-HSAM2 Electronic d/p Transmitter

Input Range Limits:	20-200" H ₂ O	
Test Range:	0-100" H ₂ O	
Supply Voltage:	75 V dc	Output Load: 600Ω
Output Current:	10-50 mA dc	MWP: 2,000 lbf/in ²
S/N 2650650		Amplifier: N0148PD

*MCA/RRW Modifications

MCA - Maximum Credible Accident
RRW - Radiation Resistant Wiring
Capsule Fill - DC710 silicone fluid
4-20 mA dc output units utilize either amplifier assembly N0148ND or N0148NL. Assembly N0148ND consists of the standard E10 series 4-20 mA amplifier with radiation-resistant wiring harness. Assembly N0148NL consists of an amplifier designed for nuclear service with the radiation-resistant wiring harness. N0148NL units used in this test were prototype assemblies.

**MCA/RRW Modifications

MCA - Maximum Credible Accident
RRW - Radiation Resistant Wiring
Capsule Fill - DC710 silicone fluid
10-50 mA dc output units have standard E10 series amplifier construction with radiation-resistant wiring harness and radiation-resistant insulating sleeving. Assigned part number is N0148PD.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

NOTES:

Note 2: Previous MCA tests were performed on Items
S/N 2692438 and 2692441. No reason
was given for not performing similar tests
on other items, nor was any similarity
analyses performed between tested models.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

Checksheets 5a-b, 5b-b, 5d-b-5g-b have been removed due to the
proprietary nature of information contained therein.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

EQUIPMENT ITEM NO. 5
PRESSURE SWITCH LOCATED IN THE CONTAINMENT
BARKSDALE MODEL D2TML5055
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 5
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): SIGNAL TO CLOSE IA ISOLATION VALVE ON LOW PRESSURE
(PC-1849)
LICENSEE SUBMITTAL: SCEW(S): C-30

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R) (T) QT, RT, (P) H, CS, A, S, (R), M, I, (QM), (RPN) EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment or
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☒ Relocate ~~or shield equipment from radiation source~~ outside of containment
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| <u>C.b Modification</u> | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

LICENSEE RESPONSE TO NRC SER

This switch will be upgraded to Loca
qualified or moved outside the containment.
See LER 2-007.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

EQUIPMENT ITEM NO. 6
TEMPERATURE SENSOR LOCATED IN THE CONTAINMENT
ALISON CONTROL MODEL AST60SS
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 6
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): TEMPERATURE MONITORING OF CHARCOAL FILTERS (TE-866,
TE-867)
LICENSEE SUBMITTAL: SCEW(S): C-16, -17, -18

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (~~has~~/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| <u>I.b</u> Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u>X</u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

LICENSEE RESPONSE TO NRC SER

The Licensee SCEW states:

- "Temp element is embedded in a stainless steel tube. These sensors are used for filter temperature only. During an accident condition the atmospheric condition in containment make the probability very remote that a temperature excursion high enough to endanger the charcoal filter would occur. The system does not meet single failure criteria and is not required to meet it. The District plans to replace these sensors with sensors that are tested and more fully documented.
- This model temperature sensor is currently being utilized in applications where it operates at the stated conditions. Discussions with American Air Filter indicate no LOCA testing has been done on any of the charcoal filter temperature sensors. The District feels the information supplied by the manufacturer is adequate to insure LOCA operation."

Licensee SER response:

"The Alison Controls Inc. temperature sensors are thermistor elements which make up the temperature measuring system in each of the two iodine removal charcoal filters in the containment air recirculation and iodine removal system. The plant designation for these is TE-866 and TE-867. The operator is required to monitor post LOCA filter temperatures and spray down the charcoal filters should the temperature exceed a specific point to prevent the re-release of iodine.

Based on information provided by the manufacturer, the District is confident that the sensors would survive a LOCA environment. The manufacturer designed the temperature sensors to survive in a 2000°F environment and have tested a similarly designed sensor for radiation levels up to $1.5 \times 10^8 R$. Therefore, continued operation of the plant is justified until replacement. The District intends to replace these sensors with sensors that are fully qualified. The schedule for replacement is dependent upon availability of qualified sensors, which the District is presently investigating."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

EQUIPMENT ITEM NO. 7
LIMIT SWITCH LOCATED IN THE CONTAINMENT
NAMCO MODEL EA18011302
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 7
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): POSITION INDICATION FOR VALVES (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C-26I, L, M, N, O, P, G, H, J, K, C;
-126, -126A, -26D, -26E, -26F)

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other ()
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	<i>Limit Switch</i>	Limit Switch	
Manufacturer's Name (5.2.2/-/-)	<i>NAMCO</i>	NAMCO Controls	
Model Number (5.2.2/-/-)	<i>EA 180</i>	EA-180, Type 23	
Serial Number	<i>N/A</i>	EA-180-11302, Rev.-D	
Features/Mounting (5.2.6/-/-)	<i>ON V-100</i>	Horizontal in Autoclave	
Connections/Interfaces (5.2.6/-/-)	<i>Sealed connections in 2 out of 3 containers</i>	Teflon Tape used to seal conduit threads	See Note 1
Location/Elevation		Not Applicable	
Equipment ID No.	<i>see p 1a</i>	Not Applicable	
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	<i>No I/D</i>	No Report I/D Number	
Report Date	<i>Sept. 5, 1978</i>	September 5, 1978	
Issued by	<i>NAMCO</i>	ACME CLEVELAND DEVELOPMENT COMPANY	
Prepared for	<i>N/A</i>	NAMCO CONTROLS	
Referenced Reports		Not Stated	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		Sequential Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Make/break contact	
Operating Conditions (-/2.2.10/2.2.10)		0.5Amps @ 100 Vdc	
Load/Cycles/Voltage/ Current/Freq.			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	N/A	Not Stated	
Accuracy (5.2.5/-/-)		Not Stated	
Number of Specimens		One (1)	
Test Instruments Calibrated		Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	active	Active	
Test Duration (5.2.1/-/-)	N/A	30 days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	< 24 hrs	Not Applicable	
Required Function Time	continuous	Not Applicable	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	Inspection/Base line data Heat/Humidity Aging Mechanical Aging Irradiation Seismic testing LOCA Simulation	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	N/A		
Thermal Aging/Basis	analysis dated 7/80	200 hours @ 200°F per ANSI draft std N278.2.1	Note 2
Material Aging Evaluation (7.0/-/-)	Arrhenius + montmorency schubert	Not Stated	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Not Stated	
Radiation Aging, Type		Gamma	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	<i>Not Stated</i>	204 Megarads	*
Radiation Aging, Dose Rate		0.7 Megarads/ hour	
Radiation Aging, Method		Test	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	<i>↓</i>	Not Stated	
Operational Aging (-/4.2/-)	<i>N/A</i>	100,000 Actuation Cycles	
Other Age Conditioning (-/4.2/-)	<i>↓</i>	Not Stated	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	<i>40 years</i>	None Claimed	<i>Note 2</i>
Normal Ambient Temperature	<i>Not Stated</i>	Not Applicable	
Normal Ambient Radiation	<i>↓</i>	Not Applicable	
Normal Ambient Humidity		Not Applicable	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	<i>yes - replace elastomers every 4-7 years</i>	Not Applicable	
On-Going Analysis of Failures and Degradation (7.0/-/-)	<i>Fit Corrosion Program</i>	Not Applicable	
Margin (General) (6.0/3.0/3.0)	<i>N/A</i>	Not Stated/ Not Applicable	
Margin (NUREG-0588, Cat. I) (-/3.2/-)	<i>↓</i>	Not Stated	
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			

* Radiation aging and accident doses were combined in a single Exposure prior to the LOCA Simulation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	<i>LOCA</i>	LOCA/MSLB	
Radiation Type	<i>Gamma</i>	Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	<i>1.09-1.12 x 10⁷</i>	204 Megarads	*
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	<i>not stated</i>	0.7 Megarads per hour Test	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)		Not Applicable	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)		Not Stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)		Not Stated	
Plateout Dose Considered (-/1.48/1.48)		Not Applicable	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		Not Applicable	

*Radiation aging and accident doses were combined in a single Exposure prior to the LOCA Simulation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		11°F/8psi/sec	
Peak: °F/psig/RH/Time	<i>see profile p-59.</i>	340/115/100/3h4s	
Decrease To: °F/psig/RH/Time		140/-/-/2h4r 340/105/100/3hrs	
Decrease To: °F/psig/RH/Time		320/76/100/2hrs 300/57/100/1hr	
Decrease To: °F/psig/RH/Time		250/25/100/4days 150/10/100/25 days	
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	<i>N/A</i>	Not Applicable	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	<i>↓</i>	Test	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	<i>70 ppm Boric</i>	Boric Acid/water/sodium thiosulfate/sodium hydrox- ide	
Spray Density (gpm/ft ²)	<i>Not stated</i>	0.15	
Spray Duration	<i>↓</i>	30Days	
Submergence Duration (4.1.3/2.2.5/2.2.5)		Not Applicable	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		Not Applicable	
Time to Submergence		Not Applicable	
Dust Environment (-/2.2.11/2.2.11)	<i>↓</i>	Not Applicable	



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

NOTES:

1. The report states "The switch was mounted in the chamber in a horizontal position such that the lever shaft pointed upwards. The switch was attached by means of a threaded pipe. Teflon tape was used for sealing the pipe threads." +

+No attempt is made to qualify the connection method. These test procedures are based on the assumption that the user will ensure that no steam enters the unit via this connection during an actual LOCA. "

The licensee states:

The switches were sealed & tested to 70 PSig. The District considers them capable of withstanding submergence.

2. The report states

"Heat aging. The heat aging test consisted of holding the unit suspended over water in a tank at a temperature of 200°F for 200 hours." +

+Heat aging conditions were taken from ANSI Draft Standard N278.2.1 (Draft 3, Rev. 0). The correlation between these conditions and the qualified life is not known.

The Licensee states

Switches qualified for 40 years using NAMCO recommended maintenance. NAMCO letter dated 7/16/80/.



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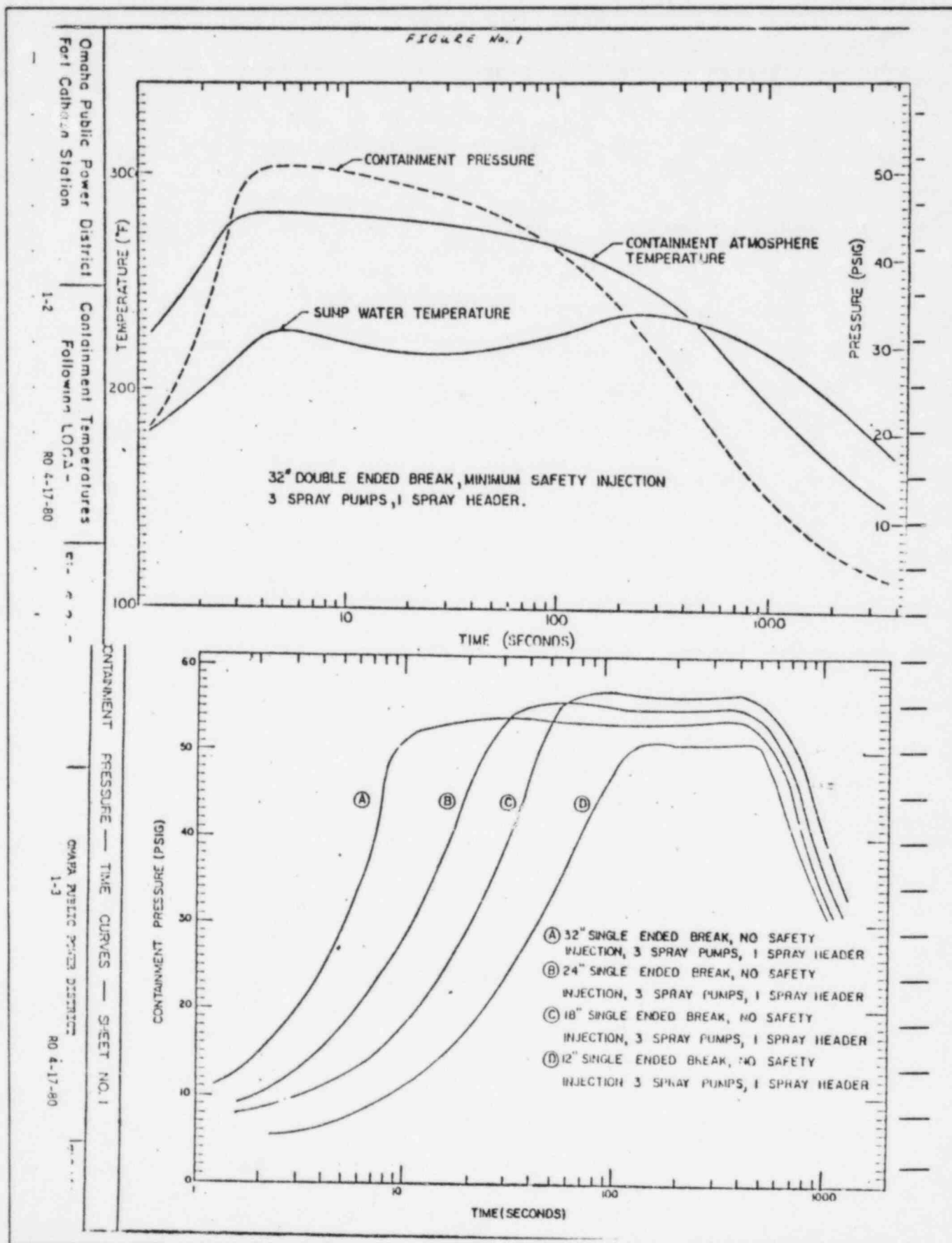
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7





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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

EQUIPMENT ITEM NO. 8

LIMIT SWITCH LOCATED IN ROOM 13

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 8

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): POSITION INDICATOR FOR WASTE DISPOSAL VALVES (HCV500A, B; HCV508A, B; HCV509A, B; HCV507A, B)

LICENSEE SUBMITTAL: SCEW(S): R1-10

FUNCTION (PLANT ID): POSITION INDICATOR FOR STEAM GENERATOR FEEDWATER & BLOWDOWN VALVES (HCV-1387B, HCV-1388B)

LICENSEE SUBMITTAL: SCEW(S): R1-8

FUNCTION (PLANT ID): POSITION INDICATOR FOR LOW PRESSURE SAFETY INJECTION VALVE (FCV-326, HCV-341)

LICENSEE SUBMITTAL: SCEW(S): R1-6

FUNCTION (PLANT ID): POSITION INDICATION (HCV349, HCV350)

LICENSEE SUBMITTAL: SCEW(S): R43

FUNCTION (PLANT ID): POSITION INDICATOR FOR COMPONENT COOLING VALVES (HCV-467B, D; HCV-438B, D)

LICENSEE SUBMITTAL: SCEW(S): R1-4

FUNCTION (PLANT ID): POSITION INDICATOR FOR CHEMICAL VOLUME CONTROL SYSTEM VALVES (HCV-204, HCV-206)

LICENSEE SUBMITTAL: SCEW(S): R1-2

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), (T), QT, RT, (P), H, CS, A, S, (R), (M), I, (QM), RPN, (EXN), SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLB and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLB. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limitorque valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used or Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, ASCO was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction in the integrated dose. The use of 100 hours is considered valid because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. f

NOTES:

(1) The licensee did not provide a plan and schedule for qualifying this equipment item to the radiation requirement of 4×10^6 rads. Further, no supporting documentation was furnished for the claimed radiation exposure capability of 10^6 rads which was stated to have been arrived at via a materials analysis. Therefore, this equipment item was judged to be deficient with respect to radiation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

EQUIPMENT ITEM NO. 9

LIMIT SWITCH LOCATED IN ROOM 21

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 9

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): RADWASTE WATER SYSTEM VALVE POSITION INDICATION
(HCV-2808C, D; -2810C, D; -2812C, D; -2813C, D)

LICENSEE SUBMITTAL: SCEW(S): I-16

FUNCTION (PLANT ID): COMPONENT COOLING WATER VALVE POSITION INDICATION
(HCV-2808A, B; -2810A, B; -2812A, B; -2813A, B)

LICENSEE SUBMITTAL: SCEW(S): I-15

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), (M), I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, 3b, 3c, ~~3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/~~has not~~) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

**EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2****AGING**

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLB and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLB. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limitorque valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used on Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, ASCO was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction in the integrated dose. The use of 100 hours is considered valid because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

NOTES:

(1) The Licensee did not provide supporting documentation for the claimed radiation exposure capability for this equipment item which was stated to have been arrived at via a materials analysis. Further, no plan and schedule was furnished for qualifying this equipment item to the radiation requirement of 7×10^6 rads.



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FRC Assignment No. 13
FRC Task No. 5C4

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

EQUIPMENT ITEM NO. 10
LIMIT SWITCH LOCATED IN ROOM 22
FISHER CONTROLS MODEL 304
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 10
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): RADWASTE WATER SYSTEM VALVE POSITION INDICATION
(HCV-2809C, D; -2811C, D; -2814C, D; -2815C, D)
LICENSEE SUBMITTAL: SCEW(S): I-17
FUNCTION (PLANT ID): POSITION INDICATION FOR COMPONENT COOLING VALVES
(HCV-2809A, B; -2811A, B; -2814A, B; -2815A, B)
LICENSEE SUBMITTAL: SCEW(S): I-7

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), (M), I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has ~~not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW
- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|---------------------------------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <input checked="" type="radio"/> II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will entail what subcomponent replacement is required and what methodology will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLB and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLB. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limitorcue valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used or Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, ASCO was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction in the integrated dose. The use of 100 hours is considered valid.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



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FRC Task No. 509

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

NOTES:

(1) The Licensee did not provide supporting documentation for the claimed radiation exposure capability for this equipment item which was stated to have been arrived at via a materials analysis. Further, no plan and schedule was furnished for qualifying this equipment item to the radiation requirement of 7×10^6 rads.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

EQUIPMENT ITEM NO. 11
LIMIT SWITCH LOCATED IN ROOM 59
FISHER CONTROLS MODEL 304
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 11
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): COOLANT WATER INLET VALVES TO SAFETY INJECTION TANKS
LEAKAGE COOLER (HCV-425B, D)
LICENSEE SUBMITTAL: SCEW(S): R2-2
FUNCTION (PLANT ID): NITROGEN SYSTEM ISOLATION VALVES (HCV-2603A, HCV-2604A)
LICENSEE SUBMITTAL: SCEW(S): R2-8
FUNCTION (PLANT ID): CONTAINMENT SPRAY HEADER ISOLATION VALVES (HCV-344,
HCV-345)
LICENSEE SUBMITTAL: SCEW(S): R2-6
FUNCTION (PLANT ID): CONTAINMENT HVAC ISOLATION VALVES (HCV-742A, B, C, D)
LICENSEE SUBMITTAL: SCEW(S): R2-4

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, (T), QT, RT, (P), H, CS, A, S, (R), M, I, (QM), RPN, (EXN), SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has ~~not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|---------------------------------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <input checked="" type="radio"/> II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. //

RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLS and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLS. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limitorque valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used on Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, ASCO was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction in the integrated dose. The use of 100 hours is considered valid.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

NOTES:

(1) The Licensee did not provide supporting documentation for the claimed radiation exposure capability for this equipment item which was stated to have been arrived at via a materials analysis. Further, no plan and schedule was furnished for qualifying this equipment item to the radiation requirement of 8×10^5 rads.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

EQUIPMENT ITEM NO. 12
LIMIT SWITCH LOCATED IN ROOM 60
FISHER CONTROLS MODEL 304
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 12
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): CONTAINMENT HVAC ISOLATION VALVES (PCV-742F, H; HCV-746B)
LICENSEE SUBMITTAL: SCEW(S): R3-2

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, (T), QT, RT, (P), H, CS, A, S, (R), M, I, (QM), RPN, (EXN), SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/~~has not~~) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (Establish Preventive Maintenance Program)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action Agng Program Implemented by June 20, 1962.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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FRC Project No. C5257

FRC Assignment No. 13

FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLB and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLB. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limitorque valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used or Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, ASCO was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction in the integrated dose. The use of 100 hours is considered valid



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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FRC Assignment No. 13

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

NOTES:

(1) The Licensee did not provide supporting documentation for the claimed radiation exposure capability for this equipment item which was stated to have been arrived at via a materials analysis. Further, no plan and schedule was furnished for qualifying this equipment item to the radiation requirement of 6×10^5 rads.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

EQUIPMENT ITEM NO. 13

LIMIT SWITCH LOCATED IN ROOM 69

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 13

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): POSITION INDICATION FOR COMPONENT COOLING OUTLET VALVES
TO CONTAINMENT AIR COOLING UNIT (HCV-400C, -401C, -402C,
-403C)

LICENSEE SUBMITTAL: SCEW(S): R4-4

FUNCTION (PLANT ID): DEMINERALIZED WATER ISOLATION VALVE POSITION INDICATION
(HCV-1559A, B; HCV-1560A, B)

LICENSEE SUBMITTAL: SCEW(S): R4-8

FUNCTION (PLANT ID): INSTRUMENT AIR ISOLATION VALVE POSITION INDICATION
(PCV-1849)

LICENSEE SUBMITTAL: SCEW(S): R4-10

FUNCTION (PLANT ID): PLANT AIR ISOLATION VALVE POSITION INDICATION (HCV-1749)

LICENSEE SUBMITTAL: SCEW(S): R4-12

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, (T), QT, RT, (P), H, CS, A, S, (R), M, I, (QM), RPN, (EXN), SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|---------------------------------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | I.f.a Exempt |
| <input checked="" type="radio"/> II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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FRC Assignment No. 13
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLB and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLB. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limitorque valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used or Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, ASCO was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction in the integrated dose. The use of 100 hours is considered valid



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue it's inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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FRC Project No. C5257

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NOTES:

(1) The Licensee did not provide supporting documentation for the claimed radiation exposure capability for this equipment item which was stated to have been arrived at via a materials analysis. Further, no plan and schedule was furnished for qualifying this equipment item to the radiation requirement of 8×10^5 rads.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

EQUIPMENT ITEM NO. 14
LIMIT SWITCH LOCATED IN ROOM 81
FISHER CONTROLS MODEL 304
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 14
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): CCW INLET & DISCHARGE VALVE POSITION INDICATION
(HCV-2898A, B; HCV-2899A, B)
LICENSEE SUBMITTAL: SCEW(S): S-1
FUNCTION (PLANT ID): MAIN STEAM SAFETY RELIEF VALVE POSITION INDICATION
(MS-291, 292)
LICENSEE SUBMITTAL: SCEW(S): S-13
FUNCTION (PLANT ID): RAW WATER VALVE POSITION INDICATION (HCV-2898C, D;
-2899C, D)
LICENSEE SUBMITTAL: SCEW(S): S-15

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QI, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,
S13, S15 ONLY
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (~~has~~/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1988.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|---------------------------------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <input checked="" type="radio"/> II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	<u>X</u>
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

**EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14**AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.

Notes extracted from SCEWS

- 1) Limit SW Functions to provide indication only. SW is designed to operate continuously @180°F. For the short time the Rm.81 temp is @212°F no damage will occur.
- 2) Based on watertight enclosure rated to not leak at a static head of 6 ft of water.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

LONG TERM CORE COOLING
[Ref. I.D. MS-291, -292]

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

NOTES:

(1) The Licensee did not provide supporting documentation to substantiate the stated capabilities of this equipment item regarding temperature, pressure and humidity. The bases for qualification of this item to the levels indicated on the SCEW sheets were judged to be inadequate. Therefore, this equipment item was concluded to be deficient with respect to temperature, pressure and humidity (steam exposure) requirements.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

EQUIPMENT ITEM NO. 15

LIMIT SWITCH LOCATED IN ROOM 69

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 15

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): COMPONENT COOLING WATER TO CONTAINMENT AIR COOLING UNITS
VALVE ACTUATORS POSITION INDICATION (HCV-400A-D;
-401A-D; -402A-D; -403A-D)

LICENSEE SUBMITTAL: SCEW(S): R4-3

FUNCTION (PLANT ID): RAW WATER INLET VALVES TO CONTAINMENT AIR COOLERS
POSITION INDICATION (HCV-400E, F; -401E, F; -402E, F;
-403E, F)

LICENSEE SUBMITTAL: SCEW(S): R4-14

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

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Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

*Item 7 contains evaluation of
qualification.*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

EQUIPMENT ITEM NO. 16
LIMIT SWITCH LOCATED IN ROOM 21
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 16
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAFETY INJECTION RADWASTE TREATMENT DISCHARGE VALVE
POSITION INDICATION (HCV-383-1, -383-2)
LICENSEE SUBMITTAL: SCEW(S): I-14

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER	3a, 3b, 3c, 3d
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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and ~~or~~ will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

For evaluation refer to item 7



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

EQUIPMENT ITEM NO. 17
LIMIT SWITCH LOCATED IN ROOM 21
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 17
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAFETY INJECTION PUMP ISOLATION VALVE POSITION
INDICATION (HCV-2917, -2927)
LICENSEE SUBMITTAL: SCREW(S): 1-5

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CB, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER	3a, 4b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

For evaluation refer to item 7



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

EQUIPMENT ITEM NO. 18
LIMIT SWITCH LOCATED IN ROOM 22
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 18
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAFETY INJECTION PUMP ISOLATION VALVE POSITION
INDICATION (HCV-2907, -2908)
LICENSEE SUBMITTAL: SCEW(S): I-6

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/~~has~~ not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has~~ not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/~~has~~ not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/~~has~~ not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
 - ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/~~has~~ not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*For detailed evaluation,
refer to Item 7*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

EQUIPMENT ITEM NO. 19
LIMIT SWITCH LOCATED IN ROOM 13
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 19
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAFETY INJECTION ISOLATION VALVE POSITION INDICATION
(HCV-306, -307)
LICENSEE SUPPLY: SCEW(S): RI-15

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*In detailed evaluation, refer
to item 7*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

EQUIPMENT ITEM NO. 20
LIMIT SWITCH LOCATED IN ROOM 21
NAMCO MODEL D2400X
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 20
LICENSEE REFERENCE(S): 12
FUNCTION (PLANT ID): HPSI PUMP DISCHARGE HEADER ISOLATION VALVE POSITION
INDICATION (HCV-304, -305)
LICENSEE SUBMITTAL: SCEW(S): I-13

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), (M), I, CM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW
- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

RADIATION ENVIRONMENT OUTSIDE CONTAINMENT
(RECIRCULATING FLUID ROOMS)

As directed by IE Bulletin 79-018 and clarified in Supplement No. 2 to the bulletin, the District has included in its evaluation equipment required to function following a LOCA or MSLS and located outside containment but subject to a high radiation environment due to recirculation piping. In determining the radiation levels for which the equipment must be qualified, the District assumed the recirculating fluid source terms to be those specified in NUREG-0578. The NUREG-0578 source terms for LOCA consist of 100% noble gases, 50% iodine, and 1% particulates. In the areas where fluid is recirculated, the LOCA radiation levels in all cases exceed those for the MSLS. The total exposure for which the equipment must be qualified, as indicated on the work sheets, represents the integrated dose over 1000 hours using the NUREG-0578 source terms.

With the exception of Limiting Valve operators and the safety injection pump motors, there is no documentation to support radiation testing of the electrical equipment outside containment. Either no testing was done or it was not documented. To determine the qualification of this equipment, manufacturers' information was used or Table C-1 of the bulletin was used in conjunction with the list of materials supplied by the manufacturer. As indicated in the individual work-sheets, much of the equipment outside containment does not meet the NUREG-0578 qualification criteria for radiation.

The District feels that several factors must be considered in the qualification evaluation for the high radiation areas. Of prime importance is the assurance of proper equipment operation. As the accident mitigation system is presently designed, all automatic operations take place prior to recirculation and in the main steam break case the radiation would not be expected to increase until the station went on residual heat removal system (RHRS). For the RHRS equipment which must be used POST LOCA the qualification is at least of the same order of magnitude (with the exception of the SI pump suction and discharge solenoid valves) and it is expected the cold shutdown can be achieved. In the case of the SI pump suction and discharge valve solenoids, A300 was contacted and provided an analysis stating that for the service the solenoids in question would be adequate.

The District also feels that the IE Bulletin Supplement No. 2 required source terms are overly conservative. A letter of clarification concerning NUREG-0660 permitted the exclusion of noble gases from recirculating fluids. These represent strong, long half life source terms. These source terms are for use in shielding evaluation for personnel access which would be expected to be considerably more sensitive than the electrical equipment under consideration. It should also be noted that a reduction from 1000 to 100 hours would result in a 40% reduction



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

in the integrated dose. The use of 100 hours is considered valid because it is unlikely that full time operation of recirculating systems would be necessary 100 hours after the LOCA.

Based on this, the District feels that an adequate level of safety is assured.

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

NOTES:

(1) The Licensee did not provide supporting documentation in the form of test results to substantiate the stated capability for temperature, humidity and radiation for this equipment item. Regarding temperature and humidity, NAMCO Controls catalog EA-79 is cited as the source documentation. This was judged to be inadequate. Regarding radiation exposure, the Licensee stated that the switch would not be expected to fail despite a radiation capability of 10^5 rads (based on a materials analysis) versus a requirement to survive 7×10^6 rads.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

EQUIPMENT ITEM NO. 21
LIMIT SWITCH LOCATED IN ROOM 60
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 21
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAMPLING SYSTEM ISOLATION VALVE POSITION INDICATION
(HCV-2504B, -2506B, -2507B)
LICENSEE SUBMITTAL: SCEW(S): R3-4

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW
- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*In detailed evaluation, refer to
item 7.*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

EQUIPMENT ITEM NO. 22

LIMIT SWITCH LOCATED IN THE CONTAINMENT

NAMCO MODEL EA180

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 22

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): VALVE POSITION INDICATION (PCV-742A)

LICENSEE SUBMITTAL: SCEW(S): C-33

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Checksheet Page No.

Equipment Item

1a

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1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 52

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

In Evaluation, refer to Item 7



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NRC Contract No. NRC-03-79-118
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

EQUIPMENT ITEM NO. 23

LIMIT SWITCH LOCATED IN THE CONTAINMENT

NAMCO MODEL EA180

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 23

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): VALVE POSITION INDICATION (PCV-742A, B; HCV-725A, B)

LICENSEE SUBMITTAL: SCEW(S): C-31

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/~~or~~ will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*In detailed evaluation, refer to
item 7*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

EQUIPMENT ITEM NO. 24

LIMIT SWITCH LOCATED IN ROOM 69

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 24

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): CONTAINMENT PURGE ISOLATION VALVE POSITION INDICATION
(PCV-742B, -742)

LICENSEE SUBMITTAL: SCEW(S): R4-6

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER

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System Consideration Review

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Equipment Environmental Qualification Review

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5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

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Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

In evaluation refer to item 7



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

EQUIPMENT ITEM NO. 25
LIMIT SWITCH LOCATED IN ROOM 21
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 25
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAFETY INJECTION ISOLATION VALVE POSITION INDICATION
(HCV-2947, -2948)
LICENSEE SUBMITTAL: SCEW(S): I-12
FUNCTION (PLANT ID): SAFETY INJECTION DISCHARGE LINE ISOLATION VALVE POSITION
INDICATION (HCV-2918, -2928)
LICENSEE SUBMITTAL: SCEW(S): I-11

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/~~or~~ will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

In detailed evaluation refers to item 7



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

EQUIPMENT ITEM NO. 26
LIMIT SWITCH LOCATED IN ROOM 22
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 26
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): LPSI ISOLATION VALVE POSITION INDICATION (HCV-2937,
-2938, -2967, -2968, -2977, -2978)
LICENSEE SUBMITTAL: SCEW(S): I-10
FUNCTION (PLANT ID): CONTAINMENT SPRAY PUMP ISOLATION VALVE POSITION
INDICATION (HCV-2957 & -2958)
LICENSEE SUBMITTAL: SCEW(S): I-8, -9

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Checksheet Page No.

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Summary of Licensee Responses to the NRC SER

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other ()
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action .)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*In detailed evaluation, refer to
item 7*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

EQUIPMENT ITEM NO. 27

LIMIT SWITCH LOCATED IN ROOM 59

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 27

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): HYDROGEN CONTAINMENT SAMPLING VALVE POSITION INDICATION
(HCV-883A, -884A)

LICENSEE SUBMITTAL: SCEW(S): R7-2

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

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Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/~~or~~ will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| <u>I.a Qualified</u> | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*In detailed evaluation refer to
item 7*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

EQUIPMENT ITEM NO. 28

MOTORIZED VALVE ACTUATOR LOCATED IN MAIN STEAM AND FEEDWATER PENETRATION ROOM (ROOM 81)

LIMITORQUE MODEL SMB

REQUIRED OPERATING TIME: NOT STATED

TER CHECKSHEET NO. 28

LICENSEE REFERENCE(S): 663

FUNCTION (PLANT ID): ACTUATES FEEDWATER INLET VALVE TO STEAM GENERATOR (HCV-1385, -1386)

LICENSEE SUBMITTAL: SCEW(S): S-9

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, 3b, ~~3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.

☒ The Licensee (has/has not) specifically stated that the equipment ~~is qualified and/or~~ will function when exposed to the applicable DBE environmental service conditions.

☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.

☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.

☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.

☒ Corrective action specified by the Licensee:

☐ Equipment replacement with qualified equipment

☐ Equipment modification

☐ Equipment relocation above submergence level

☐ Relocate or shield equipment from radiation source

☐ Verify qualification by additional (testing/analysis)

☐ Equipment relocation to a mild environment

☐ Qualification testing of equipment in progress

☒ Other (AGING and PREVENTATIVE MAINTENANCE)

☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM by June 30, 1982.)

☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-058R, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

See Evaluation on Page 5f



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

LICENSEE RESPONSE TO NRC SER

Notes:

- 1) Operates once for initial containment isolation at initial event.
- 2) See Enclosure #12.
- 3) It is the District's engineering judgement that the test conditions of 212°F, 7" H₂O Pressure for 6 hours is adequate to demonstrate qualification to 1.2 psig, 216°F for the MSLB profile. The additional pressure should not effect valve operation.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

LICENSEE RESPONSE TO NRC SER

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- ____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- ____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- ____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

1. The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
4. The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
5. The referenced test report did not provide a technical basis for the qualified life claimed in the report.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

EQUIPMENT ITEM NO. 29

MOTORIZED VALVE ACTUATOR LOCATED IN MAIN STEAM AND FEEDWATER PENETRATION ROOM
(ROOM 81)

LIMITORQUE MODEL SMB

REQUIRED OPERATING TIME: NOT STATED

TER CHECKSHEET NO. 29

LICENSEE REFERENCE(S): 1590, 662

FUNCTION (PLANT ID): ACTUATES FEEDWATER INLET VALVE TO STEAM GENERATOR
(HCV-1384)

LICENSEE SUBMITTAL: SCEW(S): S-16

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	<u> </u>
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

See Evaluation on Page 5f.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

LICENSEE RESPONSE TO NRC SER

Notes:

- 1) Operates once for initial containment
isolation at initial event.

page 6-117 (S-16)
R1 8-27-81

HCV-1384 normally
closed, remote manual operation only.

from page 6-121
(S-16)

RO 4-17-80



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- ____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- ____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- ____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a longtime frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

EQUIPMENT ITEM NO. 30
SOLENOID VALVE LOCATED IN ROOM 59
VALCOR MODEL V52660529568
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 30
LICENSEE REFERENCE(S): 1835
FUNCTION (PLANT ID): HYDROGEN ANALYZER ISOLATION VALVES (HCV-820A, -821A,
-883B, -884B)
LICENSEE SUBMITTAL: SCEW(S): R7-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, (S), (R), M, I, (QM), (RPN), EXN, SEN, QI, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------------------|--------------------------------|
| <input checked="" type="radio"/> I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no. 114 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

EQUIPMENT ITEM NO. 31

MOTORIZED VALVE ACTUATOR LOCATED IN MAIN STEAM AND FEEDWATER PENETRATION ROOM (ROOM 81)

LIMITORQUE MODEL SMB000

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 31

LICENSEE REFERENCE(S): 662

FUNCTION (PLANT ID): MAIN STEAM REMOTE OPERATED SAFETY VALVE (HCV-1041C, HCV-1042C)

LICENSEE SUBMITTAL: SCEW(S): S20

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.

☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.

☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.

☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.

☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.

☒ Corrective action specified by the Licensee:

☐ Equipment replacement with qualified equipment

☐ Equipment modification

☐ Equipment relocation above submergence level

☐ Relocate or shield equipment from radiation source

☐ Verify qualification by additional (testing/analysis)

☐ Equipment relocation to a mild environment

☐ Qualification testing of equipment in progress

☒ Other (AGING & PREVENTATIVE MAINTENANCE)

☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM BY JUNE 30, 1982.)

☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

See Evaluation on Page 5f.



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FRC Task No. 497

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

LICENSEE RESPONSE TO NRC SER

Notes:

1. See Enclosure #12.
2. Manual Operation, Normally closed

from pg. 6-96A
(R1) 10-21-80

Notes:

- 1) Operates once for initial containment isolation at initial event, HCV-1041C
HCV-1042C only

from pg. 6-121
(RΦ) 4-17-80



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

LICENSEE RESPONSE TO NRC SER

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that subcomponent replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- ____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- ____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- ____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

EQUIPMENT ITEM NO. 32
MOTORIZED VALVE ACTUATOR LOCATED IN ROOM 13
LIMITORQUE MODEL SMB000
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 32
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): ACTUATES CHARGING SYSTEM INLET VALVE TO HPSI HEADER
(HCV-308)
LICENSEE SUBMITTAL: SCEW(S): RI-11

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e , 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See Evaluation on Page 5 and 4b



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

LICENSEE RESPONSE TO NRC SER

3.0 SER Section 4 Qualification of Equipment (Continued)

These items are part of the control room HVAC units. Appendix M of the FSAR addresses the loss of these in the event of a MSLE in Room 81. If the accident takes place in containment, the HVAC units are in a normal room environment. No further consideration is necessary. The units are not required to be qualified.

Motor Operated Valves

Manufacturer: Model No./Finding:

LIMITORQUE Motor Operated - SMB-000
NRC Items - R1-11
Submittal Pages - 6-75, 6-96A
Deficiencies - T, P, QM-EXN

LIMITORQUE Motor Operated - SMB-003
NRC Item - R5-1
Submittal Page - 6-4
Deficiencies - T, P, R, EXN

LIMITORQUE Motor Operated - SMB-2
NRC Item - R1-12
Submittal Page - 6-92
Deficiency - T, P, QM-EXN

- * The concerns with the Limitorque Operators are the same as those addressed in the ASCO solenoid review for the controlled side of the auxiliary building. These operators were tested for 25 psig, 245°F, and radiation. No qualification problems should be encountered as these do not impact plant safety. The worksheets will be updated to reflect this.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for ~~concurrence~~/non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIb)
- Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- Backup (equipment/system) is subject to a potentially disabling single active failure.
- Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

Reason for Concurrence

- The equipment's accident mitigating function is completed prior to the onset of the hostile environment. No subsequent functions are necessary. See note (1) below. (NRC Qualification Evaluation Category IIIb)
- Other (see page)
- Resultant NRC Qualification Evaluation Category (IIIa/IIIb)
- Note 1: The Licensee (has/has not) stated that failure of the primary equipment will not affect other safety-related equipment or cause an operator to be misled. (See page)

Reason for Non-Concurrence

- Although backup equipment is available, it is not technically sound to relinquish defense-in-depth for this function.
- Backup (equipment/system) is not safety-related.
- This equipment is necessary for the operator to ensure an ESF system is performing its intended safety function.
- The rationale presented by the Licensee is not supported by objective technical evidence.
- ☒ Other (see page 4b)

LICENSEE STATEMENT

See page 3a of this checksheet.

EVALUATION OF LICENSEE STATEMENT

The licensee's system component evaluation worksheet (SCEW) describes the function of this device as,

"Motor operated charging system inlet valve to HPSI header"

On page 3a, the licensee states that these equipment items,

"are part of the control room HVAC units."

This confusion necessitates the assumption of the conservative function and therefore requires the qualification of this item.



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A, C)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.

C. The licensee has also referenced a letter from Limitorgue dated 3-26-79, but this document was not submitted for review.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

EQUIPMENT ITEM NO. 33
MOTORIZED VALVE ACTUATOR LOCATED IN ROOM 13
LIMITORQUE MODEL SMB2
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 33
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): ACTUATES SHUTDOWN COOLING LINE ISOLATION VALVE (HCV-347)
LICENSEE SUBMITTAL: SCEW(S): R1-12

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T QT, RT, P H, CS, A, S, (R), M, I, QM RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e , 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other ()
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW
- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See Evaluation on Page 4b & 5f.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

LICENSEE RESPONSE TO NRC SER

3.0 SER Section 4 Qualification of Equipment (Continued)

These items are part of the control room HVAC units. Appendix M of the FSAR addresses the loss of these in the event of a MSLB in Room 31. If the accident takes place in containment, the HVAC units are in a normal room environment. No further consideration is necessary. The units are not required to be qualified.

Motor Operated Valves

Manufacturer:

Model No./Finding:

LIMITORQUE

Motor Operated - SMB-000
NRC Items - R1-11
Submittal Pages - 6-75, 6-96A
Deficiencies - T, P, QM-EXN

LIMITORQUE

Motor Operated - SMB-003
NRC Item - R5-1
Submittal Page - 6-4
Deficiencies - T, P, R, EXN

LIMITORQUE

Motor Operated - SMB-2
NRC Item - R1-12
Submittal Page - 6-92
Deficiency - T, P, QM-EXN

- * The concerns with the Limitorque Operators are the same as those addressed in the ASCO solenoid review for the controlled side of the auxiliary building. These operators were tested for 25 psig, 245°F, and radiation. No qualification problems should be encountered as these do not impact plant safety. The worksheets will be updated to reflect this.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for ~~concurrence~~ non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

Reason for Non-Concurrence

— Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)

— Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.

— Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIb)

— Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.

— Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIq)

— Backup (equipment/system) is subject to a potentially disabling single active failure.

— Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.

— Failure of the primary equipment can result in erroneous indication which could mislead an operator.

— Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

Reason for Concurrence

— The equipment's accident mitigating function is completed prior to the onset of the hostile environment. No subsequent functions are necessary. See note (1) below. (NRC Qualification Evaluation Category II(b))

— Other (see page)

— Resultant NRC Qualification Evaluation Category (IIIa/IIIb)

— Note 1: The Licensee (has/has not) stated that failure of the primary equipment will not affect other safety-related equipment or cause an operator to be misled. (See page)

Reason for Non-Concurrence

— Although backup equipment is available, it is not technically sound to relinquish defense-in-depth for this function.

— Backup (equipment/system) is not safety-related.

— This equipment is necessary for the operator to ensure an ESF system is performing its intended safety function.

— The rationale presented by the Licensee is not supported by objective technical evidence.

X Other (see page 4b)

LICENSEE STATEMENT

See page 3a of this checksheet.

EVALUATION OF LICENSEE STATEMENT

On The licensee's System Component Evaluation Worksheet (SCEW) The function is stated as,
" Motor operated shutdown cooling line isolation valve."

On Page 3a, The licensee states That These equipment items,

" are part of The control room HVAC units."

This confusion necessitates the assumption of The conservative function and Therefore require it to be qualified.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A, C)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- _____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- _____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- _____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique.

For this equipment item (circled items apply):

1. The vendor has not established a qualified life estimate based on an acceptable technique.

2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)

3. The referenced test report did not include thermal aging in the test program.

4. The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.

5. The referenced test report did not provide a technical basis for the qualified life claimed in the report.

C. The licensee has also referenced a letter from Limitorgue dated 3-26-79, but this document was not provided for review.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

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It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

EQUIPMENT ITEM NO. 34
MOTORIZED VALVE ACTUATOR LOCATED OUTSIDE CONTAINMENT
LIMITORQUE MODEL SMB0
REQUIRED OPERATING TIME: 21 MINUTES
TER CHECKSHEET NO. 34
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): CONTAINMENT SUMP RECIRCULATION TO HPSI, LPSI, &
CONTAINMENT SPRAY (HCV-383-3, -383-4)
LICENSEE SUBMITTAL: SCEW(S): C-15

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

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Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

See Evaluation on Page 5f.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

LICENSEE RESPONSE TO NRC SER

Notes:

- 1) HCV-383-3 & HCV-383-4 are required to open to provide suction to HPSI pumps after SIRWT tank inventory is exhausted. This occurs approximately 20 minutes into the event, & stroke time is 10 seconds.
 - 2) HCV-383-3 & 4 are located outside the containment in TK-SI9 & TK-SI-10. They are physically separated by the containment wall from the inside of the containment. TK-SI-9 & 10 are considered an extension of containment for isolation only. TK-SI-9 & 10 are not subject to flooding or containment Loca conditions.
 - 3) 1000 hrs operation.
-
3. Radiation data for HCV348, HCV-383-3 and HCV-383-4 is being refined for long term cooling. This information will be supplied to the NRC by March 15, 1981.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- ____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- ____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- ____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue it's inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

EQUIPMENT ITEM NO. 35
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMB0
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 35
LICENSEE REFERENCE(S): 162, 662
FUNCTION (PLANT ID): ACTUATES HIGH PRESSURE INJECTION VALVES (HCV-311, -312,
-314, -315, -317, -318, -320, -321)
LICENSEE SUBMITTAL: SCEW(S): C-100

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

SEE EVALUATION ON PAGE 5f.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- _____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- _____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- _____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

EQUIPMENT ITEM NO. 36
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMBO
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 36
LICENSEE REFERENCE(S): 1590, 662
FUNCTION (PLANT ID): OPEN ON SAFETY INJECTION ACTUATION SIGNAL FOR HPSI TO
LOOPS (HCV-2914, -2934, -2954, -2974)
LICENSEE SUBMITTAL: SCEW(S): C-14

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A) S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a , 5b , 5c , 5d , 5e , 5f, 5g, 5h, 5i , 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a , 6b
Maintenance and Replacement Schedule Summary	7a , 7b , 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See Evaluations on 4b & 5f.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

LICENSEE RESPONSE TO NRC SER

Notes:

- 1) HCV-2914, 2934, 2954, 2974 are normally open and locked open. They do not operate after an event.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

SYSTEM CONSIDERATION REVIEW

The Licensee ^{implies} ~~has stated~~ that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for ~~concurrence~~/non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIb)
- Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- Backup (equipment/system) is subject to a potentially disabling single active failure.
- Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

Reason for Concurrence

- ☐ The equipment's accident mitigating function is completed prior to the onset of the hostile environment. No subsequent functions are necessary. See note (1) below. (NRC Qualification Evaluation Category IIb)
- ☐ Other (see page)
- ☐ Resultant NRC Qualification Evaluation Category (IIIa/IIb)
- ☐ Note 1: The Licensee (has/has not) stated that failure of the primary equipment will not affect other safety-related equipment or cause an operator to be misled. (See page)

Reason for Non-Concurrence

- ☐ Although backup equipment is available, it is not technically sound to relinquish defense-in-depth for this function.
- ☐ Backup (equipment/system) is not safety-related.
- ☐ This equipment is necessary for the operator to ensure an ESF system is performing its intended safety function.
- ☐ The rationale presented by the Licensee is not supported by objective technical evidence.
- ☒ Other (see page 46)

LICENSEE STATEMENT

See page 3a of this checksheet.

EVALUATION OF LICENSEE STATEMENT

The licensee has not described what is meant by "locked-open". Qualification of these valves is required ~~at~~ unless the valves are physically blocked open or, physically locked, power is removed from the operator, and administrative controls are imposed to ensure the "locked open" status.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A,C)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- _____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- _____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- _____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.

C. The licensee has also cited a letter from Limitorque dated 3-26-79, but this document was not submitted for review.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue it's inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

EQUIPMENT ITEM NO. 37
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMBO
REQUIRED OPERATING TIME: 10-12 SECONDS
TER CHECKSHEET NO. 37
LICENSEE REFERENCE(S): 1590, 662
FUNCTION (PLANT ID): OPEN ON SAFETY INJECTION ACTUATION SIGNAL FOR LPSI TO
LOOPS (HCV-327, -329, -331, -333)
LICENSEE SUBMITTAL: SCEW(S): C-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

See Evaluation on Page 5f.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- ____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- ____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- ____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not fully identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

EQUIPMENT ITEM NO. 38

MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT

LIMITORQUE MODEL SMB00

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 38

LICENSEE REFERENCE(S): 662

FUNCTION (PLANT ID): PORV ISOLATION (HCV-150, HCV-151)

LICENSEE SUBMITTAL: SCEW(S): C-150

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

4a, 4b, ~~4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
5g, 5h, ~~5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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FRC Assignment No. 13

FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established X
Aging Degradation Evaluated Adequately X
Qualified Life or Replacement Schedule Established (If Required) X
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See Evaluation on pg. 46 & 5f



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

LICENSEE RESPONSE TO NRC SER

Enclosure 19

Power Operated Relief Valves

PORV Block Valves

Pressurizer Heaters

The PORVs and their associated block valves were included in the IE Bulletin 79-018 submittal as part of the equipment referenced in the plant emergency procedures.

Under the EPs, the PORVs are used in two different areas. The first is as a possible source of a LOCA in which the PORV may open and fail to close. If this should occur, the acoustic position indication and quench tank capacity coupled with Block Valve 250F 25 psig qualification should provide adequate protection to mitigate this accident. If the PORVs are unisolable, the accident would be handled as a small break LOCA.

The second use of the PORVs is that of a backup to the steam generators for long term cooling, if the primary system is above 700 psia. This would require the failure of the redundant auxiliary feedwater system. It is felt that the auxiliary feedwater system as it stands, and as it will be upgraded to as part of the TMI modification, is adequate. In addition, the size of the PORVs would limit their effectiveness in providing cooling.

No further qualification effort is to be made. The District's plan is to leave the equipment in the emergency procedures to provide the operator with the maximum amount of flexibility in mitigation of an accident. As part of this plan, the District has already committed to identification of all qualified electrical equipment on the control boards so that the reliability and use of the equipment may be judged.

The pressurizer heaters are to be used to insure natural circulation and sub cooling. The use of these is directed by the station EPs in a LOCA. No qualification test data has been located by the District.

Use of the heaters could be made in an accident condition, only if pressurizer inventory could be maintained.

The calculations and assumptions for the heaters are based on hot standby Loss of Offsite Power Conditions (CE NPSD-133), and heat and leakage losses. This insures natural circulation. Should the heaters not work, the report requires that the ECCS be used to maintain sub cooling.

It is the District's intention to leave this in the EPs as a potential mitigation system. There are no further plans to investigate qualification. Qualification of this equipment will be identified in the control room.

Notes:

- 1) See Enclosure 19.
- 2) The motor and limit switches are totally enclosed. Chemical spray should not effect operation.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for ~~concurrence~~/non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIb)
- Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- Backup (equipment/system) is subject to a potentially disabling single active failure.
- Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

Reason for Concurrence

- ☐ The equipment's accident mitigating function is completed prior to the onset of the hostile environment. No subsequent functions are necessary. See note (1) below. (NRC Qualification Evaluation Category IIb)
- ☐ Other (see page)
- ☐ Resultant NRC Qualification Evaluation Category (IIIa/IIIb)
- ☐ Note 1: The Licensee (has/has not) stated that failure of the primary equipment will not affect other safety-related equipment or cause an operator to be misled. (See page)

Reason for Non-Concurrence

- ☒ Although backup equipment is available, it is not technically sound to relinquish defense-in-depth for this function.
- ☐ Backup (equipment/system) is not safety-related.
- ☐ This equipment is necessary for the operator to ensure an ESF system is performing its intended safety function.
- ☐ The rationale presented by the Licensee is not supported by objective technical evidence.
- ☐ Other (see page)

LICENSEE STATEMENT

See page 3a of this checksheet.

EVALUATION OF LICENSEE STATEMENT

Operability of PORV block valves is necessary to mitigate the consequences of a LOCA from a stuck-open PORV. The block valves must be qualified for the post-accident environment. Additionally, while feed-and-bleed is an unlikely method to use for post-accident core cooling, its retention as a viable decay heat removal method is an essential aspect of defense-in-depth.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- _____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- _____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- _____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

1. The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
4. The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
5. The referenced test report did not provide a technical basis for the qualified life claimed in the report.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

EQUIPMENT ITEM NO. 39
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMB3
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 39
LICENSEE REFERENCE(S): 662, 590, 662
FUNCTION (PLANT ID): SHUTDOWN COOLING LINE ISOLATION (HCV-348)
LICENSEE SUBMITTAL: SCEW(S): C-2

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QI, RT, P, H, CS, (A) S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____X_____
Aging Degradation Evaluated Adequately	_____X_____
Qualified Life or Replacement Schedule Established (If Required)	_____X_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

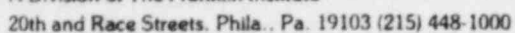
NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____X_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See Evaluation on Page 5f.



FRC Task No. 504

3a

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

1) Not required as part of EP-5B but is included since it provides an alternate cooling suction path for the LPSI system when the primary system is below 265 psia. Used in conjunction with HCV-347.

3. Radiation data for HCV348, HCV-383-3 and HCV-383-4 is being refined for long term cooling. This information will be supplied to the NRC by March 15, 1981.



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5f

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- _____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- _____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- _____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique.

For this equipment item (circled items apply):

- ① The vendor has not established a qualified life estimate based on an acceptable technique.
2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)
3. The referenced test report did not include thermal aging in the test program.
- ④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.
- ⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-01B (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue it's inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

EQUIPMENT ITEM NO. 40

MOTORIZED VALVE ACTUATOR LOCATED IN ROOM 7

LIMITORQUE MODEL SMB3

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 40

LICENSEE REFERENCE(S): 662

FUNCTION (PLANT ID): ACTUATES VOLUME CONTROL TANK DISCHARGE VALVE (LCV-218-3)

LICENSEE SUBMITTAL: SCEW(S): R5-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R) (T) QT, RT, (P) H, CS, A, S, (R), M, I, QM, RPN, (EXN) SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (~~has~~/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW
- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

See Evaluation on Page 5f.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

LICENSEE RESPONSE TO NRC SER

3.0 SER Section 4 Qualification of Equipment (Continued)

These items are part of the control room HVAC units. Appendix M of the FSAR addresses the loss of these in the event of a MSLS in Room 81. If the accident takes place in containment, the HVAC units are in a normal room environment. No further consideration is necessary. The units are not required to be qualified.

Motor Operated Valves

Manufacturer:

Model No./Finding:

LIMITORQUE

Motor Operated - SMB-000

NRC Items - R1-11

Submittal Pages - 6-75, 6-96A

Deficiencies - T, P, QM-EXN

LIMITORQUE

Motor Operated - SMB-003

NRC Item - R5-1

Submittal Page - 6-4

Deficiencies - T, P, R, EXN

LIMITORQUE

Motor Operated - SMB-2

NRC Item - R1-12

Submittal Page - 6-92

Deficiency - T, P, QM-EXN

- * The concerns with the Limitorque Operators are the same as those addressed in the ASCO solenoid review for the controlled side of the auxiliary building. These operators were tested for 25 psig, 245°F, and radiation. No qualification problems should be encountered as these do not impact plant safety. The worksheets will be updated to reflect this.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

NOTES:

"X" DENOTES APPROPRIATE NOTES

- X 1. The Licensee has not provided documentation from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced document(s). (NOTE A & C)
- X 2. The Licensee has not identified the class of the insulation system used for the motor in the motorized valve actuator.
- X 3. The Licensee has not identified whether or not this motorized valve actuator incorporates a motor-brake assembly.
- X 4. The Licensee has not identified the class of the insulation system used for the motor-brake assembly (if applicable).
- X 5. The Licensee has not identified the motor manufacturer for this motorized valve actuator.
- X 6. The Licensee has not identified the manufacturer of the motor-brake assembly (if applicable).
- X 7. The Licensee has not identified the type of current used in the motorized valve actuator.
- X 8. The Licensee has not identified the type of current used in the motor-brake assembly (if applicable).
- X 9. The Licensee has not established a qualified life estimate for this motorized valve actuator based on technically justifiable methods and conservative assumptions. (NOTE B)
- _____ 10. The Licensee has stated that the only harsh parameter that this motorized valve actuator is exposed to is radiation.
- _____ 11. Since radiation is stated to be the only harsh parameter and considering the extensive radiation testing of the motors used in this type of motorized valve actuator, the specified radiation dose of _____ is considered to be of sufficiently low value as to not affect this equipment item. This equipment item is considered qualified for this parameter.
- _____ 12. The Licensee has committed to replace this equipment item. The Licensee has stated the following:



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

NOTES:

A. The licensee has not submitted information from the manufacturer which establishes similarity between the installed equipment and the test specimen in the referenced report(s). In addition, the licensee has not adequately identified the equipment installed in this plant as noted on page 5f of this review.

B. With respect to thermal aging and qualified life, the licensee has not provided any supporting information for this equipment item. The licensee has stated in Enclosure 12 (reproduced on page 3a or 5h of this review) that they will use the qualified life established by the vendor or would establish a conservative estimate by an acceptable technique. For this equipment item (circled items apply):

① The vendor has not established a qualified life estimate based on an acceptable technique.

2. The licensee has not established a qualified life estimate based on an acceptable technique (as was stated in Enclosure 12)

3. The referenced test report did not include thermal aging in the test program.

④ The referenced test report included thermal aging, but no basis for the aging time or temperature was provided.

⑤ The referenced test report did not provide a technical basis for the qualified life claimed in the report.

C. The licensee has also cited a letter from Limitorgue dated 3-26-79, but this document was not submitted for review.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

NOTES:

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue it's inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

EQUIPMENT ITEM NO. 41

ELECTRIC MOTOR LOCATED IN ROOMS 21 & 22

GENERAL ELECTRIC MODEL 5K818837A38

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 41

LICENSEE REFERENCE(S): 29, 11, 30

FUNCTION (PLANT ID): DRIVES LOW PRESSURE SAFETY INJECTION PUMP 1A (SI-1A,
SI-1B)

LICENSEE SUBMITTAL: SCEW(S): I-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	<u>X</u> _____
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u> _____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	<u>X</u> _____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	<u>X</u> _____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

NOTES:

These motors require qualification for radiation ($6 \times 10^8 R$) exposure and thermal aging. The licensee has referenced PSR's (11,29,30).

- PGR 30 states the insulation system is qualified to an integrated radiation value of $2 \times 10^8 R$. The EPR power cables are qualified to $1.5 \times 10^7 R$. The bearing lube is qualified to $1.5 \times 10^8 R$. No data was presented for the motor to lead splice materials with respect to their radiation resistance.

- PSR #11 describes various documents that purportedly qualify the subject motors for some degree of thermal aging. None of these documents, however, were submitted. In addition the descriptions lead one to believe that the documentation does not concern specific testing or analysis of similar equipment.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

EQUIPMENT ITEM NO. 42
ELECTRIC MOTOR LOCATED IN ROOMS 21 & 22
GENERAL ELECTRIC MODEL 5K815524A51
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 42
LICENSEE REFERENCE(S): 29, 11, 30
FUNCTION (PLANT ID): DRIVES HIGH PRESSURE SAFETY INJECTION PUMPS (SI-2A,
SI-2B, SI-2C)
LICENSEE SUBMITTAL: SCEW(S): I-3

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	<u>X</u> _____
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u> _____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	<u>X</u> _____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	<u>X</u> _____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

NOTES:

These motors require qualification for radiation (6×10^6 R) exposure and thermal aging. The licensee has referenced PSR's (11,29,30).

- PGR 30 states the insulation system is qualified to an integrated radiation value of 2×10^8 R. The EPR power cables are qualified to 1.5×10^8 R. The bearing tube is qualified to 1.5×10^8 R. No data was presented for the motor to lead splice materials with respect to their radiation resistance.

- PSR #11 describes various documents that purportedly qualify the subject motors for some degree of thermal aging. None of these documents, however, were submitted. In addition the description lead one to believe that the documentation does not concern specific testing or analysis of similar equipment.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

EQUIPMENT ITEM NO. 43

ELECTRIC MOTOR LOCATED IN ROOMS 21 & 22

GENERAL ELECTRIC MODEL 5K815526A35

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 43

LICENSEE REFERENCE(S): 11, 30, 29

FUNCTION (PLANT ID): DRIVES CONTAINMENT SPRAY PUMPS (SI-3A, SI-3B, SI-3C)

LICENSEE SUBMITTAL: SCEW(S): I-4

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately X _____
Qualified Life or Replacement Schedule Established (If Required) X _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) X _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied X _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

NOTES:

These motors require qualification for radiation ($6 \times 10^6 R$) exposure and thermal aging. The licensee has referenced PSR's (11, 29, 30).

- PGR 30 states the insulation system is qualified to an integrated radiation value of $2 \times 10^6 R$. The EPR power cables are qualified to $1.5 \times 10^6 R$. The bearing tube is qualified to $1.5 \times 10^6 R$. No data was presented for the motor to lead splice materials with respect to their radiation resistance.

- PSR #11 describes various documents that purportedly qualify the subject motors for some degree of thermal aging. None of these documents, however, were submitted. In addition the descriptions lead one to believe that the documentation does not concern specific testing or analysis of similar equipment.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

EQUIPMENT ITEM NO. 44
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT
RELIANCE ELECTRIC MODEL 60301200
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 44
LICENSEE REFERENCE(S): 3367
FUNCTION (PLANT ID): DRIVES CONTAINMENT VENTILATION FANS (VA-3A, -3B)
LICENSEE SUBMITTAL: SCEW(S): C-19

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified ~~and/or will function when exposed~~ to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u> </u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> X </u>
Aging Degradation Evaluated Adequately	<u> X </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> X </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> X </u>
o Required Profile Enveloped Adequately	<u> X </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> X </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> X </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u> X </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

LICENSEE RESPONSE TO NRC SER

ENCLOSURE 9

Containment Fan Cooler Motor Splices

The containment cooler fan motor lead splices (7A-2A, 3B, 7C, and 7D motor lead splices) are, in OFPD's engineering judgment, environmentally qualified for the adverse conditions of a LOCA. Reasons for this judgment stem from the following:

- 1) First, eight half-laps of Scotch Brand #70 tape are applied to the bare joint/splice. Second, eight half-laps of Bishop Brand #3 high voltage tape are applied over the splice surface. Third, the joint/splice area is then covered with eight half-laps of Scotch Brand #68 tape. Fourth, an additional two half-laps of Scotch Brand #70 tape is then applied over the general splice/joint area. Lastly, the entire splice/joint area is covered with Dow Corning RTV #3144 compound at least 1/8" thick and at least 1" beyond all applied tape. The RTV is smoothed to completely seal the splice/joint and then the RTV is allowed to cure in accordance with instructions.
- 2) Recent conversations with the manufacturer of Scotch Brand #70 and #68 tapes have revealed satisfactory test results were obtained for samples of the two aforementioned tapes when subjected to radiation fields in the neighborhood of 50-100 x 10⁶ rads. Due to the RTV sealant, this tape will not be subjected to the pressure, moisture (100% R.H.), boric acid conditions present in a LOCA. In addition, both tapes mentioned above are capable of operating in temperatures in excess of 350°F with no subsequent damage.
- 3) The entire splice/joint is covered with a layer of RTV #3144 adhesive/sealant. Conversations with the manufacturer of the RTV, Dow Corning, revealed that several laboratory tests were run on the aforementioned RTV. Results of these tests revealed that the Dow Corning RTV #3144 was capable of operating in environments greater than 102 x 10⁶ rads (total integrated dose) with no appreciable deficiencies. In addition, the #3144 RTV reacts with water vapor in the air to cure. Upon curing, the adhesive/sealant becomes resistant to humidity and temperatures up to 482°F over long periods of time. The RTV #3144 sealant will effectively seal off all environments from the underlying Scotch Brand tapes and the splice except for radiation. The #3144 RTV is also not adversely affected by boric acid solutions in excess of 5%.

Further evidence of Dow Corning #3144 RTV sealant/adhesive's ability to stand up to the adverse conditions of a LOCA is documented by the Fisher Controls Company valve actuator tests. In these tests, Dow Corning #3144 adhesive/sealant was used to cover all bare terminations. Results of the tests provided evidence that throughout the simulated LOCA environment no termination covered with #3144 RTV was found to be shorted or damaged. Test parameters included temperatures in excess of 288°F, pressure in excess of 60 psig, and a 100% saturated steam environment.

No credit is taken for the Bishop #3 high voltage tape.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Electric motor	Electric motor	
Manufacturer's Name (5.2.2/-/-)	Reliance Electric Co.	Reliance Electric Co.	
Model Number (5.2.2/-/-)	60301200	Frame 5008	X Note 1
Serial Number	not stated	2X321793A1-CV	
Features/Mounting (5.2.6/-/-)	not stated	TEAO, 250 bHp, class N, Vema Class Brise	
Connections/Interfaces (5.2.6/-/-)		motor to lead splice not discussed	X Note 2
Location/Elevation	Containment		
Equipment ID No.	VA 3A, -3B		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	PGR (3367) X-377A	X-377A	
Report Date		September 3, 1970	
Issued by		Joy Manufacturing Co.	
Prepared for		Fort Calhoun	
Referenced Reports			
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	test + Analysis	test + analysis	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		fan operation during LOCA testing, meggar,	
Operating Conditions (-/2.2.10/2.2.10)			
Load/Cycles/Voltage/ Current/Freq.		105 Amps, 742V./45kw	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)		not stated	
Accuracy (5.2.5/-/-)		not stated	
Number of Specimens		1	
Test Instruments Calibrated		not stated	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Active	Active	
Test Duration (5.2.1/-/-)		total duration of transients 7.3 hours	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	67 min.		
Required Function Time	duration of accident		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Age/steam/pressure, chemistry	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	not stated	no basis stated 48 hrs / 410°F	X Note 3
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)		not performed	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		not stated	
Radiation Aging, Type	γ	Analysis	X Note 2



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	$1.92 \times 10^7 R$ (GL)	1.9×10^8	
Radiation Aging, Dose Rate	not stated	N/A	
Radiation Aging, Method	Analysis	Analysis	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		all organics	
Operational Aging (-/4.2/-)			
Other Age Conditioning (-/4.2/-)			
Qualified Life Claimed/ Established (5.2.4/4.10/-)	10 years	not stated	x note 4
Normal Ambient Temperature			
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)			
On-Going Analysis of Failures and Degradation (7.0/-/-)			
Margin (General) (6.0/3.0/3.0)			
Margin (NUREG-0588, Cat. I) (-/3.2/-)			
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA	LOCA	
Radiation Type	γ	γ	
Radiation Dose (rd) (4.1.2/1.4/1.4)	$1.92 \times 10^7 R$ (EL)	$1.9 \times 10^8 R$ minimum value	X Note 2
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	not stated Analysis	N/A Analysis	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)			
Equipment Susceptible to Beta Radiation (4.1.2/-/-)		not stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	$1.92 \times 10^7 R$	$1.9 \times 10^8 R$	
Plateout Dose Considered (-/1.48/1.48)		not stated	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	$1.92 \times 10^7 R$	$1.9 \times 10^8 R$	



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase	140°F/51psig/24hr.	60psig/8to29sec.	X Note 5
Peak: °F/psig/RH/Time	288/51/100/2min	60psig/3to20minutes	
Decrease To: °F/psig/RH/Time	150°/31-/66min.		
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)			
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	test	test	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700ppm Boron	not stated	X Note 6
Spray Density (gpm/ft ²)		not stated	
Spray Duration	not stated	1.6 hours	
Submergence Duration (4.1.3/2.2.5/2.2.5)			
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

NOTES:

These motors require qualification for exposure to steam/pressure, chemical spray and radiation in addition to thermal aging. The licensee has referenced PBR#3367 as evidence of qualification.

Note 1: The licensee has not established similarity between the installed motors and the tested equipments.

Although the referenced report was written for Fort Calhoun the SCEW sheets submitted do not specifically identify the motors in the same manner as the cited document.

Note 2: The referenced report did not discuss the radiation damage threshold values of the motor to lead splice materials.

Note 3: Thermal aging performed on the entire motor as discussed in the referenced report was not substantiated by a "model" or analysis. In addition the test performed caused severe degradation of the bearing lubricant. The test agency did not perform an analysis or even discuss the failure or its impact on motor operation.

Note 4: The referenced test did not conclude an estimated in plant service life from the accelerated aging.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

NOTES:

Note 4 (continued): program performed.

Note 5: Although the various individual test descriptions in the referenced report cited some peak temperatures of the water during the pressure transients no durations for these temperature excursions were given.

Note 6: The duration of chemical spray during the pressure transients was only 1.6 hrs. as listed on the test data sheets. Evidently the solution was rapidly depleted after which city water was used.

The composition and pH of the chemical spray used was not mentioned.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

EQUIPMENT ITEM NO. 45

ELECTRIC MOTOR LOCATED IN THE CONTAINMENT

RELIANCE ELECTRIC MODEL 483920MM

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 45

LICENSEE REFERENCE(S): 3367

FUNCTION (PLANT ID): DRIVES CONTAINMENT COOLING FAN (NA-7C & -7D)

LICENSEE SUBMITTAL: SCEW(S): C-32

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

5a, 5b, 5c, 5d, 5e, 5f,
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/has not) specifically stated that the equipment is qualified ~~and/or will function when exposed~~ to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|---------------------------------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <input checked="" type="radio"/> II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	<u>X</u>
o Required Profile Enveloped Adequately	<u>X</u>
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	<u>X</u>
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	<u>X</u>
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

LICENSEE RESPONSE TO NRC SER

ENCLOSURE 9

Containment Fan Cooler Motor Splices

The containment cooler fan motor lead splices (7A-3A, 3B, 7C, and 7D motor lead splices) are, in OFPD's engineering judgment, environmentally qualified for the adverse conditions of a LOCA. Reasons for this judgment stem from the following:

- 1) First, eight half-laps of Scotch Brand #70 tape are applied to the bare joint/splice. Second, eight half-laps of Bishop Brand #3 high voltage tape are applied over the splice surface. Third, the joint/splice area is then covered with eight half-laps of Scotch Brand #88 tape. Fourth, an additional two half-laps of Scotch Brand #70 tape is then applied over the general splice/joint area. Lastly, the entire splice/joint area is covered with Dow Corning RTV #3144 compound at least 1/8" thick and at least 1" beyond all applied tape. The RTV is smoothed to completely seal the splice/joint and then the RTV is allowed to cure in accordance with instructions.
- 2) Recent conversations with the manufacturer of Scotch Brand #70 and #88 tapes have revealed satisfactory test results were obtained for samples of the two aforementioned tapes when subjected to radiation fields in the neighborhood of $50-100 \times 10^6$ rads. Due to the RTV sealant, this tape will not be subjected to the pressure, moisture (100% R.H.), boric acid conditions present in a LOCA. In addition, both tapes mentioned above are capable of operating in temperatures in excess of 350°F with no subsequent damage.
- 3) The entire splice/joint is covered with a layer of RTV #3144 adhesive/sealant. Conversations with the manufacturer of the RTV, Dow Corning, revealed that several laboratory tests were run on the aforementioned RTV. Results of these tests revealed that the Dow Corning RTV #3144 was capable of operating in environments greater than 102×10^6 rads (total integrated dose) with no appreciable deficiencies. In addition, the #3144 RTV reacts with water vapor in the air to cure. Upon curing, the adhesive/sealant becomes resistant to humidity and temperatures up to 482°F over long periods of time. The RTV #3144 sealant will effectively seal off all environments from the underlying Scotch Brand tapes and the splice except for radiation. The #3144 RTV is also not adversely affected by boric acid solutions in excess of 5%.

Further evidence of Dow Corning #3144 RTV sealant/adhesive's ability to stand up to the adverse conditions of a LOCA is documented by the Fisher Controls Company valve actuator tests. In these tests, Dow Corning #3144 adhesive/sealant was used to cover all bare terminations. Results of the tests provided evidence that throughout the simulated LOCA environment no termination covered with #3144 RTV was found to be shorted or damaged. Test parameters included temperatures in excess of 288°F, pressure in excess of 60 psig, and a 100% saturated steam environment.

No credit is taken for the Bishop #3 high voltage tape.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEWCriteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Electric motor	Electric motor	
Manufacturer's Name (5.2.2/-/-)	Reliance Electric Co.	Reliance Electric Co.	
Model Number (5.2.2/-/-)		Frame 5008	X Note 1
Serial Number	not stated	2X321793A1-CV	
Features/Mounting (5.2.6/-/-)	not stated	TEAO, 250bHp, class N, Nema Class B rise	
Connections/Interfaces (5.2.6/-/-)		motor to lead splice not discussed	X Note 2
Location/Elevation	Containment		
Equipment ID No.			
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	PGR(3367) X-377A	X-377A	
Report Date		September 3, 1970	
Issued by		Joy Manufacturing Co.	
Prepared for		Fort Calhoun	
Referenced Reports			
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	test+Analysis	test + analysis	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		fan operation during LOCA testing, meggar,	
Operating Conditions (-/2.2.10/2.2.10)			
Load/Cycles/Voltage/ Current/Freq.		105 Amps/442V./45kw	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)		not stated	
Accuracy (5.2.5/-/-)		not stated	
Number of Specimens		1	
Test Instruments Calibrated		not stated	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Active	Active	
Test Duration (5.2.1/-/-)		total duration of transients 7.3 hours	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	67 min.		
Required Function Time	duration of accident		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Age / steam / pressure, chemistry	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	not stated	no basis stated 48 hrs / 410°F	X Note 3
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)		not performed	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		not stated	
Radiation Aging, Type	γ	Analysis	X Note 2



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	$1.92 \times 10^7 R$ (GL)	1.9×10^8	
Radiation Aging, Dose Rate	not stated	N/A	
Radiation Aging, Method	Analysis	Analysis	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		all organisms	
Operational Aging (-/4.2/-)			
Other Age Conditioning (-/4.2/-)			
Qualified Life Claimed/ Established (5.2.4/4.10/-)	10 years	not stated	X note 4
Normal Ambient Temperature			
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)			
On-Going Analysis of Failures and Degradation (7.0/-/-)			
Margin (General) (6.0/3.0/3.0)			
Margin (NUREG-0588, Cat. I) (-/3.2/-)			
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA	LOCA	
Radiation Type	γ	γ	
Radiation Dose (rd) (4.1.2/1.4/1.4)	$1.92 \times 10^7 R$ (u)	$1.9 \times 10^8 R$ minimum value	X Note 2
Radiation Dose Rate (rd/hr)	not stated	N/A	
Radiation Qual. Method (5.3.1/-/-)	Analysis	Analysis	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)			
Equipment Susceptible to Beta Radiation (4.1.2/-/-)		not stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	$1.92 \times 10^7 R$	$1.9 \times 10^8 R$	
Plateout Dose Considered (-/1.48/1.48)		not stated	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	$1.92 \times 10^7 R$	$1.9 \times 10^8 R$	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase	140°F/51psig/2 sec.	60psig/8 to 29 sec.	X Note 5
Peak: °F/psig/RH/Time	288/51/100/2 min	60psig/3 to 20 minutes	
Decrease To: °F/psig/RH/Time	150°/31/-/66 min.		
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)			
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	test	test	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700ppm Boron	not stated	X Note 6
Spray Density (gpm/ft ²)		not stated	
Spray Duration	not stated	1.6 hours	
Submergence Duration (4.1.3/2.2.5/2.2.5)			
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

NOTES:

These motors require qualification for exposure to steam/pressure, chemical spray and radiation in addition to thermal aging. The licensee has referenced PFR#3367 as evidence of qualification.

Note 1: The licensee has not established similarity between the installed motors and the tested equipment. Although the referenced report was written for Fort Calhoun the SCEW sheets submitted do not specifically identify the motors in the same manner as the cited document.

Note 2: The referenced report did not discuss the radiation damage threshold values of the motor to lead splice materials.

Note 3: Thermal aging performed on the entire motor as discussed in the referenced report was not substantiated by a "model" or analysis. In addition the test performed caused severe degradation of the bearing lubricant. The test agency did not perform an analysis or even discuss the failure or its impact on motor operation.

Note 4: The referenced test did not conclude an estimated in plant service life from the accelerated aging



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

NOTES:

Note 4 (continued): program performed.

Note 5: Although the various individual test descriptions in the referenced report cited some peak temperatures of the motor during the pressure transients no durations for these temperature excursions were given.

Note 6: The duration of chemical spray during the pressure transients was only 1.6 hrs. as listed on the test data sheets. Evidently the solution was rapidly depleted after which city water was used.

The composition and pH of the chemical spray used was not mentioned.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 46

EQUIPMENT ITEM NO. 46
ELECTRIC MOTOR LOCATED IN ROOM 81
TRANE MODEL SCMZ304
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 46
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): DRIVES CONTROL ROOM AIR CONDITIONING UNIT BLOWER
(VA-46A, -46B)
LICENSEE SUBMITTAL: SCEW(S): S-4

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 46

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TEP for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | <u>III.a</u> Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 46

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	<u>X</u>
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 46

SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for concurrence/~~non concurrence~~ with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- ☒ Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- ☐ Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIB)
- ☐ Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- ☐ Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- ☐ Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- ☐ Backup (equipment/system) is subject to a potentially disabling single active failure.
- ☐ Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- ☐ Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- ☐ Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.

The licensee has stated that Control Room HVAC equipment is not required to operate in the event of a HELB. (see Ft. Calhoun FSAR Appendix M.)



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 47

EQUIPMENT ITEM NO. 47
ELECTRIC MOTOR LOCATED IN ROOM 81
ILG INDUSTRIES MODEL 20P CENT FAN
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 47
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): CONTROL ROOM FRESH AIR INLET FAN MOTOR (VA-63)
LICENSEE SUBMITTAL: SCEW(S): S-5

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (~~has~~/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | <u>III.a</u> Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	___
Adequate Similarity Between Equipment and Test Specimen Established	___
Aging Degradation Evaluated Adequately	___
Qualified Life or Replacement Schedule Established (If Required)	___
Program Established to Identify Aging Degradation	___
Criteria Regarding Aging Simulation Satisfied (If Required)	___
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	___
o Peak Pressure Adequate	___
o Duration Adequate	___
o Required Profile Enveloped Adequately	___
o Steam Exposure (If Required) Adequate	___
Criteria Regarding Spray Satisfied	___
Criteria Regarding Submergence Satisfied	___
Criteria Regarding Radiation Satisfied	___
Criteria Regarding Test Sequence Satisfied	___
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	___
Criteria Regarding Functional Testing Satisfied	___
Criteria Regarding Instrument Accuracy Satisfied	___
Test Duration Margin (1 hour + Function Time) Satisfied	___
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	___

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	___
I.b	Equipment Qualification Pending Modification	___
II.a	Equipment Qualification Not Established	___
II.b	Equipment Not Qualified	___
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	___
III.a	Equipment Exempt From Qualification	<u>X</u> ___
III.b	Equipment Not in the Scope of the Qualification Review	___
IV	Documentation Not Made Available	___



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 47

SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for concurrence/~~non-concurrence~~ with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- ☒ Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIb)
- Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- Backup (equipment/system) is subject to a potentially disabling single active failure.
- Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.

The licensee has stated that Control Room HVAC equipment is not required to operate in the event of a HELB. (see Ft. Calhoun FSAR Appendix M)



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 48

EQUIPMENT ITEM NO. 48
ELECTRIC MOTOR LOCATED IN ROOM 69
ALLIS CHALMERS MODEL 030
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 48
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): COMPONENT COOLING WATER PUMP MOTOR (AC-3A, AC-3B, AC-3C)
LICENSEE SUBMITTAL: SCEW(S): R4-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), (T), QT, RT, (P), H, CS, A, S, (R), (M), I, (QM), RPN, (EXN), SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 48

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 48

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

DESIGNATION:

X = CATEGORY

NRC QUALIFICATION CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

EQUIPMENT ITEM NO. 49
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A189E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 49
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HCV-2504A, HCV-2506A,
HCV-2507A)
LICENSEE SUBMITTAL: SCEW(S): C-29E

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, Q, RT, P, H, CS, A, S, (R), M, I, QM, RPN EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------------------|--------------------------------|
| <input checked="" type="radio"/> I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Solenoid Valve	Solenoid Valve	
Manufacturer's Name (5.2.2/-/-)	ASCO	Automatic Switch Company	
Model Number (5.2.2/-/-)	NP8320A189E	HVA-206-381-6F NP8344A71E	
Serial Number		XFT831654V	
Features/Mounting (5.2.6/-/-)		HVA-206-308-3RF NP8320A184E NP831665E	
Connections/Interfaces (5.2.6/-/-)	not stated	HV-202-300-2RF NP8321A5E NP8323A39E	note 1
Location/Elevation	containment		
Equipment ID No.	see pg. 12		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	PGR 649	AQS21678/TR (Rev. A)	
Report Date	AQS21678/TR (rev. A)	March 1978 July, 1979	
Issued by		Isomedix Inc.	
Prepared for		ASCO	
Referenced Reports			
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		Type Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Coil excitation Voltage Seat leakages, noise, IR test.	
Operating Conditions (-/2.2.10/2.2.10)		Samples energized and deenergized at high and low pressure	
Load/Cycles/Voltage/ Current/Freq.			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	N/A	Operate at -15% & + 10% (Short Period)	
Accuracy (5.2.5/-/-)		Rate VAC, 90-140 VDC	
Number of Specimens		Max & Min. D/P.	
Test Instruments Calibrated		IR Coil ≥ 1.0 Megohm at 500 VDC. C-L ≤ 0.5 MA @ 2x rated Voltage + 1000 V for 1 min.	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Active		
Test Duration (5.2.1/-/-)	N/A	30 Days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	< 24 Hrs		
Required Function Time	1 hr.		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Baseline functional tests Thermal Aging Radiation Aging Operational Aging	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)		Seismic/Vibration DBE radiation exposure STM + CHSP Exposure	
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)		268 deg. F/288 hr.	
Thermal Aging/Basis		4.4 yr @ 140 deg. F	
Material Aging Evaluation (7.0/-/-)			
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Solenoid Coils & Elastomeric parts	
Radiation Aging, Type		GAMMA	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	:	50 x 10 ⁶ rd	:
Radiation Aging, Dose Rate	:	1.0 Mrd/hr.	:
Radiation Aging, Method	:	Test	:
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	:	:	:
Operational Aging (-/4.2/-)	:	40,000 cycles @ MOPD	:
Other Age Conditioning (-/4.2/-)	:	:	:
Qualified Life Claimed/ Established (5.2.4/4.10/-)	4.4 yr.	4.4 yr./ND	:
Normal Ambient Temperature	:	:	:
Normal Ambient Radiation	:	:	:
Normal Ambient Humidity	:	:	:
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	:	:	:
On-Going Analysis of Failures and Degradation (7.0/-/-)	:	:	:
Margin (General) (6.0/3.0/3.0)	:	:	:
Margin (NUREG-0588, Cat. I) (-/3.2/-)	:	:	:
1. Temperature (+15°F)	:	:	:
2. Pressure (+10%, 10 psig max)	:	:	:
3. Radiation (not required)	:	:	:
4. Time (+10%, +1 hour + function time minimum)	:	:	:



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>	:	:	:
LOCA/MSLE/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	:	: LOCA	:
Radiation Type	:	: GAMMA	:
Radiation Dose (rd) (4.1.2/1.4/1.4)	: $\sim 1 \times 10^7$ rd	: 150 Mrd	:
Radiation Dose Rate (rd/hr)	:	: < 1 Mrd/hr.	:
Radiation Qual. Method (5.3.1/-/-)	:	:	:
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	:	: --	:
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	:	: --	:
Radiation Dose (Normal + Accident) (4.1.2/-/-)	: $\sim 1 \times 10^7$ rd.	: 200 Mrd	:
Plateout Dose Considered (-/1.48/1.48)	:	: --	:
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	:	: --	:



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		28.8 deg. F/min/9.1 psig/min	
Peak: °F/psig/RH/Time	280/50/-/100 hr	346/110/100/3 HR 320/75/100/3 HR	
Decrease To: °F/psig/RH/Time	280/50/-/8 hr 140/10/-/8 hr	250/15/100/85 HR 200/10/100/26 days	
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)		--	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)		TEST H ₃ BO ₃ (3000ppm boron)	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700 ppm boron	0.064m Sodium Thiosulfate NaOH ph= 10.0	
Spray Density (gpm/ft ²)	not stated	0.306	
Spray Duration	not stated	30 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)			
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

NOTES:

Results of this test show that low Insulation resistance values were
demonstrated at the end of the LOCA test for the coils. It was concluded that
the solenoid enclosure interface degraded to the point where spray solution
entered the enclosure, degrading the coil insulation, resulting in current
leakage to ground. The test report also indicates that even though the
coil enclosure became filled with spray solution, the valves functioned
for the duration of the LOCA test. It is recommended that the
licensee provide a suitable seal for the cable entry to the solenoid
enclosure.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 50

EQUIPMENT ITEM NO. 50
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8316E37E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 50
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): PILOT SOLENOIDS FOR MAIN STEAM ISOLATION VALVES
(HCV-1041A)
LICENSEE SUBMITTAL: SCEW(S): S-11

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R) T, QT, RT, P, H, CS, A, S, (R), M, I, (M) RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 50

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 50

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See equipment item no. 49 for detailed evaluation.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 50

NOTES:

The licensee SCEW shows a 10 year qualified life estimate for this equipment. The licensee has not presented any technical basis for this qualified life estimate that exceeds the 4.4 yrs. established by ASCO. The 10 yr. qualified life estimate is based on a letter from ASCO to OPPD (PSR #9, see review of equipment item no. 61).

Please Send Copy of XA to PDR

TECHNICAL EVALUATION REPORT

REVIEW OF LICENSEES' RESOLUTION OF OUTSTANDING ISSUES FROM NRC EQUIPMENT ENVIRONMENTAL QUALIFICATION SAFETY EVALUATION REPORTS (F-11 and B-60)

OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION

VOL. 2 OF 2

NRC DOCKET NO. 50-285

FRC PROJECT C5257

NRC TAC NO. 42491

FRC ASSIGNMENT 13

NRC CONTRACT NO. NRC-03-79-118

FRC TASK 504

Prepared by

Franklin Research Center
20th and Race Streets
Philadelphia, PA 19103

FRC Group Leader: G. Toman

Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: P. Shemanski

November 10, 1982

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Please Send Copy of XA to PDR

TECHNICAL EVALUATION REPORT

REVIEW OF LICENSEES' RESOLUTION OF OUTSTANDING ISSUES FROM NRC EQUIPMENT ENVIRONMENTAL QUALIFICATION SAFETY EVALUATION REPORTS (F-11 and B-60)

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Prepared by

Franklin Research Center
20th and Race Streets
Philadelphia, PA 19103

FRC Group Leader: G. Toman

Prepared for

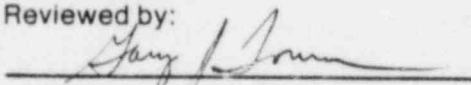
Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: P. Shemanski


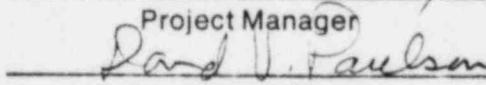
November 10, 1982

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Reviewed by:


Group Leader

Approved by:


Project Manager

Acting Department Director



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 51

EQUIPMENT ITEM NO. 51
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8316A77E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 51
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): TEST SOLENOIDS FOR MAIN STEAM ISOLATION VALVES
(HCV-1042A)
LICENSEE SUBMITTAL: SCEW(S): S-11

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R) T, QI, RT, P, H, CS, A, S, (R), M, I, (QM) RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 51

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 51

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no.'s 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 52

EQUIPMENT ITEM NO. 52

SOLENOID VALVE LOCATED IN THE CONTAINMENT

ASCO MODEL NP831655E

REQUIRED OPERATING TIME: 1 HOUR

TER CHECKSHEET NO. 52

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): ACTUATES PNEUMATIC VALVE (PCV-742A, -742C)

LICENSEE SUBMITTAL: SCEW(S): C-29A

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 52

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| <u>I.a</u> Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 52

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no. 49 for detailed evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 53

EQUIPMENT ITEM NO. 53

SOLENOID VALVE LOCATED IN THE CONTAINMENT

ASCO MODEL 8320A175E

REQUIRED OPERATING TIME: 1 HOUR

TER CHECKSHEET NO. 53

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): ACTUATES VALVES (HCV-883A, HCV-884A)

LICENSEE SUBMITTAL: SCEW(S): C-29C

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QI, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 53

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
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 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 53

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u> _____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

Reference 649 is not applicable since these valves are not identified as NP series valves.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 54

EQUIPMENT ITEM NO. 54

SOLENOID VALVE LOCATED IN ROOM 59

ASCO MODEL NP8320A185E

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 54

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): OPERATES H2 CONTAINMENT SAMPLING VALVES (HCV883B,
HCV884B)

LICENSEE SUBMITTAL: SCEW(S): R7-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, (S) (R), M, I, (QM) (RPN), EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

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Summary of Licensee Responses to the NRC SER

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 54

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above surmergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.C</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 54

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no.'s 49 and 50 for evaluation.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 55

EQUIPMENT ITEM NO. 55
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 55
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER INLET VALVES
(HCV-1107B, -1108B)
LICENSEE SUBMITTAL: SCEW(S): S-7

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 55

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 55

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u> _____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's 49 and 50 for evaluation



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 55

The Licensee has stated:

"Valves are locked open and do not operate
during an event."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 56

EQUIPMENT ITEM NO. 56

SOLENOID VALVE LOCATED IN ROOM 13

ASCO MODEL NP8314C29E

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 56

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): ACTUATES LOW PRESSURE SAFETY INJECTION VALVES (FCV-326,
HCV-341)

LICENSEE SUBMITTAL: SCEW(S): R1-5

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 56

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 56

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 57

EQUIPMENT ITEM NO. 57
SOLENOID VALVE LOCATED IN ROOM 59
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 57
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATES NITROGEN SYSTEM ISOLATION VALVES (HCV-2603A,
HCV-2604A)
LICENSEE SUBMITTAL: SCEW(S): R2-7

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 57

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.C</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 57

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's 49 and 50 for detailed evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 58

EQUIPMENT ITEM NO. 58
SOLENOID VALVE LOCATED IN ROOM 69
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 58
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR INSTRUMENT AIR ISOLATION (PCV-1849)
LICENSEE SUBMITTAL: SCEW(S): R4-9
FUNCTION (PLANT ID): VALVE ACTUATORS FOR PLANT AIR ISOLATION (HCV-1749)
LICENSEE SUBMITTAL: SCEW(S): R4-11
FUNCTION (PLANT ID): VALVE ACTUATORS RADWASTE RAW WATER INLET TO CONTAINMENT
AIR COOLERS (HCV-400E, F; -401E, F; -402E, F; -403E, F)
LICENSEE SUBMITTAL: SCEW(S): R4-13

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 58

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 58

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 59

EQUIPMENT ITEM NO. 59

SOLENOID VALVE LOCATED IN ROOM 81

ASCO MODEL NP8320A175E

REQUIRED OPERATING TIME: NOT REQUIRED

TER CHECKSHEET NO. 59

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER INLET VALVES
(HCV-1107B, -1108B)

LICENSEE SUBMITTAL: SCEW(S): S-6

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 59

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 59

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 59

LICENSEE RESPONSE TO NRC SER

The Licensee SCEW states:

"Valves are locked open and do not operate during an event."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 60

EQUIPMENT ITEM NO. 60

SOLENOID VALVE LOCATED IN THE CONTAINMENT

ASCO MODEL NP8320A185E

REQUIRED OPERATING TIME: 1 HOUR

TER CHECKSHEET NO. 60

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): HPSI FLOW VALVE ACTUATION (TCV-202, HCV-241)

LICENSEE SUBMITTAL: SCEW(S): C-28C

FUNCTION (PLANT ID): VALVE ACTUATION (HCV-425A, -425C, -467A, -467C, -746A, -2956, -2976, -2603B, -2604B, -1387A, -1388A)

LICENSEE SUBMITTAL: SCEW(S): C-28D, E, H, J, L, N

FUNCTION (PLANT ID): VALVE ACTUATION (PCV-742E, -742G, -2909, -2949, -2969; HCV-2929)

LICENSEE SUBMITTAL: SCEW(S): C-28F, -29D

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 60

SUMMARY OF LICENSEE RESPONSES TO THE NRC SEP - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DEE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 60

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 61

EQUIPMENT ITEM NO. 61
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 61
LICENSEE REFERENCE(S): 649, 9
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-238, -239, -240)
LICENSEE SUBMITTAL: SCEW(S): C-128, -128A

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 61

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 61

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no. 49 for detailed
evaluation of PGR# (649).



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 61

NOTES:

PSR # 9 is a letter from ASCO to R.F. Mahaffy of OPPD. The letter discusses extended qualification of ASCO NP-1 solenoid valves and states the following:

"Based on previous testing and a regression analysis of the Class H insulation system, ASCO can state that the minimum life of our coils inside containment at 140°F ambient will be 10 years, plus a LOCA (in accordance with Figure 1 and Table 2 of IEEE-382-1972) and an outside containment life of 13.5 years. These are minimums for continuously energized valves, and ASCO is confident that our type testing will yield results which will increase this qualified life."

The preceding statement only encompasses the coil insulation system and shows that although ASCO is confident that the coil is qualified by regression analysis, there is no test documentation to date to verify a ten year qualified life for the coils. The letter also states:

"The extension of the qualified life of the valves will be based on the 10°C Rule and the extension of the qualified life of the coils will be based on additional type tests at elevated temperatures, with the life at the required ambient temperatures determined by the 10°C Rule."

with regard to this statement the licensee has not provided technical justification for his qualified life claim in the form of either the figures referenced in the letter or his own analysis.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 62

EQUIPMENT ITEM NO. 62
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 62
LICENSEE REFERENCE(S): 649, 3392
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-545)
LICENSEE SUBMITTAL: SCEW(S): C-28A

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, (S) (R), M, I, (QM) (RPN) EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 62

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | <u>III.a</u> Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 62

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	<u>X</u>
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no. 49 for evaluation.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 62

LICENSEE RESPONSE TO NRC SER

Solenoid Valve - NP8320A/85
NRC Items - C-28A, C-29
Submittal Pages - 5-5, 5-6
Deficiency - RPN

Solenoid - NP8320A185E
NRC Items - C-28, C-28A
Submittal Pages - 5-4, 5-5
References RPN, QM-S

RPN - the replacement of these solenoids was completed during the 1980 refueling as committed to in LER 79-014. The only requirement is to update the worksheet. This does not impact plant safety.

QM-S - The concern here is submergence. The District uses these solenoids to initiate containment isolation. Upon initiation of CIAS these solenoid valves de-energize. Conversations with ASCO indicate that submergence may render the coil inoperable however, the solenoid seats would remain intact. Therefoer, this is not a safety concern.

Licensee SCEW indicates that these valves are normally locked closed.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 62

SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for concurrence/non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- X Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIb)
- Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- Backup (equipment/system) is subject to a potentially disabling single active failure.
- Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 63

EQUIPMENT ITEM NO. 63

SOLENOID VALVE LOCATED IN ROOM 13

ASCO MODEL WPHT831429

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 63

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): PILOT OPERATOR (HCV-349, HCV-350)

LICENSEE SUBMITTAL: SCEV(S): R42

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 63

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 63

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate X
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 63

NOTES:

The Licensee SCEW indicates that the room 13 environment is mild except for radiation (~ 4 Mrd.).

The Licensee SCEW indicates that the valve is qualified to 5×10^6 rd by material analysis. The licensee has not presented this referenced analysis.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 64

EQUIPMENT ITEM NO. 64
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 64
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-2808C, D; -2810C, D; -2812C, D;
-2813C, D)
LICENSEE SUBMITTAL: SCEW(S): I-28

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, (S), (R), M, I, (QM), (RPN), EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 64

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | <u>III.a</u> Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 64

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	<u>X</u>
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 64

The Licensee has stated:

"Valves are locked open and do not operate during an event."



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 64

SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for concurrence/non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- ☒ Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- ☐ Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIb)
- ☐ Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- ☐ Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- ☐ Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- ☐ Backup (equipment/system) is subject to a potentially disabling single active failure.
- ☐ Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- ☐ Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- ☐ Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 65

EQUIPMENT ITEM NO. 65
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 65
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): INLET & OUTLET VALVES FOR SAFETY INJECTION & SPRAY PUMP
BEARING COOLERS (HCV-2808A, B; -2810A, B; -2812A, B;
-2813A, B; -2809C, D; -2811C, D; -2814C, D; -2815C, D)
LICENSEE SUBMITTAL: SCEW(S): 1-24, -26

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, (S) (R), M, I, (QM) (RPN) EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 64

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 65

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification X _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 65

The Licensee has stated:

" Valves are locked open and do not operate during an event."



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 65

SYSTEM CONSIDERATION REVIEW

The Licensee has stated that this equipment item does not require environmental qualification and/or should be exempted from qualification. The Licensee's rationale has been evaluated and the reasons for concurrence/non-concurrence with the technical basis of the Licensee's position are presented below.

Reason for Concurrence

- ☒ Equipment does not provide a safety function or mitigate the consequences of a design basis accident. Equipment Environmental Qualification is not required by the DOR Guidelines. (NRC Qualification Evaluation Category IIIa)
- Equipment is not exposed to a harsh environment by the accident it is intended to mitigate. See note (1) on page 4b. (NRC Qualification Evaluation Category IIb)
- Backup (equipment/system) is available which completely performs the safety function. The backup (equipment/system) is environmentally qualified and appears to meet single active failure criterion. See note (1) on page 4b. (NRC Qualification Evaluation Category IIIa)

Reason for Non-Concurrence

- Backup (equipment/system) is not fully capable of performing the intended safety function or accident mitigating function.
- Backup (equipment/system) is not environmentally qualified and can be exposed to a hostile environment simultaneously with the primary equipment.
- Backup (equipment/system) is subject to a potentially disabling single active failure.
- Failure of the primary equipment can compromise the ability of other safety-related equipment to perform its specified safety function.
- Failure of the primary equipment can result in erroneous indication which could mislead an operator.
- Requirement for continued functioning throughout the post-accident period necessitates environmental qualification.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 66

EQUIPMENT ITEM NO. 66
SOLENOID VALVE LOCATED IN ROOM 60
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 66
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT HVAC ISOLATION
(PCV-742F, H; HCV-746B)
LICENSEE SUBMITTAL: SCEW(S): R3-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 66

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 66

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item nos 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 66

LICENSEE RESPONSE TO NRC SER

HCV-746B is a NP 8314C29E
PCV-742F & 742H are NP 8320A185E



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 67

EQUIPMENT ITEM NO. 67

SOLENOID VALVE LOCATED IN ROOM 81

ASCO MODEL NP8320A185E

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 67

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): VALVE ACTUATORS INLET & OUTLET VALVE FOR CONTROL ROOM
AIR CONDITIONING UNITS (HCV-2898C, -2898D; HCV-2899C,
-2899D; HCV-2898A, -2898B; HCV-2899A, -2899B)

LICENSEE SUBMITTAL: SCEW(S): S-14

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, (S) (R), M, I, (QM) (RPN) EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

4a, 4b, ~~4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 67

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 67

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

*Refer to items 49 & 50
For evaluation.*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 67

The Licensee has stated:

“

VV's are required to operate only if there is a failure of the Component Cooling System. They function to block CCW flow and are normally open and de-energized.”



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 68

EQUIPMENT ITEM NO. 68
SOLENOID VALVE LOCATED IN ROOM 13
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 68
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION ISOLATION (HCV-306, HCV-307)
LICENSEE SUBMITTAL: SCEW(S): R1-14
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CHEMICAL VOLUME CONTROL SYSTEM (HCV-204, HCV-206)
LICENSEE SUBMITTAL: SCEW(S): R1-1
FUNCTION (PLANT ID): VALVE ACTUATORS FOR COMPONENT COOLING (HCV-467B, D; HCV-438B, D)
LICENSEE SUBMITTAL: SCEW(S): R1-3

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

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Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 68

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 68

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 cr Replacement Schedule Justified X
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 69

EQUIPMENT ITEM NO. 69
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 69
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR HPSI HEADER ISOLATION VALVES
(HCV-383-1, -383-2; HCV-304, -305)
LICENSEE SUBMITTAL: SCEW(S): I-2, -30

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 69

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 69

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 68

The Licensee SCEWS noted the following:

HCV-383-1, -2

"LCV-383-1 & 2 are required to close on receipt of a RAS signal. This occurs 20 minutes into the event. Valves close in 10 seconds. In addition check valves are provided to ensure proper operation. These solenoids are expected to remain functional during the long term core cooling"

HCV-304 and 305

"Values are locked open and do not operate during an event. The valve is expected to function adequately for long term core cooling"



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 70

EQUIPMENT ITEM NO. 70
SOLENOID VALVE LOCATED IN ROOM 59
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 70
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT SPRAY HEADER ISOLATION
VALVE (HCV-344, -345)
LICENSEE SUBMITTAL: SCEW(S): R2-5
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT HVAC ISOLATION
(A/HCV-742, B/HCV-742, C/HCV-742, D/HCV-742)
LICENSEE SUBMITTAL: SCEW(S): R2-3
FUNCTION (PLANT ID): VALVE ACTUATORS FOR COMPONENT COOLING LEAKAGE (HCV-425B,
-425D)
LICENSEE SUBMITTAL: SCEW(S): R2-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Licensee Response to NRC SER	3a, 3b, 3c, 3d
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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 70

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item nos. 49 and 50 for evaluation



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 71

EQUIPMENT ITEM NO. 71

SOLENOID VALVE LOCATED IN ROOM 69

ASCO MODEL NP8314C29E

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 71

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): VALVE ACTUATORS FOR DEMINERALIZED WATER ISOLATION VALVES
(HCV-1559A, B; HCV-1560A, B)

LICENSEE SUBMITTAL: SCEW(S): R4-7

FUNCTION (PLANT ID): VALVE ACTUATORS FOR COMPONENT COOLING WATER TO
CONTAINMENT AIR COOLING UNITS (HCV-400A-D; HCV-401A-D;
HCV-402A-D; HCV-403)

LICENSEE SUBMITTAL: SCEW(S): R4-2

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER For Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 71

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u> _____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 72

EQUIPMENT ITEM NO. 72
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL LB8316C44
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 72
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION INLET AND DISCHARGE
ISOLATION VALVES (HCV-2947, -2948, -2957, -2958, -2917,
-2927)
LICENSEE SUBMITTAL SCEW(S): I-24, -23, -18

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), M, I, (QM), RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action June 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 72

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u>X</u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 72

LICENSEE RESPONSE TO NRC SER

ASCO

NRC Items - R1-1, R1-3, R2-1, R4-2, R2-3, R4-7, I-30,
I-2, R1-14, R1-5, R2-7, R4-13
Submittal Pages - 6-2, 6-11, 6-13, 6-16, 6-30, 6-44,
6-66, 6-76, 6-90, 6-97, 6-107
Deficiencies - T, P, EXN, R-M, QM - EXN

ASCO

Solenoid Valve - WPHT 831429
NRC Items - S-2, I-26, I-27, R3-1, I-29, I-28
Submittal Pages - 6-6, 6-7, 6-0, 6-35, 6-103
Deficiencies - QM, R-M, P, T, QM-EXN

ASCO

Solenoid Valve - HTX (HT)
NRC Items - R2-5, R7-1, R4-9, R4-11, S-6, R1-9
Submittal Pages - 6-41, 6-78, 6-80, 6-99, 6-119
Deficiencies - P, T, QM-EXN, R-M

ASCO

Solenoid Valve - LB8316C44
NRC Items - R4-5, I-20, I-18, I-24, I-21, I-23, I-22
Submittal Pages - 6-32, 6-70, 6-73, 6-86, 6-88,
6-37, 6-39
Deficiencies - R-M, P, T, QM-EXN, R, QM, R-QM

ASCO

Solenoid Valve - LB8320A26
NRC Item - R-3-3
Submittal Page - 6-114
Deficiencies - P, T, QM-EXN, R-M

ASCO

Solenoid Valve - HT8321A5
NRC Items - I-19, I-25
Submittal Pages - 6-68, 6-71
Deficiencies - R, QM

All of the listed solenoid valves are located in the Auxiliary building. The questions raised by the NRC regarding equipment in the Auxiliary building are related to both generic qualification methodology and specific items.

Generically a question has been raised regarding temperature, and pressure, margin. Temperature was considered a harsh environment only in Room 81 and the SI Pump rooms, 21 and 22. Here specific analyses were run to determine maximum stress levels. In the remaining rooms an engineering judgement was used. In Rooms 59 and 69 the heat input would result from continued containment spray after recirculation. The rooms are large compared to the spray piping. No significant heat input is expected. The post-accident heat input in Room 13 is from the SI piping after recirculation. Although there is a large amount of piping compared to room size, it is felt that in a post-accident situation the isolation of blow down and letdown will eliminate those heat sources and little temperature change is expected. This is supported by the fact that temperature has been stable in Room 13 when the unit is in a shutdown cooling mode. Room 60 has no post-accident heat source.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 72

LICENSEE RESPONSE TO NRC SER (Continued)

It is expected that changes in room temperature would be very slow should ventilation be lost. After containment recirculation occurs and the HPSI pumps trip, adequate capacity exists to start the auxiliary building ventilation fans even if the plant is on emergency diesel generators.

Pressure was not considered in the radiation controlled area. The analysis in the FSAR Appendix M indicates a high energy line break (HELB) in the Auxiliary Building would not effect the ability to shut the plant down.

The remaining specific issue for solenoid valves is radiation. All valves in the controlled side of the auxiliary building operate automatically prior to recirculation (with exception of HCV-304 and HCV-305). Continued operation was permitted under a similar analysis for the same solenoids in containment during 1979. HCV-304 and HCV-305 are required to operate for long term core cooling at about 50 hours into the accident. Engineering judgement indicates that no problem should be encountered. Radiation dose would be below the threshold level of material change. In the event these two valves are not operable the HPSI pump discharge check valves can be used to perform the same function. In addition, there is a high level of assurance that once the valves are operated they will remain in that position.

For Room 81 the FSAR states that if an MSLE occurs in Room 81, the control room HVAC will be lost. Therefore, the solenoids on the Raw Water and Component Cooling Water do not have to function. It is desirable however, that the interface valves remain shut to prevent dumping chromates into the Raw Water System, and these should function based on the judgement submitted in the worksheets.

The MSIV solenoids should perform their function at the onset of a MSLE in Room 81. This analysis was submitted and still appears valid.

In the long term the listed ASCO solenoids will be changed out with solenoids that meet a LOCA profile and conform to the proposed aging program. This change out is to be completed by June 30, 1982.

The Licensee SCEW states:

"Valves are locked open and do not operate during an event."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 73

EQUIPMENT ITEM NO. 73

SOLENOID VALVE LOCATED IN ROOM 22

ASCO MODEL LB8316C44

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 73

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION INLET AND DISCHARGE
ISOLATION VALVES (HCV-2937, -2938, -2907, -2967, -2968,
-2977, -2978)

LICENSEE SUBMITTAL: SCEW(S): I-21, -20, -22

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

(R), T, QT, RT, P, H, CS, A, S, (R), M, I, (QM), RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, ~~3b~~, ~~3c~~, 3d

System Consideration Review

~~4a~~, ~~4b~~, ~~4c~~, ~~4d~~, ~~4e~~, ~~4f~~

Equipment Environmental Qualification Review

~~5a~~, ~~5b~~, ~~5c~~, ~~5d~~, ~~5e~~, ~~5f~~,
~~5g~~, ~~5h~~, ~~5i~~, ~~5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a~~, ~~6b~~

Maintenance and Replacement Schedule Summary

~~7a~~, ~~7b~~, ~~7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 73

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action June 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 73

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u>X</u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 73

LICENSEE RESPONSE TO NRC SER

ASCO

NRC Items - R1-1, R1-3, R2-1, R4-2, R2-3, R4-7, I-30,
I-2, R1-14, R1-5, R2-7, R4-13
Submittal Pages - 6-2, 6-11, 6-13, 6-16, 6-30, 6-44,
6-66, 6-76, 6-90, 6-97, 6-107
Deficiencies - T, P, EXN, R-M, QM - EXN

ASCO

Solenoid Valve - WPHT 831429
NRC Items - S-2, I-26, I-27, R3-1, I-29, I-28
Submittal Pages - 6-6, 6-7, 6-0, 6-35, 5-103
Deficiencies - QM, R-M, P, T, QM-EXN

ASCO

Solenoid Valve - HTX (HT)
NRC Items - R2-5, R7-1, R4-9, R4-11, S-6, R1-9
Submittal Pages - 6-41, 6-78, 6-80, 6-99, 6-119
Deficiencies - P, T, QM-EXN, R-M

ASCO

Solenoid Valve - LB8316C44
NRC Items - R4-5, I-20, I-18, I-24, I-21, I-23, I-22
Submittal Pages - 6-32, 6-70, 6-73, 6-86, 6-88,
6-37, 6-39
Deficiencies - R-M, P, T, QM-EXN, R, QM, R-QM

ASCO

Solenoid Valve - LB8320A26
NRC Item - R-3-3
Submittal Page - 6-114
Deficiencies - P, T, QM-EXN, R-M

ASCO

Solenoid Valve - HT3321A5
NRC Items - I-19, I-25
Submittal Pages - 6-68, 6-71
Deficiencies - R, QM

All of the listed solenoid valves are located in the Auxiliary building. The questions raised by the NRC regarding equipment in the Auxiliary building are related to both generic qualification methodology and specific items.

Generically a question has been raised regarding temperature, and pressure, margin. Temperature was considered a harsh environment only in Room 81 and the SI Pump rooms, 21 and 22. Here specific analyses were run to determine maximum stress levels. In the remaining rooms an engineering judgement was used. In Rooms 59 and 69 the heat input would result from continued containment spray after recirculation. The rooms are large compared to the spray piping. No significant heat input is expected. The post-accident heat input in Room 13 is from the SI piping after recirculation. Although there is a large amount of piping compared to room size, it is felt that in a post-accident situation the isolation of blow down and letdown will eliminate those heat sources and little temperature change is expected. This is supported by the fact that temperature has been stable in Room 13 when the unit is in a shutdown cooling mode. Room 60 has no post-accident heat source.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 73

LICENSEE RESPONSE TO NRC SER (Continued)

It is expected that changes in room temperature would be very slow should ventilation be lost. After containment recirculation occurs and the HPSI pumps trip, adequate capacity exists to start the auxiliary building ventilation fans even if the plant is on emergency diesel generators.

Pressure was not considered in the radiation controlled area. The analysis in the FSAR Appendix M indicates a high energy line break (HELB) in the Auxiliary Building would not effect the ability to shut the plant down.

The remaining specific issue for solenoid valves is radiation. All valves in the controlled side of the auxiliary building operate automatically prior to recirculation (with exception of HCV-304 and HCV-305). Continued operation was permitted under a similar analysis for the same solenoids in containment during 1979. HCV-304 and HCV-305 are required to operate for long term core cooling at about 50 hours into the accident. Engineering judgement indicates that no problem should be encountered. Radiation dose would be below the threshold level of material change. In the event these two valves are not operable the HPSI pump discharge check valves can be used to perform the same function. In addition, there is a high level of assurance that once the valves are operated they will remain in that position.

For Room 81 the FSAR states that if an MSLB occurs in Room 81, the control room HVAC will be lost. Therefore, the solenoids on the Raw Water and Component Cooling Water do not have to function. It is desirable however, that the interface valves remain shut to prevent dumping chromates into the Raw Water System, and these should function based on the judgement submitted in the worksheets.

The MSIV solenoids should perform their function at the onset of a MSLB in Room 81. This analysis was submitted and still appears valid.

In the long term the listed ASCO solenoids will be changed out with solenoids that meet a LOCA profile and conform to the proposed aging program. This change out is to be completed by June 30, 1982.

The Licensee SCEW states:

"Valves are locked open and do not operate during an event."



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 74

EQUIPMENT ITEM NO. 74
SOLENOID VALVE LOCATED IN ROOM 69
ASCO MODEL NP831655E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 74
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT HVAC ISOLATION
(PCV-742B, D)
LICENSEE SUBMITTAL: SCEW(S): R4-5

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 74

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 74

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's 49 and 50 for evaluation



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 75

EQUIPMENT ITEM NO. 75

SOLENOID VALVE LOCATED IN ROOM 21

ASCO MODEL HT8321A5

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 75

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION DISCHARGE ISOLATION
VALVES (HCV-2918, -2928)

LICENSEE SUBMITTAL: SCEW(S): I-19

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, M, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Equipment Item

Summary of Licensee Responses to the NRC SER

Equipment Environmental Qualification Summary Forms

Licensee Response to NRC SER

System Consideration Review

Equipment Environmental Qualification Review

Installed TMI Lessons Learned Implementation
Equipment Summary

Maintenance and Replacement Schedule Summary

Checksheet Page No.

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~~3a, 3b, 3c, 3d~~

~~4a, 4b, 4c, 4d, 4e, 4f~~

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

~~6a, 6b~~

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 75

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action June 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

☒ I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 75

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 75

LICENSEE RESPONSE TO NRC SER

ASCO NRC Items - R1-1, R1-3, R2-1, R4-2, R2-3, R4-7, I-30,
I-2, R1-14, R1-5, R2-7, R4-13
Submittal Pages - 6-2, 6-11, 6-13, 6-16, 6-30, 6-44,
6-66, 6-76, 6-90, 6-97, 6-107
Deficiencies - T, P, EXN, R-M, QM - EXN

ASCO Solenoid Valve - WPHT 831429
NRC Items - S-2, I-26, I-27, R3-1, I-29, I-28
Submittal Pages - 6-6, 6-7, 6-0, 6-35, 6-103
Deficiencies - QM, R-M, P, T, QM-EXN

ASCO Solenoid Valve - HTX (HT)
NRC Items - R2-5, R7-1, R4-9, R4-11, S-6, R1-9
Submittal Pages - 6-41, 6-78, 6-80, 6-99, 6-119
Deficiencies - P, T, QM-EXN, R-M

ASCO Solenoid Valve - LB8316C44
NRC Items - R4-5, I-20, I-18, I-24, I-21, I-23, I-22
Submittal Pages - 6-32, 6-70, 6-73, 6-86, 6-88,
6-37, 6-39
Deficiencies - R-M, P, T, QM-EXN, R, QM, R-QM

ASCO Solenoid Valve - LB8320A26
NRC Item - R-3-3
Submittal Page - 6-114
Deficiencies - P, T, QM-EXN, R-M

ASCO Solenoid Valve - HT8321A5
NRC Items - I-19, I-25
Submittal Pages - 6-68, 6-71
Deficiencies - R, QM

All of the listed solenoid valves are located in the Auxiliary building. The questions raised by the NRC regarding equipment in the Auxiliary building are related to both generic qualification methodology and specific items.

Generically a question has been raised regarding temperature, and pressure, margin. Temperature was considered a harsh environment only in Room 81 and the SI Pump rooms, 21 and 22. Here specific analyses were run to determine maximum stress levels. In the remaining rooms an engineering judgement was used. In Rooms 59 and 69 the heat input would result from continued containment spray after recirculation. The rooms are large compared to the spray piping. No significant heat input is expected. The post-accident heat input in Room 13 is from the SI piping after recirculation. Although there is a large amount of piping compared to room size, it is felt that in a post-accident situation the isolation of blow down and letdown will eliminate those heat sources and little temperature change is expected. This is supported by the fact that temperature has been stable in Room 13 when the unit is in a shutdown cooling mode. Room 60 has no post-accident heat source.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 75

LICENSEE RESPONSE TO NRC SER (Continued)

It is expected that changes in room temperature would be very slow should ventilation be lost. After containment recirculation occurs and the HPSI pumps trip, adequate capacity exists to start the auxiliary building ventilation fans even if the plant is on emergency diesel generators.

Pressure was not considered in the radiation controlled area. The analysis in the FSAR Appendix M indicates a high energy line break (HELB) in the Auxiliary Building would not effect the ability to shut the plant down.

The remaining specific issue for solenoid valves is radiation. All valves in the controlled side of the auxiliary building operate automatically prior to recirculation (with exception of HCV-304 and HCV-305). Continued operation was permitted under a similar analysis for the same solenoids in containment during 1979. HCV-304 and HCV-305 are required to operate for long term core cooling at about 50 hours into the accident. Engineering judgement indicates that no problem should be encountered. Radiation dose would be below the threshold level of material change. In the event these two valves are not operable the HPSI pump discharge check valves can be used to perform the same function. In addition, there is a high level of assurance that once the valves are operated they will remain in that position.

For Room 81 the FSAR states that if an MSLB occurs in Room 81, the control room HVAC will be lost. Therefore, the solenoids on the Raw Water and Component Cooling Water do not have to function. It is desirable however, that the interface valves remain shut to prevent dumping chromates into the Raw Water System, and these should function based on the judgement submitted in the worksheets.

The MSIV solenoids should perform their function at the onset of a MSLB in Room 81. This analysis was submitted and still appears valid.

In the long term the listed ASCO solenoids will be changed out with solenoids that meet a LOCA profile and conform to the proposed aging program. This change out is to be completed by June 30, 1982.

The Licensee SCEW states:

"Valves are locked open and do not operate during an event."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 76

EQUIPMENT ITEM NO. 76
SOLENOID VALVE LOCATED IN ROOM 22
ASCO MODEL HT8321A5
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 76
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATOR FOR SI-2B DISCHARGE ISOLATION VALVE
(HCV-2908)
LICENSEE SUBMITTAL: SCEW(S): I-25

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED IT-1(S) ONLY:
(See Section 3 of this TER for Legend)

(R) T, QT, RT, P, H, CS, A, S, (R), M, I, (QM), RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 76

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action June 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

☒ I.b Modification

II.a Qualification Not Established

II.b Not Qualified

☒ II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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FRC Assignment No. 13

FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 76

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate X
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 76

LICENSEE RESPONSE TO NRC SER

ASCO NRC Items - R1-1, R1-3, R2-1, R4-2, R2-3, R4-7, I-30,
I-2, R1-14, R1-5, R2-7, R4-13
Submittal Pages - 6-2, 6-11, 6-13, 6-16, 6-30, 6-44,
6-66, 6-76, 6-90, 6-97, 6-107
Deficiencies - T, P, EXN, R-M, QM - EXN

ASCO Solenoid Valve - WPHT 831429
NRC Items - S-2, I-26, I-27, R3-1, I-29, I-28
Submittal Pages - 6-6, 6-7, 6-9, 6-35, 6-103
Deficiencies - QM, R-M, P, T, QM-EXN

ASCO Solenoid Valve - HTX (HT)
NRC Items - R2-5, R7-1, R4-9, R4-11, S-6, R1-9
Submittal Pages - 6-41, 6-78, 6-80, 6-99, 6-119
Deficiencies - P, T, QM-EXN, R-M

ASCO Solenoid Valve - LB8316C44
NRC Items - R4-5, I-20, I-18, I-24, I-21, I-23, I-22
Submittal Pages - 6-32, 6-70, 6-73, 6-86, 6-88,
6-37, 6-39
Deficiencies - R-M, P, T, QM-EXN, R, QM, R-QM

ASCO Solenoid Valve - LB8320A26
NRC Item - R-3-3
Submittal Page - 6-114
Deficiencies - P, T, QM-EXN, R-M

ASCO Solenoid Valve - HT8321A5
NRC Items - I-19, I-25
Submittal Pages - 6-68, 6-71
Deficiencies - R, QM

All of the listed solenoid valves are located in the Auxiliary building. The questions raised by the NRC regarding equipment in the Auxiliary building are related to both generic qualification methodology and specific items.

Generically a question has been raised regarding temperature, and pressure, margin. Temperature was considered a harsh environment only in Room 81 and the SI Pump rooms, 21 and 22. Here specific analyses were run to determine maximum stress levels. In the remaining rooms an engineering judgement was used. In Rooms 59 and 69 the heat input would result from continued containment spray after recirculation. The rooms are large compared to the spray piping. No significant heat input is expected. The post-accident heat input in Room 13 is from the SI piping after recirculation. Although there is a large amount of piping compared to room size, it is felt that in a post-accident situation the isolation of blow down and letdown will eliminate those heat sources and little temperature change is expected. This is supported by the fact that temperature has been stable in Room 13 when the unit is in a shutdown cooling mode. Room 60 has no post-accident heat source.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 76

LICENSEE RESPONSE TO NRC SER (Continued)

It is expected that changes in room temperature would be very slow should ventilation be lost. After containment recirculation occurs and the HPSI pumps trip, adequate capacity exists to start the auxiliary building ventilation fans even if the plant is on emergency diesel generators.

Pressure was not considered in the radiation controlled area. The analysis in the FSAR Appendix M indicates a high energy line break (HELB) in the Auxiliary Building would not effect the ability to shut the plant down.

The remaining specific issue for solenoid valves is radiation. All valves in the controlled side of the auxiliary building operate automatically prior to recirculation (with exception of HCV-304 and HCV-305). Continued operation was permitted under a similar analysis for the same solenoids in containment during 1979. HCV-304 and HCV-305 are required to operate for long term core cooling at about 50 hours into the accident. Engineering judgement indicates that no problem should be encountered. Radiation dose would be below the threshold level of material change. In the event these two valves are not operable the HPSI pump discharge check valves can be used to perform the same function. In addition, there is a high level of assurance that once the valves are operated they will remain in that position.

For Room 81 the FSAR states that if an MSLE occurs in Room 81, the control room HVAC will be lost. Therefore, the solenoids on the Raw Water and Component Cooling Water do not have to function. It is desirable however, that the interface valves remain shut to prevent dumping chromates into the Raw Water System, and these should function based on the judgement submitted in the worksheets.

The MSIV solenoids should perform their function at the onset of a MSLE in Room 81. This analysis was submitted and still appears valid.

In the long term the listed ASCO solenoids will be changed out with solenoids that meet a LOCA profile and conform to the proposed aging program. This change out is to be completed by June 30, 1982.

The Licensee SCEW states:

"Valves are locked open and do not operate during an event."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 77

EQUIPMENT ITEM NO. 77
SOLENOID VALVE LOCATED IN ROOM 13
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 77
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR STEAM GENERATOR FEEDWATER AND
BLOWDOWN (HCV-1387B, HCV-1388B)
LICENSEE SUBMITTAL: SCEW(S): R1-7
FUNCTION (PLANT ID): VALVE ACTUATORS FOR WASTE DISPOSAL (HCV-500A, B; -506A,
B; -507A, B; -508A, B; -509A, B)
LICENSEE SUBMITTAL: SCEW(S): R1-9

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 77

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's. 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 78

EQUIPMENT ITEM NO. 78

SOLENOID VALVE LOCATED IN ROOM 60

ASCO MODEL NT5320A189E

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 78

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAMPLING SYSTEM ISOLATION
(HCV-2504B, -2506B, -2507B)

LICENSEE SUBMITTAL: SCEW(S): R3-3

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 78

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 78

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See review of equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 79

EQUIPMENT ITEM NO. 79
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 79
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): REMOTE OPERATION OF PNEUMATIC VALVE (HCV-742A, HCV-742B,
HCV-725A, HCV-725B)
LICENSEE SUBMITTAL: SCEW(S): C-29B

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 79

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
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 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------------------|------------------------------------------------------|
| <input checked="" type="radio"/> I.a Qualified | <input type="radio"/> II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 79

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*See review of equipment item no. 49 for
detailed evaluation.*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 80

EQUIPMENT ITEM NO. 80
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: INTERMITTENT
TER CHECKSHEET NO. 80
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): MAIN STEAM SAFETY RELIEF VALVE OPERATOR (MS-291, -292)
LICENSEE SUBMITTAL: SCEW(S): C-12

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, (RPN) EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 80

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 80

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no. 43 for detailed evaluation.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 80

The Licensee SCEW states:

"The Main Steam Safeties can be used as an alternate path of decay heat removal using the Aux Feedwater System and Steam Generators."



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 81

EQUIPMENT ITEM NO. 81
SOLENOID VALVE LOCATED IN THE CONTAINMENT
VALCOR MODEL V70900213
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 81
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-438A, -438C, -881, -882, -883A,
HCV-884A, -864, -865, -1107A, -1108A)
LICENSEE SUBMITTAL: SCEW(S): C-27

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM RPN EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER	3a, 3b , 3c , 3d
System Consideration Review	4a , 4b , 4c , 4d , 4e , 4f
Equipment Environmental Qualification Review	5a , 5b , 5c , 5d , 5e , 5f , 5g , 5h , 5i , 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a , 6b
Maintenance and Replacement Schedule Summary	7a, 7b , 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 81

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☒ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action fall, 1981 outage.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| <u>I.b</u> Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 81

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u>X</u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 81

LICENSEE RESPONSE TO NRC SER

Manufacturer:

VALCOR

Model/Findings:

Solenoid - V70900-21-3
NRC Item - C-27, S-12
Submittal* Pages - 5-3, 6-94
References - RPN, QM-S, A

Analysis - These valves were addressed in IE Bulletin 80-23 and are scheduled for replacement with fully qualified solenoid valves during the fall 1981 outage. RPN - a replacement date can be provided, QM-S Submergence should not be a problem; a failure would result in the same failure as would a loss of instrument air. However, the valves are not expected to fail with submergence, A - aging - the valves are tested for a 40 year life.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 81

MAINTENANCE AND REPLACEMENT SCHEDULE SUMMARY

The following information regarding the maintenance and replacement schedule(s) for components, sub-components, and materials has been provided by the Licensee.

*Equipment replacement during fall, 1981 outage.
Revisions to the Licensee's submittal indicate
that equipment was replaced on schedule.*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

EQUIPMENT ITEM NO. 82

SOLENOID VALVE LOCATED IN THE CONTAINMENT

TARGET ROCK MODEL 80B0017

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 82

LICENSEE REFERENCE(S): 3587

FUNCTION (PLANT ID): REACTOR COOLANT SYSTEM VENT VALVES (HCV-176, -177, -178, -179, -180, -181)

LICENSEE SUBMITTAL: SCEW(S): TMI-1

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

new item

LISTING OF APPLICABLE CHECKSHEETS:

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Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

5a, 5b, 5c, 5d, 5e, 5f,
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
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 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
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 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I X; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Solenoid Valve	SOLENOID VALVE	
Manufacturer's Name (5.2.2/-/-)		TARGET ROCK	
Model Number (5.2.2/-/-)	80B-001-7	77CC-001	
Serial Number		MODIFIED TO SK-4017	
Features/Mounting (5.2.6/-/-)		DUAL PILOT DISC, POTTED COIL 2500 lb. ANSI 1IN. NORMALLY CLOSED	X adequate similarity not established
Connections/Interfaces (5.2.6/-/-)	not stated	INTERNAL TERMINAL CONNECTIONS	
Location/Elevation	Containment		
Equipment ID No.	HCV-176, -177, -178, -179, -180, -181		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	PGR 3587	TRP-2375 Rev. C	
Report Date	TRP 2375 rev. C	9-26-79	
Issued by		TARGET ROCK CORP.	
Prepared for		TARGET ROCK CORP.	
Referenced Reports		East-West Technology Report No. 92906-9	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		SEQUENTIAL TEST	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Seat Leakage test Operational test Position Indication I. R. tests	
Operating Conditions (-/2.2.10/2.2.10)		2485 psig water supplied to inlet port	
Load/Cycles/Voltage/ Current/Freq.		120 VAC COIL VOLTAGE	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)		PASS FUNCTIONAL TESTING	
Accuracy (5.2.5/-/-)			
Number of Specimens		1	
Test Instruments Calibrated		APPENDIX A OF TRP 2302C	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Rx coolant system vents		
Test Duration (5.2.1/-/-)			
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	not stated		
Required Function Time	long term		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		RAD/TA+HUM/OPER/ SEIS/STM+CHSP/RAD	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)		792 hr. @ 350°F	
Thermal Aging/Basis		10°C RULE	
Material Aging Evaluation (7.0/-/-)			
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type		GAMMA	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	:	: 22.7 x 10 ⁶ rd.	:
Radiation Aging, Dose Rate	:	: NOT STATED	:
Radiation Aging, Method	:	: TEST	:
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	:	:	:
Operational Aging (-/4.2/-)	:	: 18,000 cycles @ 122°F, 90%rh	:
Other Age Conditioning (-/4.2/-)	:	:	:
Qualified Life Claimed/ Established (5.2.4/4.10/-)	: 40 yr.	: 40 yrs.	:
Normal Ambient Temperature	} not stated	:	:
Normal Ambient Radiation		:	:
Normal Ambient Humidity		:	:
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	:	: TARGET ROCK REPLACEMENT PROGRAM	:
On-Going Analysis of Failures and Degradation (7.0/-/-)	:	:	:
Margin (General) (6.0/3.0/3.0)	:	:	:
Margin (NUREG-0588, Cat. I) (-/3.2/-)	:	:	:
1. Temperature (+15°F)	:	:	:
2. Pressure (+10%, 10 psig max)	:	:	:
3. Radiation (not required)	:	:	:
4. Time (+10%, +1 hour + function time minimum)	:	:	:



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)		LOCA	
Radiation Type		GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	$10^5 - 10^6 \text{ rd}$	1.32×10^7	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)		NOT STATED	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)			
Equipment Susceptible to Beta Radiation (4.1.2/-/-)			
Radiation Dose (Normal + Accident) (4.1.2/-/-)	$10^5 - 10^6 \text{ rds}$		
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		385°F, 66 psig within 1.0 min.	
Peak: °F/psig/RH/Time	280/50/-/100 sec	385/66/-/1.5 min.	
Decrease To: °F/psig/RH/Time	280/50/-/8 hr.	365/66/-/9.5 min.	
Decrease To: °F/psig/RH/Time	140/10/-/10	312/65/-/468 min.	
Decrease To: °F/psig/RH/Time		290/27.5/-/34.0 hr.	
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)		215/11/-/12.3 days	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)			
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700 pp boron	BORIC ACID HYDRAZINE	
Spray Density (gpm/ft ²)	} not stated	0.15	
Spray Duration		20, 100 min.	
Submergence Duration (4.1.3/2.2.5/2.2.5)			
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 82

NOTES:

1. Test valve passed functional testing after each sequence of the test program. Post DBE performance was not demonstrated past 14 days. The valve has a 40 yr. qualified life provided the replacement schedule outlined in the report conclusion is adopted.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 83

EQUIPMENT ITEM NO. 83

I AND C PANEL LOCATED IN ROOM 81

JOHNSON CONTROLS, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT REQUIRED

TER CHECKSHEET NO. 83

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): CONTROL ROOM HVAC CONTROL PANELS (AI-106A & AI-106B)

LICENSEE SUBMITTAL: SCEW(S): S-3

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Checksheet Page No.

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~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 83

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 83

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	<u>X</u> _____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 83

LICENSEE RESPONSE TO NRC SER

- 1) Failure of the control Room HVAC equipment to operate during HELB in Room 81 is addressed in Appendix M of the Fort Calhoun FSAR.

Associated excerpt from Appendix M.

For the purpose of this investigation, it was assumed that the control room air-conditioning equipment, located in room 81, would become inoperative following the postulated rupture. A study indicated that it would take at least seven (7) hours before the proper functioning of essential instrumentation and equipment would be compromised. During this time, a path would be established for the circulation of cooler air from the computer room by the proper positioning of various doors. Fans, powered from the emergency diesels and strategically positioned, would ensure the forced circulation of this cooler air. The control room would thus be kept at a temperature low enough to ensure not only the proper operation of equipment, but also an environment habitable by control room personnel.

Thus, it can be seen that the required operation of the control room would continue satisfactorily in the event of the postulated high energy line rupture.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 84

EQUIPMENT ITEM NO. 84
E/P TRANSDUCER LOCATED IN ROOM 13
FISHER CONTROLS MODEL 546
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 84
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): POSITION SIGNAL FOR LOW PRESSURE SAFETY INJECTION VALVE
(FCV-326, HCV-341)
LICENSEE SUBMITTAL: SCEW(S): R1-13

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 84

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 84

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u>X</u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 84

LICENSEE RESPONSE TO NRC SER

1. See Enclosure #14.
2. Material Analysis 10 R. The E/P is expected to be operable for long term cooling.
3. See Enclosure #12.
4. See Enclosure #18.

Enclosure 12

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 84

NOTES:

The Licensee's SCEW sheet refers to Enclosure 12 for aging. This enclosure describes the plan to evaluate aging and replacement schedules. No results from the program were included for evaluation. The program was scheduled for completion June 30, 1982.

Note 2 of the SCEW sheet states that the electro-pneumatic transducer can withstand 10^6 rads. A materials analysis is cited as proof. This analysis was not provided for review.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

EQUIPMENT ITEM NO. 85

ELECTRICAL INSTRUMENT CABLE LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING
CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 85

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): INSTRUMENT CABLE FOR TEMPERATURE, FLOW, & PRESSURE
INDICATION (W-57, W-59)

LICENSEE SUBMITTAL: SCEW(S): C-9

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, KPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	<u>X</u> _____
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u> _____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	<u>X</u> _____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	_____
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

LICENSEE RESPONSE TO NRC SER

3. As previously stated, in the FRC, the only cables which are required to be operable during and after the design basis accident were manufactured by Cerro Wire & Cable Company.

The qualification testing performed by Cerro covers all cables mentioned above by testing the largest and the smallest gauge of wire for each type used at the Fort Calhoun Station. Refer to the Franklin Institute Research Laboratories Final Test Report F-C3050.

For the cables listed in ENCLOSURE #6, the known exterior (jacket) materials are Cross-Linked Polyethylene. A search was made in Perry's Chemical Engineers Handbook for an indication of the relative corrosion or chemical resistance of polyethylene in slightly alkaline solutions and dilute boric acid. This reference described polyethylene as being resistant to dilute alkali and mineral acid solutions. Therefore, it is inferred that this material would not undergo chemical attack by the boric acid spray water.

Some additional cables, purchased from Anaconda and Boston Insulated Wire & Cable Company, which are not required to operate under and subsequent to a design basis accident, were also type tested in a fashion similar to that of the Cerro cable. This was the case for all reactor protective system and engineered safeguard system cables inside and outside the containment not mentioned previously in ENCLOSURE #6. For copies of these test reports, refer to the Franklin Institute Research Laboratory Final Test Report F-C2525 (Anaconda) and Boston Insulated Wire & Cable Test Report B901.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	<i>Electrical Cable</i>	<i>Electrical Cable</i>	
Manufacturer's Name (5.2.2/-/-)	<i>CERRO</i>	<i>CERRO</i>	
Model Number (5.2.2/-/-)	<i>N/A</i>	<i>See page 5 i</i>	
Serial Number	<i>N/A</i>	<i>N/A</i>	
Features/Mounting (5.2.6/-/-)	<i>Not Stated</i>	<i>Horizontal in autochamber.</i>	
Connections/Interfaces (5.2.6/-/-)	<i>Not Stated</i>	<i>Not Stated</i>	
Location/Elevation	<i>Contaminant sampling body N/A</i>	<i>N/A ↓</i>	
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	<i>F-C3050</i>	<i>F-C3050</i>	
Report Date	<i>May 1971</i>	<i>May 1971</i>	
Issued by	<i>FIRL</i>	<i>FIRL</i>	
Prepared for	<i>CERRO</i>	<i>CERRO</i>	
Referenced Reports	<i>None</i>	<i>None</i>	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	<i>N/A</i>	<i>Test</i>	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		<i>Insulation Resist. & HIPOT</i>	
Operating Conditions (-/2.2.10/2.2.10)		<i>Not Stated</i>	
Load/Cycles/Voltage/ Current/Freq.			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	N/A	Not stated	
Accuracy (5.2.5/-/-)		N/A	
Number of Specimens		7 (see p 5 i)	
Test Instruments Calibrated			
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Not stated	N/A	
Test Duration (5.2.1/-/-)	N/A	20 hrs	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	< 2 hrs	N/A	
Required Function Time	20 min @ 286 50 min @ 240 Continuous @ 112	N/A	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)			
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	Not applicable	Irradiation steam/chemical spray	
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	N/A	not performed	X Note 1
Thermal Aging/Basis			
Material Aging Evaluation (7.0/-/-)			
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type			



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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	<i>Not Stated</i>	<i>see accident Dose</i>	
Radiation Aging, Dose Rate		<i>7 hr</i>	
Radiation Aging, Method			
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		<i>Not stated</i>	
Operational Aging (-/4.2/-)		<i>None</i>	
Other Age Conditioning (-/4.2/-)			
Qualified Life Claimed/ Established (5.2.4/4.10/-)	<i>40 years</i>		
Normal Ambient Temperature	<i>Not stated</i>	<i>N/A</i>	
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	<i>Fast Colburn Program</i>		
On-Going Analysis of Failures and Degradation (7.0/-/-)			
Margin (General) (6.0/3.0/3.0)	<i>N/A</i>		
Margin (NUREG-0588, Cat. I) (-/3.2/-)			
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA/HELB	LOCA.	
Radiation Type	Gamma	Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	$3 \times 10^7 / 7 \times 10^6$	3×10^6	X note 2
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	Not stated	3.5×10^5	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)		N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)			
Radiation Dose (Normal + Accident) (4.1.2/-/-)			
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase	<i>see</i>		
Peak: °F/psig/RH/Time	<i>profile</i>	<i>285-300/60/100/20min</i>	<i>} repeat 5 times</i>
Decrease To: °F/psig/RH/Time	<i>pg 5j.</i>	<i>250-270/40-55/100/20min</i>	
Decrease To: °F/psig/RH/Time		<i>226-250/20-40/100/40min</i>	
Decrease To: °F/psig/RH/Time		<i>196-225/2.5-15/100/60min</i>	
Decrease To: °F/psig/RH/Time		<i>142-188/0/100/100min</i>	<i>see note 3</i>
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	<i>N/A</i>		
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	<i>N/A</i>		
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	<i>1700 gpm Boron</i>	<i>1900 gpm Boron + NaOH for pH of 9</i>	
Spray Density (gpm/ft ²)	<i>Not stated</i>	<i>4 gal/hr.</i>	
Spray Duration	<i>↓</i>	<i>22 hrs</i>	
Submergence Duration (4.1.3/2.2.5/2.2.5)	<i>↓</i>	<i>N/A</i>	
In-Leakage Considered (5.2.6, 5.3.2/-/-)	<i>↓</i>	<i>↓</i>	
Time to Submergence	<i>↓</i>	<i>↓</i>	
Dust Environment (-/2.2.11/2.2.11)	<i>↓</i>	<i>↓</i>	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

NOTES:

Note 1 - No presaging and no analysis of age related degradation has been performed which would establish a qualified life of 40 years.

Note 2 - The radiation test does not encompass the requirement for either the Auxiliary Building or the Reactor Containment.

Regarding the above, the licensee has stated

By _____
similarity Pyrotrol III will perform adequately.

and supplied the following letters from the manufacturer



THE ROCKWELL COMPANY
NEW HAVEN, CONNECTICUT 06511 USA TELEPHONE (203) 772-2250 TELEX 710-463-2149

May 19, 1980

Omaha Public Power District
1623 Harney St.
Omaha, Neb. 68102

Attention: Mr. Bob Mehaffey

Subject: Fort Calhoun Nuclear Station

Gentlemen:

Firewall III insulation material evolved from Pyrotol III and was introduced in 1973. Although the polymer system remained essentially the same, significant improvements were made in the areas of thermal stability (during processing) and flame retardance through the use of more effective additive systems.

FEB 12 1982

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

NOTES:

It is our best judgement that in the qualification test procedure of IEEE-383, Pyrotol would perform adequately and similarly to Firewall III. This judgement is based on the very close relationship of the base polymer systems used in the two cables.

The critical exposure conditions in IEEE-383 are, of course, thermal, radiation and moisture on thermally aged cable. The effect of these aging and LOCA conditions on the physical and electrical properties of the insulation is primarily due to attack on the basic polymer structure. Since this structure is essentially the same for both cables, we are confident that the cables would perform similarly in Class 1E service.

Very truly yours,

CC Diglio

C. C. Diglio
Dev. Chemist

CCD:k

cc: L. T. Harper



THE ROCKWELL COMPANY
NEW HAVEN, CONNECTICUT 06524 USA TELEPHONE (203) 772-2285 TELEFAX 775-465-2143

October 27, 1980

Mr. Bob Mehaffey
Omaha Public Power District
1623 Harney St.
Omaha, Neb. 68102

Subject: Fort Calhoun Nuclear Station

Dear Mr. Mehaffey:

As previously mentioned in a letter forwarded on May 19, 1980, I described Firewall III as having been evolved from Pyrotol III. I stated that the polymer system remained essentially the same with improvements made in the areas of thermal stability (during process) and flame retardance through the use of more effective additive systems. I also stated that the effect of aging and LOCA conditions on the physical and electrical properties of the insulation was primarily due to attack on the base polymer structure.

As in thermal degradation, resistance to material degradation from radiation is primarily a function of attack on the base polymer structure. Having stated that the polymer systems are essentially the same in both Pyrotol III and Firewall III, then we can deduce that Pyrotol III would perform adequately and similarly to Firewall III when subjected to a 200 megarad dose of radiation.

Sincerely,

CC Diglio

C. C. Diglio
Development Chemist

CCD:k

cc: L. T. Harper



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. CS

NOTES:

Firevroll III is a polyethylene cable insulation which is either radiation cross-linked or chemically cross linked. The temperature performance, radiation resistance and aging characteristics are determined primarily by the details of the manufacturing process and while the letter from the manufacturer provide some assurance of similarity, the DOE guideline are not satisfied.

2. Test Specimen - The test specimen should be the same model as the equipment being qualified. The type test should only be considered valid for equipment identical in design and material construction to the test specimen. Any deviations should be evaluated as part of the qualification documentation (see also Section 8.0 below).

Note 3 - The test envelope the accident profile shown on p-5J



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EQ JIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85

2. SAMPLE IDENTIFICATION

One sample of each of seven types of cable were tested. The samples were designated as follows:

<u>Sample No.</u>	<u>Number of Conductors</u>	<u>Conductor Size</u>	<u>Cable Code</u>
W9	1	500 MCM	644N6023
W21	3	10 AWG	655N3112
W33	2	10 AWG	655N3111
W47	21	16 AWG	655N3118
W57	2	14 AWG*	655N3121
W62	5	14 AWG*	655N3119
W68	7	16 AWG*	655N3120

Each cable sample was 10 ft in length.

Commonwealth Electric Company
Fort Calhoun Station Unit No. 1
Purchase Order 14229

It is certified that Qualification Testing to Test Procedures, agreed upon in advance with Commonwealth Electric Co., and detailed on page 2 of Cerro's report of Qualification Post Containment Environmental Tests conducted on May 10, 1971 at Cerro Wire & Cable Co., New Haven, Conn., has been performed with satisfactory results, was witnessed by T. C. Ball of Commonwealth Electric Co. and A. Jean of Gibbs & Hill, Inc., and is reported item by item in the above-mentioned Cerro report, 14 copies of which have been furnished to Commonwealth Electric Co., fulfilling requirements of Criteria for Acceptance, page H2-11, paragraph 15.08 of Technical Specification No. 2.

With respect to conformance to the Design Basis, page H2-3, paragraph 4.01 of Technical Specification No. 2 it is certified that the Qualification Testing Program satisfies the design basis as evidenced by

- (a) Section 4, Conclusions, of the FIRC report, since the tests performed were agreed upon in advance with Commonwealth Electric Co., and previously forwarded by our letter of June 21, 1971, transmitting 14 copies of the FIRC reports, and

- (b) Page 7, Conclusions, of the Cerro report forwarded by our letter of July 8, 1971.

FT. CALHOUN STA

CONT. NO. 765

Quality Control Manager

Date

Sworn to on this 20th day of Sept

Barbara A. Rocio



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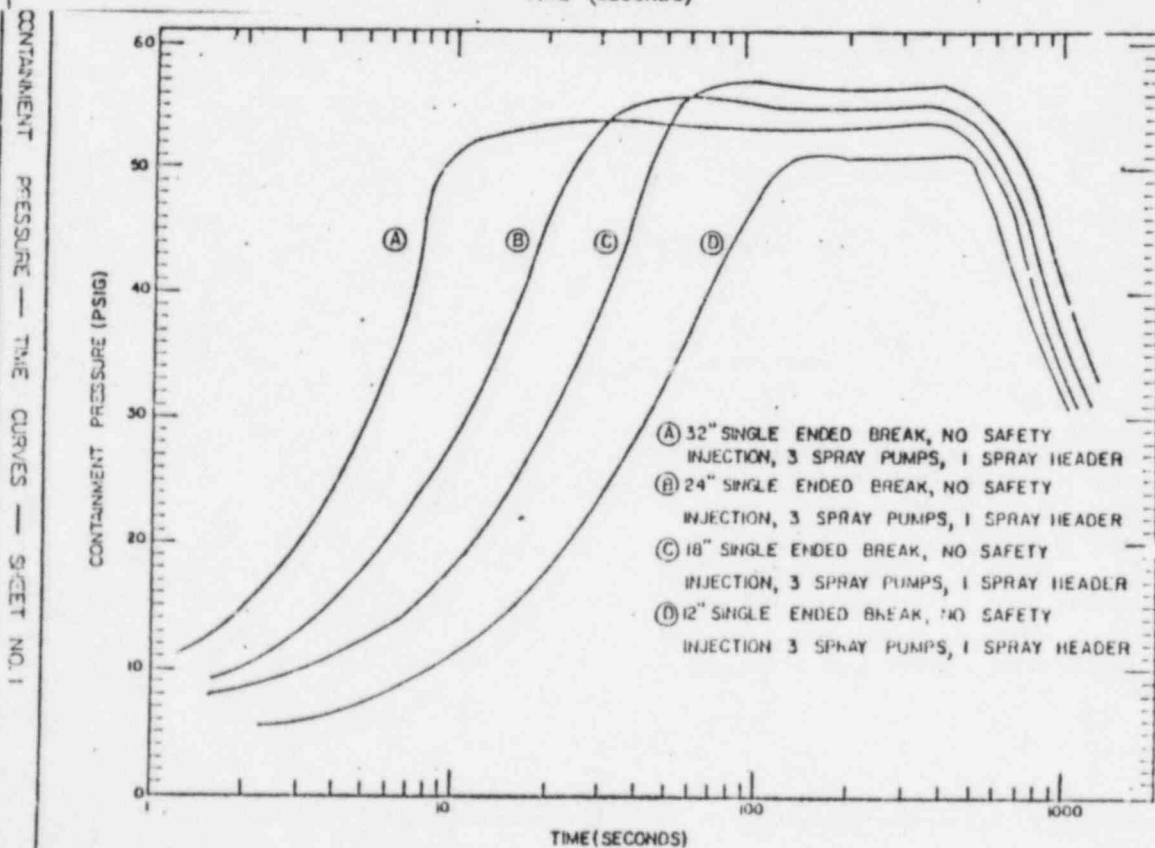
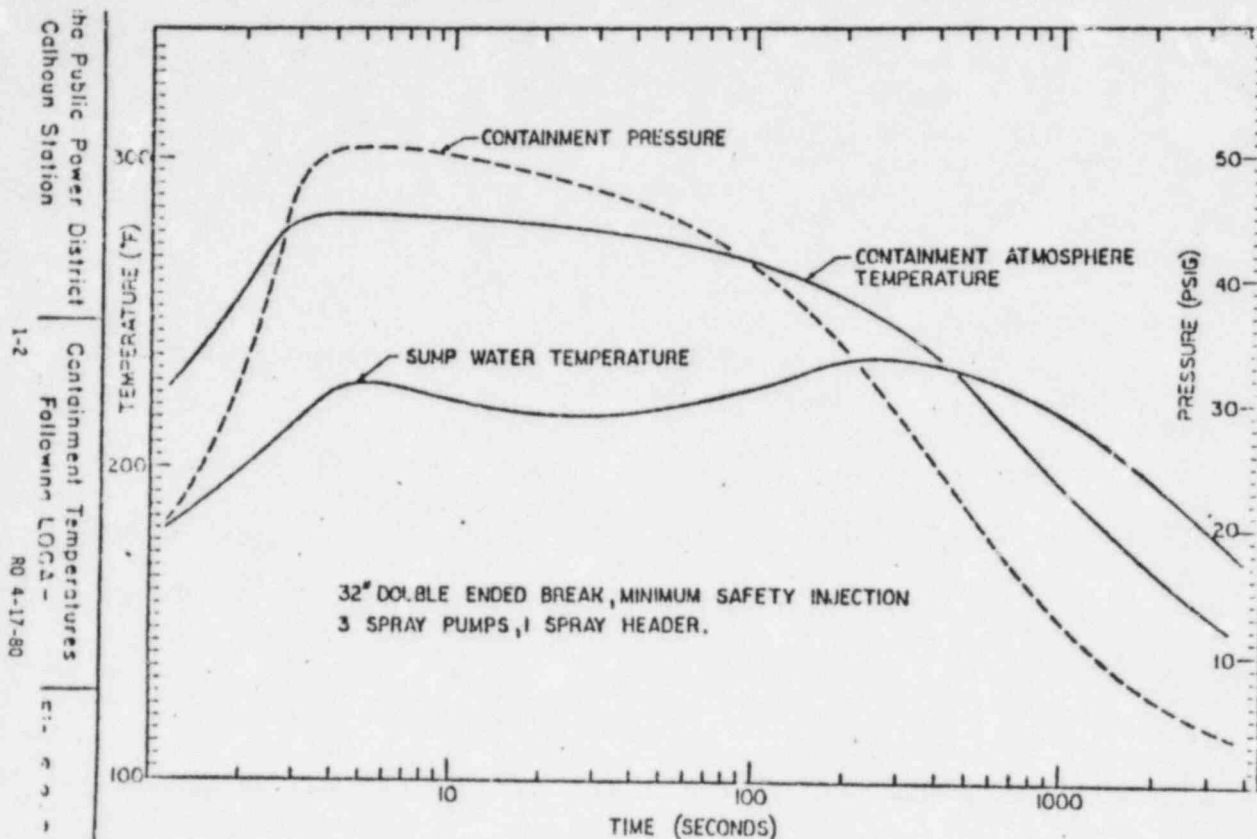
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 85





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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 86

EQUIPMENT ITEM NO. 86

ELECTRICAL POWER CABLE LOCATED IN AUXILIARY BUILDING ROOM 69

CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 86

LICENSEE REFERENCE(S): 2997, 2, 3

FUNCTION (PLANT ID): COMPONENT COOLING WATER PUMP POWER CABLE (W11)

LICENSEE SUBMITTAL: SCEW(S): C-12B

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 86

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 86

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

For detailed evaluation refer to item 85. The test envelopes the radiation value stated on the SCEW sheet



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 66

LICENSEE RESPONSE TO NRC SER

3. As previously stated in the FSAR, the only cables which are required to be operable during and after the design basis accident were manufactured by Cerro Wire & Cable Company.

The qualification testing performed by Cerro covers all cables mentioned above by testing the largest and the smallest gauge of wire for each type used at the Fort Calhoun Station. Refer to the Franklin Institute Research Laboratories Final Test Report F-C3050.

For the cables listed in ENCLOSURE #6, the known exterior (jacket) materials are Cross-Linked Polyethylene. A search was made in Perry's Chemical Engineers Handbook for an indication of the relative corrosion or chemical resistance of polyethylene in slightly alkaline solutions and dilute boric acid. This reference described polyethylene as being resistant to dilute alkali and mineral acid solutions. Therefore, it is inferred that this material would not undergo chemical attack by the boric acid spray water.

Some additional cables, purchased from Anaconda and Boston Insulated Wire & Cable Company, which are not required to operate under and subsequent to a design basis accident, were also type tested in a fashion similar to that of the Cerro cable. This was the case for all reactor protective system and engineered safeguard system cables inside and outside the containment not mentioned previously in ENCLOSURE #6. For copies of these test reports, refer to the Franklin Institute Research Laboratory Final Test Report F-C2525 (Anaconda) and Boston Insulated Wire & Cable Test Report B901.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 87

EQUIPMENT ITEM NO. 87

ELECTRICAL POWER CABLE LOCATED IN THE CONTAINMENT

CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 87

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): CONTAINMENT VENTILATION COOLING FAN POWER CABLE (W10)

LICENSEE SUBMITTAL: SCEW(S): C-12

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER

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System Consideration Review

~~4a~~, ~~4b~~, ~~4c~~, ~~4d~~, ~~4e~~, ~~4f~~

Equipment Environmental Qualification Review

~~5a~~, ~~5b~~, ~~5c~~, ~~5d~~, ~~5e~~, ~~5f~~,
~~5g~~, ~~5h~~, ~~5i~~, ~~5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a~~, ~~6b~~

Maintenance and Replacement Schedule Summary

~~7a~~, ~~7b~~, ~~7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 87

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 87

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately X _____
Qualified Life or Replacement Schedule Established (If Required) X _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied X _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

For evaluation refer to item
85



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 87

LICENSEE RESPONSE TO NRC SER

3. As previously stated in the FSAR, the only cables which are required to be operable during and after the design basis accident were manufactured by Cerro Wire & Cable Company.

The qualification testing performed by Cerro covers all cables mentioned above by testing the largest and the smallest gauge of wire for each type used at the Fort Calhoun Station. Refer to the Franklin Institute Research Laboratories Final Test Report F-C3050.

For the cables listed in ENCLOSURE #6, the known exterior (jacket) materials are Cross-Linked Polyethylene. A search was made in Perry's Chemical Engineers Handbook for an indication of the relative corrosion or chemical resistance of polyethylene in slightly alkaline solutions and dilute boric acid. This reference described polyethylene as being resistant to dilute alkali and mineral acid solutions. Therefore, it is inferred that this material would not undergo chemical attack by the boric acid spray water.

Some additional cables, purchased from Anaconda and Boston Insulated Wire & Cable Company, which are not required to operate under and subsequent to a design basis accident, were also type tested in a fashion similar to that of the Cerro cable. This was the case for all reactor protective system and engineered safeguard system cables inside and outside the containment not mentioned previously in ENCLOSURE #6. For copies of these test reports, refer to the Franklin Institute Research Laboratory Final Test Report F-C2525 (Anaconda) and Boston Insulated Wire & Cable Test Report B901.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 88

EQUIPMENT ITEM NO. 88

ELECTRICAL POWER CABLE LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING
CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 88

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): POWER CABLE (W-14, -16, -17, -18, -19, -21)

LICENSEE SUBMITTAL: SCEW(S): C-11

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A) S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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System Consideration Review

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Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 88

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE

☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.

☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.

☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.

☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.

☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.

☐ Corrective action specified by the Licensee:

☐ Equipment replacement with qualified equipment

☐ Equipment modification

☐ Equipment relocation above submergence level

☐ Relocate or shield equipment from radiation source

☐ Verify qualification by additional (testing/analysis)

☐ Equipment relocation to a mild environment

☐ Qualification testing of equipment in progress

☐ Other (_____)

☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)

☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 88

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately X _____
Qualified Life or Replacement Schedule Established (If Required) X _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied X _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*For detailed evaluation
refer to item 85*



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NRC Contract No. NRC-03-79-118

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 88

LICENSEE RESPONSE TO NRC SER

3. As previously stated in the FSAR, the only cables which are required to be operable during and after the design basis accident were manufactured by Cerro Wire & Cable Company.

The qualification testing performed by Cerro covers all cables mentioned above by testing the largest and the smallest gauge of wire for each type used at the Fort Calhoun Station. Refer to the Franklin Institute Research Laboratories Final Test Report F-C3050.

For the cables listed in ENCLOSURE #6, the known exterior (jacket) materials are Cross-Linked Polyethylene. A search was made in Perry's Chemical Engineers Handbook for an indication of the relative corrosion or chemical resistance of polyethylene in slightly alkaline solutions and dilute boric acid. This reference described polyethylene as being resistant to dilute alkali and mineral acid solutions. Therefore, it is inferred that this material would not undergo chemical attack by the boric acid spray water.

Some additional cables, purchased from Anaconda and Boston Insulated Wire & Cable Company, which are not required to operate under and subsequent to a design basis accident, were also type tested in a fashion similar to that of the Cerro cable. This was the case for all reactor protective system and engineered safeguard system cables inside and outside the containment not mentioned previously in ENCLOSURE #6. For copies of these test reports, refer to the Franklin Institute Research Laboratory Final Test Report F-C2525 (Anaconda) and Boston Insulated Wire & Cable Test Report B901.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 89

EQUIPMENT ITEM NO. 89

ELECTRICAL CONTROL CABLE LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING
CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 89

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): CONTROL CABLE (W-37, -38, -39, -40, -41, -42)

LICENSEE SUBMITTAL: SCEW(S): C-10

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

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Summary of Licensee Responses to the NRC SER

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Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 89

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a Qualification Not Established</u> | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 89

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately X
Qualified Life or Replacement Schedule Established (If Required) X
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied X
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*In detailed evaluation
refer to item NO 85*



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 89

LICENSEE RESPONSE TO NRC SER

3. As previously stated in the FSAR, the only cables which are required to be operable during and after the design basis accident were manufactured by Cerro Wire & Cable Company.

The qualification testing performed by Cerro covers all cables mentioned above by testing the largest and the smallest gauge of wire for each type used at the Fort Calhoun Station. Refer to the Franklin Institute Research Laboratories Final Test Report F-C3050.

For the cables listed in ENCLOSURE #6, the known exterior (jacket) materials are Cross-Linked Polyethylene. A search was made in Perry's Chemical Engineers Handbook for an indication of the relative corrosion or chemical resistance of polyethylene in slightly alkaline solutions and dilute boric acid. This reference described polyethylene as being resistant to dilute alkali and mineral acid solutions. Therefore, it is inferred that this material would not undergo chemical attack by the boric acid spray water.

Some additional cables, purchased from Anaconda and Boston Insulated Wire & Cable Company, which are not required to operate under and subsequent to a design basis accident, were also type tested in a fashion similar to that of the Cerro cable. This was the case for all reactor protective system and engineered safeguard system cables inside and outside the containment not mentioned previously in ENCLOSURE #6. For copies of these test reports, refer to the Franklin Institute Research Laboratory Final Test Report F-C2525 (Anaconda) and Boston Insulated Wire & Cable Test Report B901.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90

EQUIPMENT ITEM NO. 90
ELECTRICAL POWER CABLE LOCATED IN THE AUXILIARY BUILDING
ANACONDA WIRE AND CABLE MODEL TRIPLEXED 5KV
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 90
LICENSEE REFERENCE(S): 2996, 1347, 347, 24, 25
FUNCTION (PLANT ID): POWER CABLE (W-3)
LICENSEE SUBMITTAL: SCEW(S): C-13

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,
Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e , 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9a

LICENSEE RESPONSE TO NRC SER

3. As previously stated in the ESAR, the only cables which are required to be operable during and after the design basis accident were manufactured by Cerro Wire & Cable Company.

The qualification testing performed by Cerro covers all cables mentioned above by testing the largest and the smallest gauge of wire for each type used at the Fort Calhoun Station. Refer to the Franklin Institute Research Laboratories Final Test Report F-C3050.

For the cables listed in ENCLOSURE #6, the known exterior (jacket) materials are Cross-Linked Polyethylene. A search was made in Perry's Chemical Engineers Handbook for an indication of the relative corrosion or chemical resistance of polyethylene in slightly alkaline solutions and dilute boric acid. This reference described polyethylene as being resistant to dilute alkali and mineral acid solutions. Therefore, it is inferred that this material would not undergo chemical attack by the boric acid spray water.

Some additional cables, purchased from Anaconda and Boston Insulated Wire & Cable Company, which are not required to operate under and subsequent to a design basis accident, were also type tested in a fashion similar to that of the Cerro cable. This was the case for all reactor protective system and engineered safeguard system cables inside and outside the containment not mentioned previously in ENCLOSURE #6. For copies of these test reports, refer to the Franklin Institute Research Laboratory Final Test Report F-C2525 (Anaconda) and Boston Insulated Wire & Cable Test Report B901.

Notes:

- 1) Cable has been LOCA qualified but has been installed outside the containment. Cable is required to operate in the LPSI pp rooms at an ambient of 122°F, 100% RH and 10^{-4} RADS/HR.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 92

NOTES:

*The review provided the following
Vendor Documentation*

ANACONDA WIRE AND CABLE COMPANY

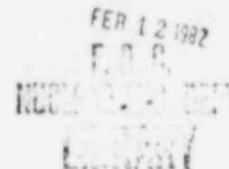
EAST 8th STREET
MARION, INDIANA 46952



317 664-2331

September 16, 1971

Mr. T. C. Ball
Quality Control Manager
Commonwealth Electric Company
P.O. Box 367
Fort Calhoun, Nebraska 68023



Subject: Fort Calhoun Station Unit #1

Referring To: Purchase Order No. 14231
Anaconda Order No. 5-66840

File Reference: Your letter of May 26, 1971, and telephone
conversation Morrison, Jones and Ball on
September 10, 1971

Dear Mr. Ball:

The cable manufactured and supplied on the above referenced
order does comply with contract #765 and addendum letter dated
April 14, 1971. The cable design and fabrication was per the
approved shop drawings.

The following details of compliance and procedures are offered
for complete clarification.

DESIGN BASIS
Para. 4.00, Page H2-3, Specification #765

1. The cable supplied conforms to IPCEA requirements and
procedures as documented in the Acceptance Test Program
dated July 21, 1970.

PERMANENT RETENTION



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90

NOTES:

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2. The documentation of the cables ability to perform satisfactorily after being submitted to a radiation exposure of 5×10^6 Rads is in the FIRC Report F-C1033 dated April, 1971.
3. thru 6. The material subjected to radiation testing was returned to this mill and flame propagation tests were performed per the procedures outlined in Para. 16.00 of specification #765. The burlap burned in excess of five minutes. No flame propagation was observed and the cable did not breakdown electrically during the ten minute observation period. The electrical circuit was between the conductor and the insulation shield of each individual cable. Examination of the cables after flame testing showed the shield system and insulation system to be in good condition. Documentation of the testing procedure and the cable's visual condition was submitted in the form of photographs along with the certifications from the Inspection Department.
7. The certification supplied for this order shows moisture absorption levels on insulation and jackets to be well below the specified maximum levels.
8. The overall performance of the cable during the flame propagation tests substantiate the heat resisting ability of the cable. The insulating and jacket materials were thermosetting.

QUALIFICATION TESTING OF ENGINEERING SAFEGUARDS CABLES
Para. 15.00, Page 8-2, Specification #765

1. Para. 15.06 Post test examination. Examination of the cable after irradiation did not show any dimensional distortion and the subsequent performance of the cable during physical and electrical testing showed the cable to perform satisfactorily. Therefore, no premature aging detrimental to cable performance was present.
2. Para. 15.09 Dimensional Distortions. Data listed on page 4 of the FIRC Report shows the diameters before irradiation and after steam/chemical spray tests. The growth is less than 1%. The dimensions shown after 3.0 Mrad irradiation show a slight shrinkage of the cable. These dimensions are well within the measuring accuracies and are not felt to be detrimental to the overall performance of the cable.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90

NOTES:

ANACONDA Wire and Cable Division
201 East 64th Street
Indianapolis, Indiana 46210
Telephone: 317 557-5522

May 23, 1980

Mr. Robert Mehaffey
Omaha Public Power District
1623 Harney St.
Omaha, Neb. 68102

Subject: Qualification Test Results
Anaconda Order No. 5-66840

Dear Mr. Mehaffey:

Per our telephone conversation dated May 21, 1980, you informed us that Omaha Public Power District bought #2/0 ANG 5kV EP/Hypalon shielded power cable through Westinghouse Supply Company (D S-5325-8016). Although it has been more than 10 years, Anaconda has made no change regarding the insulation and jacket composition. Thus, the following documentations are applicable to the cable in your hand:

1. Technical Report F-C4350-3, "Tests of Electrical Cables Subjected to Thermal Aging, Gamma Radiation and a Loss-Of-Coolant Accident Simulation."
2. Attachment to FIRC Technical Report F-C4350-3.
3. Anaconda cables for nuclear power generation pass Flame Tests in IEEE Standard 383-1974.

It is my opinion that the 5kV Shielded power cable in your hand meets IEEE-383-1974 and IEEE-323-1972.

If you have any questions, please call me.

Sincerely,

J. H. Ling
T. H. Ling
Technical Product Manager

THL:lh

Attachments

The review has established that test reports F-C3033 and F-C4350-3 apply and establish suitability for radiation and aging.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

EQUIPMENT ITEM NO. 91
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
AMP MODEL AMP CAT. NO. 321280
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 91
LICENSEE REFERENCE(S): 3381, 2990
FUNCTION (PLANT ID): SOLENOID, TRANSMITTER CABLE SPLICE
LICENSEE SUBMITTAL: SCEW(S): C-36

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1982.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

DESIGNATION:

X = CATEGORY

NRC QUALIFICATION CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

Cable Splice Evaluation

In its November 1, 1980 submittal regarding IE Bulletin 79-018, the District committed to providing beta radiation data for cable splices. Attached is the Wyle Laboratories Preliminary Assessment Report on Cable Splices Inside Containment For Fort Calhoun Station Unit No. 1.*

The report provides a comprehensive preliminary summary of all harsh environmental parameters, including beta radiation effects.

The report is considered preliminary for two primary reasons. The first is that several assumptions, as listed in the report, were required. It will be necessary to do some in containment verification of the assumptions. The second is that a qualified life/radiation study is still being conducted to determine overall qualification.

The District feels the assumptions made are consistent with available documents and "common plant knowledge" during construction. Based on information in the report, the District feels that continued safe operation is justified. A final report will be issued after verification and evaluation has been completed during the fall 1981 outage.

* PGR 2114- Wyle Test Report 26333-01

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 91

NOTES:

(1) The licensee cited PGR 2998 and PGR 3381 as the basis for qualification of this equipment item to the temperature, pressure, humidity and chemical spray requirements.

The AMP-CAT-B 3B1280 cable splice was employed in the actuator test by Fisher Controls reported in PGR 3381 and was not indicated in this report to have performed unsatisfactorily. PGR 2998 (EAC report # E-C3279) includes the results of LOCA tests on 4 cable splices where 2 were considered to have passed and 2 were concluded to have failed the test. However, the make and model of the 4 cable splices were not cited in PGR 2998. In view of the fact that the 2 failed cable splices were not identifiable no conclusions regarding the qualification status of this equipment item could be made.

(2) PGR 2114 does not include supporting documentation to substantiate the stated radiation capability for this equipment item.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 92

EQUIPMENT ITEM NO. 92

ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT

MANUFACTURER AND MODEL NOT STATED

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 92

LICENSEE REFERENCE(S): 2999, 3377

FUNCTION (PLANT ID): SPLICES AT ELECTRICAL PENETRATIONS FOR SOLENOID VALVES &
INSTRUMENTATION

LICENSEE SUBMITTAL: SCEW(S): C-6

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
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Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 92

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 92

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately X
Qualified Life or Replacement Schedule Established (If Required) X
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied X
Criteria Regarding Test Sequence Satisfied X
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

see page 5 f.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 92

NOTES:

The licensee has referenced 2 documents as evidence of qualification.

The first document F-C3348 is a report of LOCA simulation testing on
Fort Calhoun Cable splices. However the splices were neither Pre-aged
nor Pre-irradiated.

The second document is a report of Testing (IPS-435) of an electrical
penetration feed through with TFE teflon primary sealant.

For Materials with Known sensitivity to radiation and aging
the DOR Guidelines state:

3. Test Sequence - The component being tested should be exposed to a
steam/air environment at elevated temperature, and pressure in the
sequence defined for its service conditions. Where radiation is a
service condition which is to be considered as part of a type test, it
may be applied at any time during the test sequence provided the component
does not contain any materials which are known to be susceptible to
significant radiation damage at the service condition levels or
materials whose susceptibility to radiation damage is not known (see
Appendix C). If the component contains any such materials, the radiation
dose should be applied prior to or concurrent with exposure to the elevated
temperature and pressure steam/air environment. The same test specimen
should be used throughout the test sequence for all service conditions
the equipment is to be qualified for by type testing. The type test
should only be considered valid for the service conditions applied to
the same test specimen in the appropriate sequence.

Teflon is known to be very sensitive to both radiation and thermal aging.

Therefore the separate effects testing cannot be considered valid for this
equipment.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 93

EQUIPMENT ITEM NO. 93

ELECTRICAL SEALANT LOCATED IN THE CONTAINMENT

DOW-CORNING MODEL RTV3144

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 93

LICENSEE REFERENCE(S): 3381, 18, 17

FUNCTION (PLANT ID): SEALING OF TERMINAL BLOCKS & CABLE SPLICES

LICENSEE SUBMITTAL: SCEW(S): C-4

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER

3a, 3b, ~~3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation

~~6a, 6b~~

Equipment Summary

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| <u>I.a</u> Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

Containment Fan Cooler Motor Splices

The containment cooler fan motor lead splices (VA-3A, 3B, 7C, and 7D motor lead splices) are, in ORPD's engineering judgment, environmentally qualified for the adverse conditions of a LOCA. Reasons for this judgment stem from the following:

- 1) First, eight half-laps of Scotch Brand #70 tape are applied to the bare joint/splice. Second, eight half-laps of Bishop Brand #3 high voltage tape are applied over the splice surface. Third, the joint/splice area is then covered with eight half-laps of Scotch Brand #88 tape. Fourth, an additional two half-laps of Scotch Brand #70 tape is then applied over the general splice/joint area. Lastly, the entire splice/joint area is covered with Dow Corning RTV #3144 compound at least 1/8" thick and at least 1" beyond all applied tape. The RTV is smoothed to completely seal the splice/joint and then the RTV is allowed to cure in accordance with instructions.
- 2) Recent conversations with the manufacturer of Scotch Brand #70 and #88 tapes have revealed satisfactory test results were obtained for samples of the two aforementioned tapes when subjected to radiation fields in the neighborhood of 50-100 x 10⁶ rads. Due to the RTV sealant, this tape will not be subjected to the pressure, moisture (100% R.H.), boric acid conditions present in a LOCA. In addition, both tapes mentioned above are capable of operating in temperatures in excess of 350°F with no subsequent damage.
- 3) The entire splice/joint is covered with a layer of RTV #3144 adhesive/sealant. Conversations with the manufacturer of the RTV, Dow Corning, revealed that several laboratory tests were run on the aforementioned RTV. Results of these tests revealed that the Dow Corning RTV #3144 was capable of operating in environments greater than 100 x 10⁶ rads (total integrated dose) with no appreciable deficiencies. In addition, the #3144 RTV reacts with water vapor in the air to cure. Upon curing, the adhesive/sealant becomes resistant to humidity and temperatures up to 482°F over long periods of time. The RTV #3144 sealant will effectively seal off all environments from the underlying Scotch Brand tapes and the splice except for radiation. The #3144 RTV is also not adversely affected by boric acid solutions in excess of 5%.

Further evidence of Dow Corning #3144 RTV sealant/adhesive's ability to stand up to the adverse conditions of a LOCA is documented by the Fisher Controls Company valve actuator tests.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

In these tests, Dow Corning #3144 adhesive/sealant was used to cover all bare terminations. Results of the tests provided evidence that throughout the simulated LOCA environment no termination covered with #3144 RTV was found to be shorted or damaged. Test parameters included temperatures in excess of 2860°F, pressure in excess of 60 psig, and a 100% saturated steam environment.

No credit is taken for the Bishop #3 high voltage tape.

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 94

EQUIPMENT ITEM NO. 94

TERMINAL LUGS LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING

BURNDY MODEL HY-LUG INSULUG

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 94

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): POWER, CONTROL, & INSTRUMENT TERMINATIONS ON TERMINAL
BLOCKS

LICENSEE SUBMITTAL: SCEW(S): C-5

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
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Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 94

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other: (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified
I.b Modification
II.a Qualification Not Established
II.b Not Qualified

II.c Qualified Life Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 94

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	<u>X</u>
IV	Documentation Not Made Available	_____

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 94

LICENSEE RESPONSE TO NRC SER

- 1) Terminal lugs are listed for reference only. Burndy RYLUG terminals are fabricated of pure copper and are unaffected by radiation. The Burndy INSULUG terminals are spaced on terminal boards in a manner such that insulation failure on the terminal lug will not cause a circuit failure.
- 2) Some of these terminal lugs are below flood level, therefore subject to flooding.



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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 95

EQUIPMENT ITEM NO. 95
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
MANUFACTURER AND MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 95
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): 480V POWER CABLES FOR CONTAINMENT VENT FANS
LICENSEE SUBMITTAL: SCEW(S): C-34

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. FS

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (Test or replace)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 524

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 95

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u>X</u>
II.a	Equipment Qualification Not Established	<u> </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>

**EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 95****AGING**

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 95

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

Cable Splice Evaluation

In its November 1, 1980 submittal regarding IE Bulletin 79-01B, the District committed to providing beta radiation data for cable splices. Attached is the Wyle Laboratories Preliminary Assessment Report on Cable Splices Inside Containment For Fort Calhoun Station Unit No. 1.

The report provides a comprehensive preliminary summary of all harsh environmental parameters, including beta radiation effects.

The report is considered preliminary for two primary reasons. The first is that several assumptions, as listed in the report, were required. It will be necessary to do some in containment verification of the assumptions. The second is that a qualified life/radiation study is still being conducted to determine overall qualification.

The District feels the assumptions made are consistent with available documents and "common plant knowledge" during construction. Based on information in the report, the District feels that continued safe operation is justified. A final report will be issued after verification and evaluation has been completed during the fall 1981 outage.

* PGR 2114 - Wyle Test Report 26333-01

- 2) OPPD is currently investigating the possibility of conducting Loca tests or replacement of existing splices with new ones utilizing Loca tested splice materials.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25Containment Fan Cooler Motor Splices

The containment cooler fan motor lead splices (VA-3A, 3B, 7C, and 7D motor lead splices) are, in OP9D's engineering judgment, environmentally qualified for the adverse conditions of a LOCA. Reasons for this judgment stem from the following:

- 1) First, eight half-laps of Scotch Brand #70 tape are applied to the bare joint/splice. Second, eight half-laps of Bishop Brand #3 high voltage tape are applied over the splice surface. Third, the joint/splice area is then covered with eight half-laps of Scotch Brand #88 tape. Fourth, an additional two half-laps of Scotch Brand #70 tape is then applied over the general splice/joint area. Lastly, the entire splice/joint area is covered with Dow Corning RTV #3144 compound at least 1/8" thick and at least 1" beyond all applied tape. The RTV is smoothed to completely seal the splice/joint and then the RTV is allowed to cure in accordance with instructions.
- 2) Recent conversations with the manufacturer of Scotch Brand #70 and #88 tapes have revealed satisfactory test results were obtained for samples of the two aforementioned tapes when subjected to radiation fields in the neighborhood of $50-100 \times 10^6$ rads. Due to the RTV sealant, this tape will not be subjected to the pressure, moisture (100% R.H.), boric acid conditions present in a LOCA. In addition, both tapes mentioned above are capable of operating in temperatures in excess of 350°F with no subsequent damage.
- 3) The entire splice/joint is covered with a layer of RTV #3144 adhesive/sealant. Conversations with the manufacturer of the RTV, Dow Corning, revealed that several laboratory tests were run on the aforementioned RTV. Results of these tests revealed that the Dow Corning RTV #3144 was capable of operating in environments greater than 102×10^6 rads (total integrated dose) with no appreciable deficiencies. In addition, the #3144 RTV reacts with water vapor in the air to cure. Upon curing, the adhesive/sealant becomes resistant to humidity and temperatures up to 482°F over long periods of time. The RTV #3144 sealant will effectively seal off all environments from the underlying Scotch Brand tapes and the splice except for radiation. The #3144 RTV is also not adversely affected by boric acid solutions in excess of 5%.

Further evidence of Dow Corning #3144 RTV sealant/adhesive's ability to stand up to the adverse conditions of a LOCA is documented by the Fisher Controls Company valve actuator tests. In these tests, Dow Corning #3144 adhesive/sealant was used to cover all bare terminations. Results of the tests provided evidence that throughout the simulated LOCA environment no termination covered with #3144 RTV was found to be shorted or damaged. Test parameters included temperatures in excess of 288°F, pressure in excess of 60 psig, and a 100% saturated steam environment.

No credit is taken for the Bishop #3 high voltage tape.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 96

EQUIPMENT ITEM NO. 96

ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT

MANUFACTURER AND MODEL NOT STATED

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 96

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): MOTOR LEADS PENETRATION FOR CONTAINMENT VENT FANS

LICENSEE SUBMITTAL: SCEW(S): C-37

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 96

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (~~has~~/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|-------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <u>II.a</u> Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

Cable Splice Evaluation

In its November 1, 1980 submittal regarding IE Bulletin 79-01B, the District committed to providing beta radiation data for cable splices. Attached is the Wyle Laboratories Preliminary Assessment Report on Cable Splices Inside Containment For Fort Calhoun Station Unit No. 1.

The report provides a comprehensive preliminary summary of all harsh environmental parameters, including beta radiation effects.

The report is considered preliminary for two primary reasons. The first is that several assumptions, as listed in the report, were required. It will be necessary to do some in containment verification of the assumptions. The second is that a qualified life/radiation study is still being conducted to determine overall qualification.

The District feels the assumptions made are consistent with available documents and "common plant knowledge" during construction. Based on information in the report, the District feels that continued safe operation is justified. A final report will be issued after verification and evaluation has been completed during the fall 1981 outage.

**PGR 2114-Wyle Test Report 26333-01*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 97

EQUIPMENT ITEM NO. 97

TERMINAL BLOCK LOCATED IN THE CONTAINMENT

STATES MODELS M25014, M25016, M25018, M25112

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 97

LICENSEE REFERENCE(S): 20

FUNCTION (PLANT ID): CONTROL & INSTRUMENT TERMINATIONS

LICENSEE SUBMITTAL: SCEW(S): C-7

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER

3a, 3b, 3c, 3d

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 97

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☒ The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☒ Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.
- ☒ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☒ Verify qualification by additional (~~testing~~/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☒ Other (ESTABLISH PREVENTIVE MAINTENANCE PROGRAM)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☒ The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action AGING PROGRAM IMPLEMENTED BY JUNE 30, 1992.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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FRC Project No. C5257

FRC Assignment No. 13

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

RADIATION EFFECTS ON STATES NT-TYPE TERMINAL BLOCKS
(MATERIAL ANALYSIS)

Information obtained from the terminal block manufacturer, States Company, has revealed that the NT-type terminal block is made up of the following materials:

- 1) All current carrying parts are made of copper alloy and are nickel plated to commercial thickness.
- 2) All current carrying parts are mounted on a base of wood/paper filled phenolic (bakelite) to make up a terminal element or pole.
- 3) The poles are attached by nickel plated steel screws to a galvanized steel strip to make a terminal block assembly.
- 4) Barriers between terminal elements are made of flame retardant grade polypropylene.
- 5) Miscellaneous terminal block materials consist of: nylon (rivets) laminated melamine (marker strips), and Franklin Fibre Corp., Laminex-Black-Grade XPC-FR (cover material).

ANALYSIS

The prime component of the terminal block is the base material. This material is made up of phenol formaldehyde with a wood/paper filler as is the Laminex cover material. The following is a list of properties characteristic of this material when subjected to the radiation doses given below:

<u>Radiation Dose</u>	<u>Base Material Exhibits a 25% Decrease In:</u>
2.2×10^7 RADs	- Tensile Strength
2.2×10^7 RADs	- Elongation
2.5×10^8 RADs	- Elastic Modules
2.2×10^7 RADs	- Shear Strength
2.2×10^7 RADs	- Impact Strength

It is OPPDs' engineering judgment that a 25% decrease in those properties mentioned above will not prohibit base materials or the terminal block from performing their designed functions. In addition, boric acid solutions of greater than 1,700 ppm boron are postulated to have no significant or detrimental effect on the phenolic base material of the terminal block (refer to Perry and Chilton-Chemical Engineers' Handbook).

Other terminal block components such as melamine, polypropylene, and nylon, do not exhibit a 25% decrease in those physical properties mentioned above until irradiated to significantly higher amounts of radiation than that listed for the phenolic base material (above). More specifically, in the case of nylon, tensile strength and shear strength are positively affected as radiation dose is increased. In addition, the metallic components of the terminal block (i.e., nickel plated copper and nickel plated steel and galvanized steel) are not expected to receive any detrimental effects from being irradiated to doses in the neighborhood of 1×10^8 RADs. Similar materials such as copper cable, steel motor casings, etc. irradiated to equivalent doses (1×10^8 RADs) were found to be insignificantly altered.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

As additional protection, all terminal blocks located within the Fort Calhoun reactor containment have been covered with Dow Corning No. 3144 RTV adhesive/sealant and installed inside protective junction boxes of at least NEMA 12 rating.

Lastly, the Fort Calhoun States NT-type terminal block is qualified by similar comparison to Crystal River #3 (Florida Power and Light) and Joseph M. Farley (Alabama Power and Light) terminal block qualification submitted in response to IE Bulletin 79-01.

Information pertaining to radiation characteristics of terminal block materials was obtained from the following references:

- 1) "Nuclear Engineering Handbook" by Etherington, pages 10-141 through 10-148.
- 2) "Reactor Handbook - Volume I - Materials", by Tipton, pages 76-77 and 50-51.
- 3) "Nuclear Reactor Materials" by C. O. Smith.

LONG TERM CORE COOLING

The long term core cooling for Fort Calhoun Station is based on the equipment required in EP-5, EP-5A, and EP-5B emergency procedures. Also included are the required supporting auxiliaries which are located in the harsh environment.

The EPs operator guidance is based on primary system pressure. Above 700 psia the heat removal path is that of the steam generators with a backup using the pressurizer power operated relief valves. Below 700 psia, the high pressure safety injection and auxiliary pressurizer spray line are used for long term core cooling. In addition, the shutdown cooling (low pressure safety injection and cold leg suction) and containment spray are included to insure reactor shut down.

The environmental parameters for the equipment remain as outlined in Enclosures 1, 11, and 14. The only change made was the use throughout of a 1000 hour radiation dose. As explained in Enclosure 14, the 1000 hours represents the primary dose contribution time, with little increase expected beyond this value.

Since the same source terms were used throughout this investigation, the "Dose Correction For Time Required To Remain Functional" nomogram of the DOR Guidelines was used to adjust the dose for submerged equipment in the containment. The auxiliary building was reported with the 1000 hour numbers.

Table 1 is an index of the equipment required in the EPs. Table 2 is a tabulation of the required supporting electrical equipment. These tables may then be cross referenced to the master list in Enclosure 4.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

It is expected that long term core cooling will be initiated approximately 24 hours following an accident. The District feels the discussions made in Enclosure 14 are still valid, even though the radiation levels will continue to remain at the post accident levels.

Note, the steam generator heat removal path requires the auxiliary feedwater system. This system is being installed and upgraded as part of Lessons Learned and will be submitted with that information.

AGING

As directed by IE Bulletin 79-018 (D.O.R. Guidelines), the District is establishing a program to identify significant aging, establish the necessary requirements to restore a component to "new" condition and establish a preventative maintenance program to insure that sub-component replacement or refurbishment takes place prior to the end of qualified life.

Significant aging, as identified in the D.O.R. Guidelines, is identified using two different criteria by the District and/or vendor. The first is that in which a qualified life has been established by the vendor. The test information and manufacturer's recommendations will be used to establish the expected qualified life of a component. The second criteria is employed for that equipment for which no qualified life has been established by the vendor. To establish aging, current methodology including, but not limited to, the Arrhenius method will be used. As an example, the Arrhenius method uses a plot to establish time to degrade material properties based on service temperature. The equipment material list of the equipment will be examined using the Arrhenius method. A qualified life will be established based on the life of any of the subcomponents.

Once the qualified life of the equipment has been established, the next step in the District's "Aging Program" will be to establish at what frequency preventative maintenance and to what extent preventative maintenance will be required to return each component to its "new" or unaged condition. This will detail what subcomponent replacement is required and what methods will be used to perform the preventative maintenance.

The final step to the District's program will be the establishment of a Preventative Maintenance Schedule to refurbish the safety related electrical equipment exposed to a harsh environment. This schedule will account for the qualified life, equipment availability for preventative maintenance, and impact on plant safety.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 77

Even though this addition of an aging program will help insure equipment operability, the District will continue its inservice surveillance programs to verify proper operation of this equipment. This includes such areas as performance testing and calibration. Any failure which occurs will be analyzed in an attempt to identify failure modes including aging. This will allow a continual reexamination of the aging data to insure the accuracy of the analysis.

It is the District's intention to have this program fully implemented by June 30, 1982. Since aging is a long time frame parameter, it is felt that this should be an adequate implementation schedule.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

NOTES:

(1) PSR 20 provides a summary of a qualification test by the GE Co. of GE type CB151 and states Co. type NT terminal blocks. The test, designed to simulate a LOCA including high temperature and pressure and steam exposure, adequately enveloped the accident environment for this equipment item. However, the licensee did not furnish information to permit an assessment regarding the similarity between the tested terminal blocks and this equipment item. Further, the summary makes note of an insulation resistance drop which was insufficient to impact the continued operation of associated electrical equipment; the magnitude of the insulation resistance was not included in the summary.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 98

EQUIPMENT ITEM NO. 98

JUNCTION BOX LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING

HOFFMAN, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 98

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): MECHANICAL PROTECTION OF TERMINAL BLOCKS & WIRE
TERMINATIONS

LICENSEE SUBMITTAL: SCEW(S): C-8

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 98

SUMMARY OF LICENSEE RESPONSES TO THE FRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☒ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | <u>III.a Exempt</u> |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 98

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____ X _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

Terminal Box is not electrical equipment



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 98

LICENSEE RESPONSE TO NRC SER

Notes:

- 1) Terminal boxes are listed for reference only. While terminal boxes are gasketed and dripproof and will provide protection from direct sprays, the box is not required to ensure integrity of electrical circuits.
- 2) Some terminal boxes within the containment may be subject to submergence. No credit is taken for the terminal box in this situation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 99

EQUIPMENT ITEM NO. 99

ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT

CONAX, MODEL NOT STATED

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 99

LICENSEE REFERENCE(S): 3377, 3375, 3371

FUNCTION (PLANT ID): POWER, CONTROL & INSTRUMENT CABLE PENETRATIONS

LICENSEE SUBMITTAL: SCEW(S): C-3

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

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Equipment Environmental Qualification Review

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~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 99

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately X _____
Qualified Life or Replacement Schedule Established (If Required) X _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied X _____
Criteria Regarding Test Sequence Satisfied X _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established X _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

Refer to page 5 f



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

LICENSEE RESPONSE TO NRC SER

5. The Conax electrical penetration modules were tested under a chemical/steam environment consisting of a boric acid solution of 1900 ppm. This is less than the minimum boron concentration of the SIRWT tank, which is 1700 ppm boron or approximately 10,000 ppm boric acid solution. However, the portions of the penetrations which could be exposed to the adverse chemical spray are made of painted carbon steel or FEP teflon. A search through Perry & Chilton's Chemical Engineers' Handbook has revealed these materials to have strong resistance to boron corrosion. Differences between the solution used in the electrical penetration environmental tests and the Fort Calhoun SIRWT tank is insignificant as far as the Conax electrical penetrations are concerned.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 99

NOTES:

The licensee has referenced 3 documents as evidence of qualification.

The first document IPS-37, is a report of LOCA simulation testing on

Fort Calhoun Penetrations. However the units were neither Pre-aged

nor Pre-irradiated. The Second Document is for Kapton and Polysulfone sealant.

The third document is a report of Testing (IPS-435) of an electrical

penetration feed through with TFE teflon primary sealant.

For Materials with Known sensitivity to radiation and aging
the DOR Guidelines state:

3. Test Sequence - The component being tested should be exposed to a steam/air environment at elevated temperature, and pressure in the sequence defined for its service conditions. Where radiation is a service condition which is to be considered as part of a type test, it may be applied at any time during the test sequence provided the component does not contain any materials which are known to be susceptible to significant radiation damage at the service condition levels or materials whose susceptibility to radiation damage is not known (see Appendix C). If the component contains any such materials, the radiation dose should be applied prior to or concurrent with exposure to the elevated temperature and pressure steam/air environment. The same test specimen should be used throughout the test sequence for all service conditions the equipment is to be qualified for by type testing. The type test should only be considered valid for the service conditions applied to the same test specimen in the appropriate sequence.

Teflon is known to be very sensitive to both radiation and thermal aging.

Therefore the separate effects testing cannot be considered valid for this equipment. The Applicability of IPS 27 concerning Kapton and Polysulfone sealants for Fort Calhoun has not been established.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 100

EQUIPMENT ITEM NO. 100
CONDUCTOR SEAL ASSEMBLY LOCATED IN THE CONTAINMENT
CONAX, MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 100
LICENSEE REFERENCE(S): 816, 1049
FUNCTION (PLANT ID): SEALING OF WIRES FOR MOTORS L-SWITCHES, PUMPS, VALVE
OPERATORS
LICENSEE SUBMITTAL: SCEW(S): C-300

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 100

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 100

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____ <u>X</u> _____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____ <u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

NOTES:

The licensee has not provided sufficient information to establish that the
Equipment described on the SCEW sheet is the same as the Equipment described
in the referenced report.

EQUIPMENT DESCRIPTION

System: Electrical Equipment

Item No.: CONAX Electrical
Conductor Seal Assemblies

Component: All

Manufacturer: CONAX

Model No.: N/A

Function: Sealing of wires for
mtrs, L-Switches, pps, inst, vv
oper, inst transmters, etc.

Accuracy - Spec: N/A

Demon: N/A

Service: See function

QUALIFICATION REPORT

FOR

CONDUCTOR MODULES

FOR

ARKANSAS NUCLEAR ONE

UNIT 2

ARKANSAS POWER AND LIGHT COMPANY

BECHTEL POWER P.O. 6600-E-2039B-AC

CONAX W.O.'s 7-57000, 7-66800, 7-67701

SCEW C-300

PREPARED BY

W. C. Frederick

W.C. Frederick, Project Engineer

DATE 3/8/79

IPS409



Franklin Research Center

A Division of The Franklin Institute

20th and Race Streets, Phila. Pa. 19103 (215) 448-1000

NRC Contract No. NRC-03-79-118

FRC Project No. C5257

FRC Assignment No. 13

FRC Task No. 504

Page

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 100

NOTES:

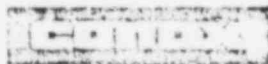
TABLE 4.1

TEST DATA BASE CONFIGURATION

Feedthru Tube Length: 14 inches
Feedthru Tube Materials: 300 series SST
Feedthru Seal: Crp & Ferrule - stainless steel
Sealants: Polysulfone
Conductor Insulation: Kapton polyimide film
Wire Markers: Raychem RT-876, Type 1
Copper Conductor: ASTM-B3

Feedthru Module Conductor Density and Wire Size

24/C #12 AWG	Combination Feedthru of copper & thermocouple pair conductors
20/C #16 AWG	
4/C #16 T	
4/C #16 K	
4/C #16 E	
4/C #16 J	



CONAX CORPORATION, 2300 WALDEN AVENUE, BUFFALO, NEW YORK 14201 TEL 716-884-4500 TELEX - 091 275

February 5, 1982

Omaha Public Power District
1623 Harney
Omaha, NB 68102

Attention: Mr. R. P. McHaffey
Supervisor - I & C and Electrical
Technical Services
(Jones Street)

Subject: Design Qualification Report IPS-409

Reference: OPD Letter Dated 1/15/82

Dear Mr. McHaffey:

Aging qualification as presented on page 7 of Conax Report, IPS-325 (Orig. Rev.) is applicable to Conax's Design Qualification Report for Electric Conductor Seal Assemblies (IPS-409).

In addition, the chemical spray composition used during tests described in IPS-409 consisted of 3000 PPM buffered water with NaOH added to produce a pH of 10.5.

Should further information be required in this matter, you may contact Mr. Geoff Rhodes or the undersigned directly.

Very truly yours,

CONAX CORPORATION

W. C. Frederick

W. C. Frederick
Project Engineer
Nuclear Products Division

F. B. I.
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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 100

NOTES:

Requirements for establishing similarity between installed and tested items are contained in the DOR Guidelines and IEEE 317-76 which are reproduced below for convenience.

2. Test Specimen - The test specimen should be the same model as the equipment being qualified. The type test should only be considered valid for equipment identical in design and material construction to the test specimen. Any deviations should be evaluated as part of the qualification documentation (see also Section B.0 below).

[DOR]

There is no question concerning the qualification of equipment tested in IPS 409.



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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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1a

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 101

EQUIPMENT ITEM NO. 101
LIMIT SWITCH LOCATED IN ROOM 81
NAMCO MODEL EA18011302
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 101
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): VALVE POSITION INDICATION (YCV-1045, YCV-1045A,
YCV-1045B, FCV-1368, FCV-1369, HCV-1107B,
1108B SOLENOIDS #1 & #2)
LICENSEE SUBMITTAL: SCEW(S): S-204

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QI, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

<u>Contents</u>	<u>Checksheet Page No.</u>
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 101

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 181

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

For evaluation refer to item 7



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NRC Contract No. NRC-03-79-118

FRC Project No. C5257

FRC Assignment No. 13

FRC Task No. 504

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1a

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 102

EQUIPMENT ITEM NO. 102

LIMIT SWITCH LOCATED IN ROOM 21

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 102

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): HPSI PUMP DISCHARGE HEADER ISOLATION VALVE POSITION
INDICATION (HVC-304, -305)

LICENSEE SUBMITTAL: SCEW(S): I-13

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 102

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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NRC Contract No. NRC-03-79-118

FRC Project No. C5257

FRC Assignment No. 13

FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 102

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____ X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

For evaluation refer to item 7



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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 103

EQUIPMENT ITEM NO. 103
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
RAYCHEM MODEL RAYCHEM BREAKOUT KITS
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 103
LICENSEE REFERENCE(S): 1851
FUNCTION (PLANT ID): SPLICES FOR INTERFACING IN ALL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C-300, -301, -302

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5h ₂
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 103

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

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2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 123

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	<u>X</u> _____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	_____
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

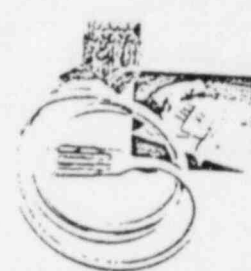
I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	<u>X</u> _____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 123

NOTES:

The licensee has not provided sufficient information to establish that the Equipment described on the SCEW sheet is the same as the Equipment described in the referenced report. The installed Equipment is a cable Breakout:



This custom-made transition provides the finishing touch for Automatic Electric's Call Commander®
© T.M. Automatic Electric Co.

Typical installation

Cable Breakouts are simple to use and fast to install.

1. Prepare cable ends to needed requirements.
2. Position Cable Breakouts over cable legs or conduit ends as required.
3. Using torch or heat gun, shrink into place.
4. During shrinking, the adhesive or sealant melts and bonds to metal or plastic substrates to create an environmental seal.

Sealants or adhesives

Two types of coatings are available:

Sealants are sticky, water insoluble materials which maintain their softness and self-sealing characteristics over a wide temperature range. They are generally intended for low pressure or unpressurized applications and will adhere to virtually all substrate materials.

Adhesives are hot melting thermoplastics designed to withstand pressure up to 100 psi and to provide environmental seals. This type of integrity is normally required in applications in which cable oil, gas pressure or hydraulic fluids are involved. Standard adhesives adhere to PVC, neoprene, EPR, polyolefin synthetic sheaths and to most metals including lead and aluminum.

Sizes and configurations

Thermofit Cable Breakouts are available for the full range of multiconductor cable sizes. Because the Thermofit component is heat-shrinkable, one part will cover a wide range of cable diameters.

Specialty breakouts

Raychem produces several hundred different transitions or breakout configurations developed from a wide selection of plastic and elastomeric materials. Contact a local sales office for additional information.

Selection Guide for electrical construction applications

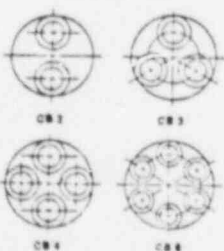
	MAXIMUM CONDUIT SIZE (Standard Bushing) (inches)	WIRE SIZE RANGE*
CB 2-1	None	#12-#8
CB 2-2	1/4	#6-#2
CB 2-3	1	#2-250 MCM
CB 2-4	2	#3/0-750 MCM
CB 3-1	None	#12-#8
CB 3-2	1/4	#8-#2
CB 3-3	1	#4-250 MCM
CB 3-4	1 1/4	#4/0-500 MCM
CB 3-5	3 & 4	750-1500 MCM
CB 4-1	None	#12-#8
CB 4-2	1/4	#8-#2
CB 4-3	1 1/4	#2-250 MCM
CB 4-4	2	#3/0-600 MCM
CB 4-5	3 & 4	#4/0-600 MCM
CB 5-3	1 1/4	#2-#4/0

*This guide applies to 600 V wire types used in building and UG distribution systems. For other wire types, breakouts must be selected by exact wire dimensions.

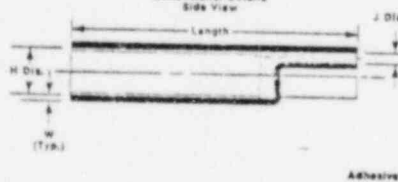
Part numbers and dimensions

PART NUMBER	CABLE (H) DIAMETER		LEGS (L) DIAMETER		LENGTH	WALL
	Expanded ID	Recovered ID	Expanded O	Recovered ID		
CB 2-1	.85	.39	.28	.11	2.75	.05
CB 2-2	1.20	.50	.48	.17	3.50	.07
CB 2-3	1.92	.91	.80	.28	4.75	.10
CB 2-4	3.00	1.50	1.42	.50	5.75	.12
CB 3-1	.90	.38	.33	.12	2.75	.06
CB 3-2	1.20	.59	.50	.18	3.50	.08
CB 3-3	1.70	.90	.82	.25	3.75	.11
CB 3-4	2.40	1.42	1.30	.50	4.75	.12
CB 3-5	4.80	2.80	2.30	1.18	12.00	.12
CB 4-1	.90	.47	.28	.11	2.75	.06
CB 4-2	1.35	.71	.48	.17	3.50	.07
CB 4-3	2.03	1.29	.80	.28	4.20	.10
CB 4-4	3.30	1.73	1.42	.50	5.00	.12
CB 4-5	5.25	3.00	1.35	.55	9.00	.13
CB 5-3	2.35	1.44	.81	.29	6.00	.10

End View (2 Dia.)



Dimensional Details



Ordering data

To order a Cable Breakout, simply specify the part number, size and adhesive or sealant. Example:

CB 2 - 1 - A
A - adhesive
S - sealant
Size
Number of Breakouts

Standard color is black

RAYCHEM

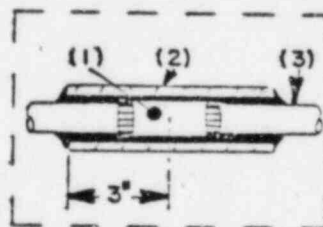
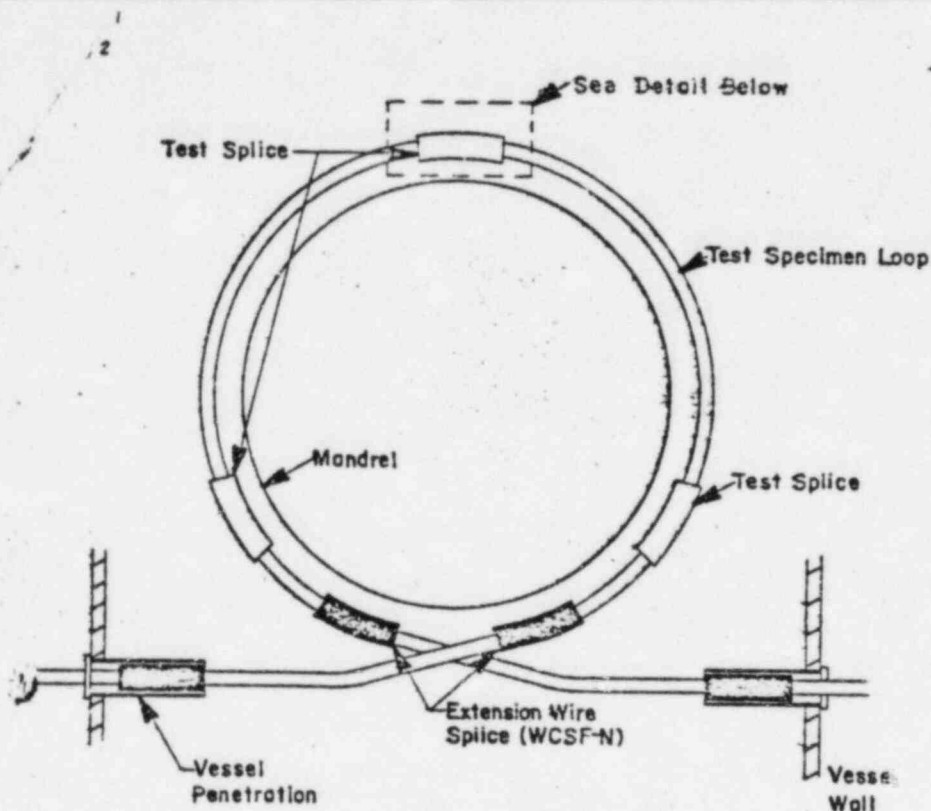
RAYCHEM CORPORATION
300 CONSTITUTION DRIVE
MENLO PARK, CALIFORNIA 94025
415/325-3333 TWX: 910-373-1728



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 103

NOTES:

The equipment tested is an in-line cable splice;




- (1) Connector, Burndy YSV-10
- (2) Raychem WCSF-N, Insulating Sleeve Size 115, 6inch, Precoated With S-1119 Adhesive.
- (3) Rockbestos Firewall  Insulated Wire, 1/C, 12 Awg. (030 in. wall)

FIGURE 1. SAMPLE CONSTRUCTION

There is no question regarding qualification of the in-line Raychem cable splice. However, even though the cable breakout and in-line splice may be made of the same material, the configurations differ widely.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 133

NOTES:

Requirements for establishing similarity between installed and tested cables are contained in the DOR Guidelines and IEEE 383-74 which are reproduced below for convenience.

2. Test Specimen - The test specimen should be the same model as the equipment being qualified. The type test should only be considered valid for equipment identical in design and material construction to the test specimen. Any deviations should be evaluated as part of the qualification documentation (see also Section 8.0 below).

[DOR]

IEEE-383

1.3.1 Cable Description. This description or specification should include as a minimum:

1.3.1.1 Conductor -- material identification, size, stranding, coating.

1.3.1.2 Insulation -- material identification, thickness, method of application.

1.3.1.3 Assembly (multiconductor cables only) -- number and arrangement of conductors, fillers, binders.

1.3.1.4 Shielding -- tapes, extrusions, braids, or others.

1.3.1.5 Covering -- jacket or metallic armor or both, material identification, thickness, method of application.

1.3.1.6 Characteristics -- voltage and temperature rating (normal and emergency). For instrumentation cables -- capacitance, attenuation, characteristic impedance, microphonics, insulation resistance, as applicable.

1.3.1.7 Identification -- manufacturer's trade name, catalog number.

1.3.2 Field Splice or Connection Description or Both. This description or specification should include as a minimum:

1.3.2.1 Whether factory or field assembled to cable.

1.3.2.2 Conductor connection -- type, material identification, and method of assembly.

1.3.2.3 Items from Sections 1.3.1.2 through 1.3.1.7.

- 2.2 Type Test Samples. The samples tested should contain the conductor, insulation, fillers, jacket, binder tape, overall jacket, shielding, and field splices which are representative of the cable category being qualified. Table 1 lists sizes which have been considered representative of these categories. The sample lengths should be sufficient to permit reliable test readings and evaluation consistent with good testing practices.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 104

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

Equipment Item not mentioned in the SER

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☐ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
 - ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW

- CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.a</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 104

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	<u>X</u>
Qualified Life or Replacement Schedule Established (If Required)	<u>X</u>
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	<u>X</u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 104

NOTES:

This Hydrogen Analyzer requires qualification for radiation exposure ($8 \times 10^5 R$) and thermal aging. The licensee has referenced PGR 2070 as evidence of qualification.

- The report discusses radiation exposure of the component parts to 1 Mrad with no loss of functional capabilities.
- Thermal aging of the component devices was performed with a minimum stated qualified life of 5 yrs. for some components. The model used to determine the time/temperature exposure for the accelerated aging program was the $10^\circ C$ rule. The use of this rule of thumb without any analysis to substantiate it is technically unsound. The weak link component or component materials should be thoroughly examined to demonstrate that the model used is sufficiently conservative to approximate the actual in plant thermal degradation. It should be noted that conservative utilization of the Arrhenius technique with the data provided in the referenced report could establish qualification.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

EQUIPMENT ITEM NO. 105

ELECTRICAL CABLE LOCATED IN THE REACTOR AND AUXILIARY BUILDINGS

ROCKBESTOS MODEL FIRE WALL III

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 105

LICENSEE REFERENCE(S): 1391

FUNCTION (PLANT ID): INTERCONNECTING - CABLES FOR ALL SYSTEMS

LICENSEE SUBMITTAL: SCEW(S): S-303, -250, -304

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Checksheet Page No.

Equipment Item

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Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

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Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

5a, 5b, 5c, 5d, 5e, 5f,
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☐ The Licensee (has/has not) provided a response to the SER concerns.
- ☒ The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a Equipment Qualified X
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life
 or Replacement Schedule Justified _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>		ELECTRICAL CABLE	
Equipment Type	<i>Cable</i>	POWER/INSTRUMENT/CONTROL	
Manufacturer's Name (5.2.2/-/-)	<i>Rockbestos</i>	ROCKBESTOS CO.	
Model Number (5.2.2/-/-)	<i>FireWall III</i>	FIREWALL III	
Serial Number	<i>N/A</i>	POWER 600V (1/C, #6AWG, 45MIL, FR, XLPE)	
Features/Mounting (5.2.6/-/-)	<i>Not staked</i>	INSTRUMENT 300V (1/C #16AWG, 20MIL, FR, XLPE)	NOTE 1
Connections/Interfaces (5.2.6/-/-)	<i>"</i>	CONTROL 600V (1/C, #12AWG, 30MIL, FR, XLPE)	
Location/Elevation	<i>Roof top & any bldg</i>		
Equipment ID No.	<i>N/A</i>		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	<i>No ID</i>		
Report Date	<i>2/1/77</i>	7-7-77	
Issued by	<i>Rockbestos</i>	ROCKBESTOS CO.	
Prepared for	<i>Rockbestos</i>	ROCKBESTOS CO.	
Referenced Reports	<i>None</i>	ND	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	<i>N/A</i>	TYPE TEST	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		5 MINUTE DIELECTRIC WITHSTAND TEST, TAP WATER IMMERSION 80 VAC/MIL	
Operating Conditions (-/2.2.10/2.2.10)		600 VAC, 70 A (POWER)	
Load/Cycles/Voltage/ Current/Freq.		300 VAC, 22A (INSTRUMENT)	
		600 VAC, 30A (CONTROL)	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 205

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	N/A	PASS 80 VAC/MIL VOLTAGE W/STAND TEST	
Accuracy (5.2.5/-/-)		NA	
Number of Specimens		18 TEST SAMPLES	NOTE 2
Test Instruments Calibrated			
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	active	—	
Test Duration (5.2.1/-/-)	N/A	30 days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	24 hrs	N/A	
Required Function Time	continuous		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	TA/RAD/STM+CHSP/ POST LOCA SIMULATION	B SAMPLES (NOTE 2)
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)			
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)	N/A	1300 HR. @ 150 °C / 40 yr. @ OPERATING TEMPERATURE OF 90 °C	
Thermal Aging/Basis		ARRHENIUS DATA	
Material Aging Evaluation (7.0/-/-)			
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		INSULATING MATERIALS	
Radiation Aging, Type		GAMMA	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	<i>Not stated</i>	50.0 x 10 ⁶	
Radiation Aging, Dose Rate		0.65 Mrd/h	
Radiation Aging, Method		TEST	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)			
Operational Aging (-/4.2/-)		NA	
Other Age Conditioning (-/4.2/-)		ND	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	<i>40 years</i>	40 yr. / 40 yr.	
Normal Ambient Temperature	<i>Not stated</i>	N/A	
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	<i>F. Colburn Program</i>		
On-Going Analysis of Failures and Degradation (7.0/-/-)			
Margin (General) (6.0/3.0/3.0)	<i>N/A</i>		
Margin (NUREG-0588, Cat. I) (-/3.2/-)			
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)	LOCA/ HEB	LOCA	
Radiation Type	Gamma	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	* 2.0×10^7	1.5×10^8 rd	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	not stated	0.8 Mrd/h	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)		N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)			
Radiation Dose (Normal + Accident) (4.1.2/-/-)			
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)			

* Worst Case.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		140-346/0-113 IN 45 MIN.	
Peak: °F/psig/RH/Time	<i>see</i>	346/113/100/3 HR	
Decrease To: °F/psig/RH/Time	<i>page 5 f</i>	335/93/100/3 HR	
Decrease To: °F/psig/RH/Time	<i>FW</i>	315/69/100/4 HR	
Decrease To: °F/psig/RH/Time	<i>Worst Case</i>	265/28/100/81 HR.	
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	<i>N/A</i>	90°C	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	<i>↓</i>	SIMULTANEOUS TEST	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	<i>1200 ppm Boron</i>	H ₃ BO ₃ , 3000 PPM BORON PH = 10.5	
Spray Density (gpm/ft ²)	<i>Not coded</i>	0.15	
Spray Duration	<i>↓</i>	24 HR	
Submergence Duration (4.1.3/2.2.5/2.2.5)	<i>↓</i>		
In-Leakage Considered (5.2.6, 5.3.2/-/-)	<i>↓</i>	ND	
Time to Submergence	<i>↓</i>		
Dust Environment (-/2.2.11/2.2.11)	<i>↓</i>	NA	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105

NOTES:

1. The samples tested are representative cable low type testing as outlined by IEEE STD. 383-74 (TABLE 1).

2. Three sets of cable samples (A, B and C) were tested. Each set consisted of two 10 ft lengths of cable. Testing was performed on the A, B and C samples to simulate the following conditions:

A - normal 40 yr. service life

B - LOCA late in installed life

C - LOCA early in installed life

All samples were subjected to and passed an 80 VAC/MIL voltage withstand test in accordance with IEEE STD 383-74 section 2.3.3.4

The LOCA tests were performed with the cable energized at rated voltage and current.

The B samples were exposed to an additional 100 days at 200°F and 100%rh, and passed another voltage withstand test following this exposure.



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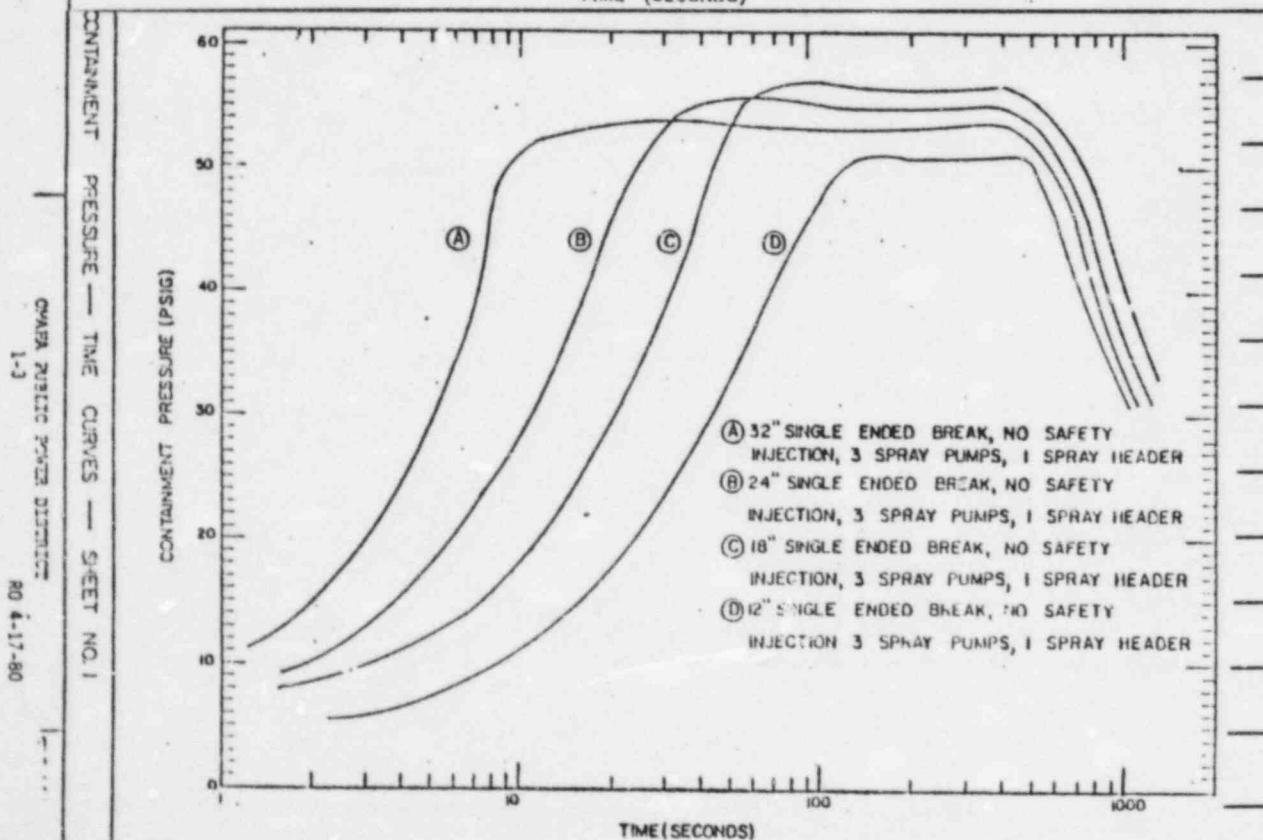
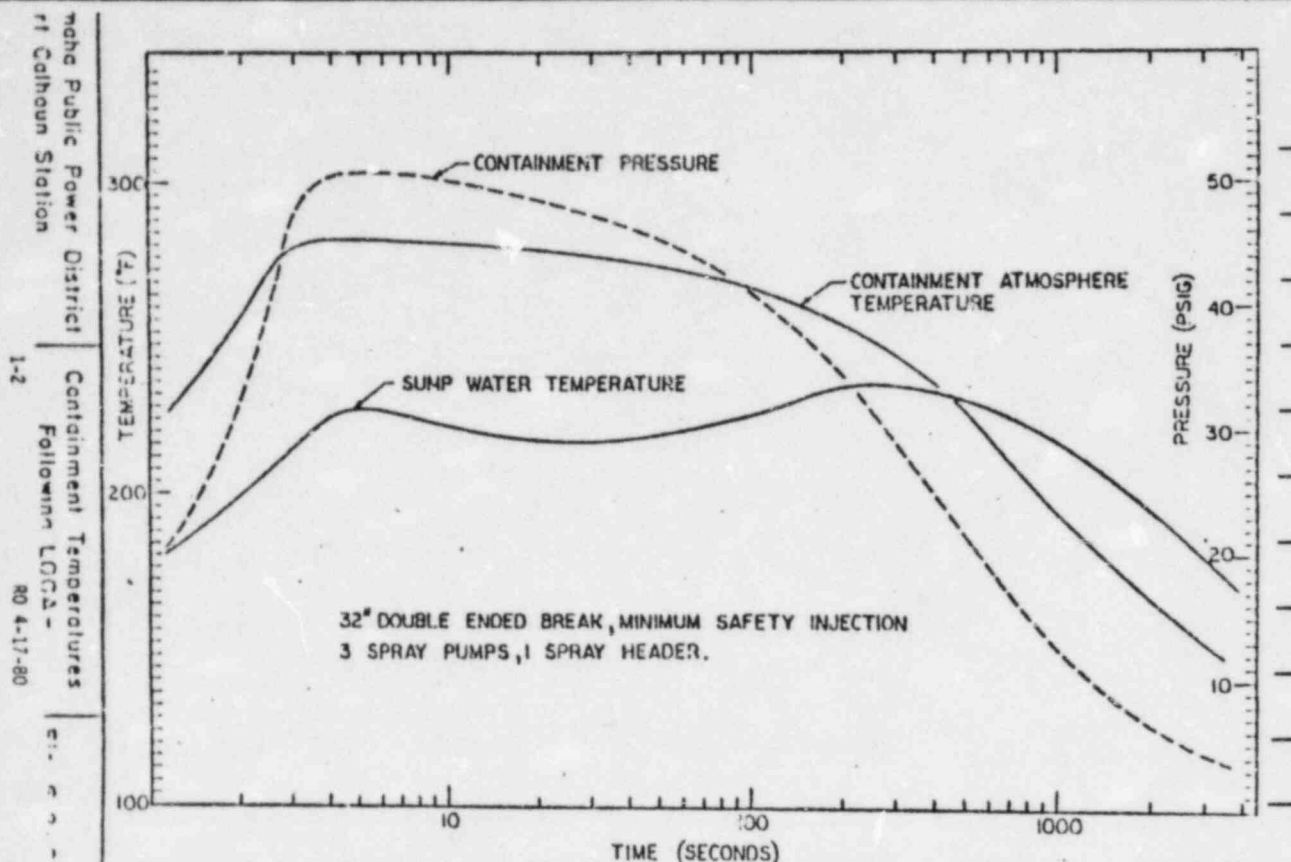
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 105





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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

EQUIPMENT ITEM NO. 106

RADIATION DETECTOR LOCATED IN THE CONTAINMENT

VICTOREEN MODEL 878

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 106

LICENSEE REFERENCE(S): 2883

FUNCTION (PLANT ID): HIGH RANGE CONTAINMENT RADIATION AREA MONITOR (RM-091A,
-091B)

LICENSEE SUBMITTAL: SCEW(S): C-200

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable *new item*

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

5a, 5b, 5c, 5d, 5e, 5f,
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM : J. 106

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.

☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.

☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.

☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.

☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.

☐ Corrective action specified by the Licensee:

☐ Equipment replacement with qualified equipment

☐ Equipment modification

☐ Equipment relocation above submergence level

☐ Relocate or shield equipment from radiation source

☐ Verify qualification by additional (testing/analysis)

☐ Equipment relocation to a mild environment

☐ Qualification testing of equipment in progress

☐ Other (_____)

☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)

☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u>X</u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u>X</u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I X; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u> Equipment Type	Radiation Detector	CONTAINMENT AREA RADIATION MONITOR AND ASSOCIATED CABLES	
Manufacturer's Name (5.2.2/-/-)	Victoreen	VICTOREEN INSTRUMENT	
Model Number (5.2.2/-/-)	878	877-1 (DETECTOR) 878-1 (CABLE ASSEMBLY)	
Serial Number		907341 (CABLE ASSEMBLY; ANO -1 UNIT 2	
Features/Mounting (5.2.6/-/-)			
Connections/Interfaces (5.2.6/-/-)	not stated	ST-ST HOSE AND FULL BOX PER VICTOREEN DWG. No. 91007	X NOTE 2
Location/Elevation			
Equipment ID No.	RM-091A RM-091B		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	PGR#2883 Victoreen 950.301	VICTOREEN 950.301	
Report Date		JUN - 19 - 1981	
Issued by		VICTOREEN	
Prepared for		VICTOREEN	
Referenced Reports		WYLE LABS 45050-1	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		TEST	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		INITIAL AND FINAL BASELINE TESTS INCLUDE:	
Operating Conditions (-/2.2.10/2.2.10)		VOLTAGE W/STAND and LEAKAGE CURRENT;	
Load/Cycles/Voltage/ Current/Freq.		TRANSFER CAPACITANCE; ACCURACY and OPERABILITY CHECKS	



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)		± 36% OF INPUT RADIATION VALUE	
Accuracy (5.2.5/-/-)		WITHIN ± 36% SPEC.	
Number of Specimens		2 DETECTORS WITH ASSOCIATED CABLES	
Test Instruments Calibrated			
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Hi-range radiation monitoring		
Test Duration (5.2.1/-/-)		30 DAYS	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)			
Required Function Time	continuous	LONG TERM	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)			
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)		TA/OPER/RAD/SEIS/STM+CHSP	
1. Representative Sample			
2. Baseline Data			
3. Performance Extremes			
4. Thermal Aging			
5. Radiation Aging			
6. Wear Aging			
7. Vibration/Seismic			
8. DBE Exposure			
9. Post-DBE Exposure			
10. Inspection			
Aging (5.2.4, 7.0/4.0/4.0)		240 h@ 151°C for DETECTOR WITH 878-1 CABLES	
Thermal Aging/Basis		240 h@ 85°C for DETECTOR WITH 907341 CABLES	
Material Aging Evaluation (7.0/-/-)		Arrhenius Analysis presented in qual, test plan	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Cable & seal materials	
Radiation Aging, Type		GAMMA	



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)		41 Mrd	NOTE 1
Radiation Aging, Dose Rate		220 Mrd	
Radiation Aging, Method		1.0×10^6 rd/h TEST	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)			
Operational Aging (-/4.2/-)		HV POWER SUPPLY 550 VAC, 120 Hz 1.24×10^6 CYCLES (287 HR.)	
Other Age Conditioning (-/4.2/-)			
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 yrs.	40 YR./40 YR.	
Normal Ambient Temperature	} not stated		
Normal Ambient Radiation			
Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)			
On-Going Analysis of Failures and Degradation (7.0/-/-)			
Margin (General) (6.0/3.0/3.0)			
Margin (NUREG-0588, Cat. I) (-/3.2/-)			
1. Temperature (+15°F)			
2. Pressure (+10%, 10 psig max)			
3. Radiation (not required)			
4. Time (+10%, +1 hour + function time minimum)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>			
LOCA/MSLB/HELB/Uncontrolled (4.1, 4.2, 4.3.1, 4.3.3/ 1.1, 1.2, 1.5/1.1, 1.2, 1.5)		LOCA	
Radiation Type	$1 \times 10^6 \text{ rd.}$	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)		INCLUDED IN AGING DOSE	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)		NA	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)		NA	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)		NA	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	$1 \times 10^6 \text{ rd.}$	$41 \times 10^6 \text{ rd.}$ $220 \times 10^6 \text{ rd.}$	note 1
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)			



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase			
Peak: °F/psig/RH/Time	280/50/-/10s.	357/133/-/3 hr.	
Decrease To: °F/psig/RH/Time	280/50/1/10 - 8 hr.	320/75.8/-/3 hr.	
Decrease To: °F/psig/RH/Time	140/10/1/10	300/53.8/-/4 hr.	
Decrease To: °F/psig/RH/Time		250/15/-/81 hr.	
		200/0/-/26 days	
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)			
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)		TEST	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700 ppm boron	0.28 m H ₃ BO ₃ NaOH pH = 11.0	
Spray Density (gpm/ft ²)	not stated	0.15 24 hr. (1440 min.)	
Spray Duration			
Submergence Duration (4.1.3/2.2.5/2.2.5)	NA	ND	
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence	NA		
Dust Environment (-/2.2.11/2.2.11)			



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

NOTES:

1. Cable assembly 907341 and Detector #103 were radiation aged to 41 Mrd, cable assembly 878-1 and Detector #104 were aged to 220 Mrd.

2. Testing has identified the method of connection of the Detector cables as critical with respect to the ability of this equipment to pass a LOCA test. The Licensee has not identified the installed interface for this equipment. Victoreen Drawing no. 91007 outlines the method used to qualify the Detector to LOCA conditions. The Licensee should identify the installed method of connection and justify the integrity of the connection through qualification testing/analysis or document similarity between the installed interface and Victoreen Dwg. 91007.



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 106

INSTALLED TMI LESSONS LEARNED IMPLEMENTATION EQUIPMENT SUMMARY

NRC requested an evaluation of the environmental qualification of safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. The objective is to evaluate qualification documentation of equipment within the scope of IE Bulletin 79-01B, Supplement 3 (item 2), in accordance with criteria established by the NRC (see Section 2 of this report) in a manner identical to the evaluation of all other safety-related electrical equipment. The scope of this review is limited to TMI Action Plan equipment associated with specific sections of NUREG-0737 which have an installation implementation date of January 1, 1981 (sections are identified below). Where applicable, a review is to be performed on installed equipment with implementation dates after January 1, 1981 if adequately identified by the licensee.

This plant is a PWR X, BWR ____.
The NSSS Vendor is Westinghouse (W) X, Babcox & Wilcox (B&W) ____,
Combustion Engineering (CE) ____, General Electric (GE) ____.

With respect to this equipment item, it is noted (applicable section checked):

- ☐ The Licensee does not provide adequate information with respect to identification of TMI Action Plan equipment installed as of 1/1/81.
- ☐ The Licensee has not provided the correlation of this equipment item with the specific sections of NUREG-0737. [The correlation is needed to ensure that all items are included in the review, e.g., if a transmitter is identified as a TMI Action Plan item, are the cable and the terminal blocks associated with the device also identified?]
- ☐ The Licensee has not provided the approximate installation date for the TMI Action Plan equipment items so that the appropriate qualification criteria (NUREG-0588 or DOR Guidelines) can be used in the EEQ evaluation.
- ☐ The Licensee has provided a standard Owners' Group position with respect to a NUREG-0737 technical area.
- ☐ The Licensee has requested extensions of implementation dates.
- ☐ The Licensee has stated that this equipment item is associated with the following section of NUREG-0737. (This list of applicable NUREG-0737 sections has been identified by NRC as sections within the scope of this review):
 - ☐ II.B.3 (ALL/1-1-81) Post-Accident Sampling Capability of Reactor Coolant and Containment
 - ☐ II.D.3 (ALL/1-1-81) Direct Indication of Relief and Safety Valve Position

X II.F.1.3 Containment High Range Radiation Monitor



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 107

EQUIPMENT ITEM NO. 107
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL X2063816RF
REQUIRED OPERATING TIME: 100 DAYS
TER CHECKSHEET NO. 107
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): HYDROGEN ANALYZER CONTAINMENT SAMPLE VALVE (HCV-883C,
-883D, -883E, -883F, -883G, -883H, -820C, -820D, -820E,
-820F, -820G, -820H)
LICENSEE SUBMITTAL: SCEW(S): C-26J

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 107

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 107

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies	
(If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

*See review of equipment item no's 49 and 50
for detailed evaluation.*



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 108

EQUIPMENT ITEM NO. 108
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO, MODEL NOT STATED
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 108
LICENSEE REFERENCE(S): 649, 9
FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HCV-883A, -884A)
LICENSEE SUBMITTAL: SCEW(S): C-51

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Installed TMI Lessons Learned Implementation Equipment Summary	6a, 6b
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 108

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|---------------------------------------------------------------------|--------------------------------|
| I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| <input checked="" type="radio"/> II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 108

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	<u> </u>
Adequate Similarity Between Equipment and Test Specimen Established	<u> X </u>
Aging Degradation Evaluated Adequately	<u> </u>
Qualified Life or Replacement Schedule Established (If Required)	<u> </u>
Program Established to Identify Aging Degradation	<u> </u>
Criteria Regarding Aging Simulation Satisfied (If Required)	<u> </u>
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	<u> </u>
o Peak Pressure Adequate	<u> </u>
o Duration Adequate	<u> </u>
o Required Profile Enveloped Adequately	<u> </u>
o Steam Exposure (If Required) Adequate	<u> </u>
Criteria Regarding Spray Satisfied	<u> </u>
Criteria Regarding Submergence Satisfied	<u> </u>
Criteria Regarding Radiation Satisfied	<u> </u>
Criteria Regarding Test Sequence Satisfied	<u> </u>
Criteria Regarding Test Failures or Severe Anomalies	<u> </u>
(If Any) Satisfied	<u> </u>
Criteria Regarding Functional Testing Satisfied	<u> </u>
Criteria Regarding Instrument Accuracy Satisfied	<u> </u>
Test Duration Margin (1 hour + Function Time) Satisfied	<u> </u>
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	<u> </u>

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u> </u>
I.b	Equipment Qualification Pending Modification	<u> </u>
II.a	Equipment Qualification Not Established	<u> X </u>
II.b	Equipment Not Qualified	<u> </u>
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u> </u>
III.a	Equipment Exempt From Qualification	<u> </u>
III.b	Equipment Not in the Scope of the Qualification Review	<u> </u>
IV	Documentation Not Made Available	<u> </u>



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 109

EQUIPMENT ITEM NO. 109

SOLENOID VALVE LOCATED IN ROOM 22

ASCO MODEL NP8320A185E

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 109

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): INLET & OUTLET VALVES FOR SAFETY INJECTION & SPRAY PUMPS
BEARING COOLERS (HCV-2809A, B; -2811A, B; -2814A, B;
-2815A, B)

LICENSEE SUBMITTAL: SCEW(S): I-27

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

3a, ~~3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,~~
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 109

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 109

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See review of equipment item no.'s 49 and 50 for detailed evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 109

The licensee SCEW states:

"Valves are locked open and do not operate during an event."



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1a

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 110

EQUIPMENT ITEM NO. 110

SOLENOID VALVE LOCATED IN ROOM 81

ASCO MODEL NP8320A185V

REQUIRED OPERATING TIME: INTERMITTENT

TER CHECKSHEET NO. 110

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER VALVES
(YCV-1045A, -1045B)

LICENSEE SUBMITTAL: SCEW(S): S-203

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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Licensee Response to NRC SER

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System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 110

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 110

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X _____
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

See equipment item no's 49 and 50 for evaluation



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 111

EQUIPMENT ITEM NO. 111

SOLENOID VALVE LOCATED IN ROOM 81

ASCO MODEL NP8314C29E

REQUIRED OPERATING TIME: INTERMITTENT

TER CHECKSHEET NO. 111

LICENSEE REFERENCE(S): 649

FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER VALVES
(FCV-1368, -1369, YCV-1045)

LICENSEE SUBMITTAL: SCEW(S): S-201, -202, -200

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QI, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

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Summary of Licensee Responses to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, 3b, 3c, 3d
System Consideration Review	4a, 4b, 4c, 4d, 4e, 4f
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
Installed TMI Lessons Learned Implementation	6a, 6b
Equipment Summary	
Maintenance and Replacement Schedule Summary	7a, 7b, 7c



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 111

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.c</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 111

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

See equipment item no's 49 and 50 for evaluation.



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 112

EQUIPMENT ITEM NO. 112

SOLENOID VALVE LOCATED IN THE CONTAINMENT

ASCO MODEL NP8321A185E

REQUIRED OPERATING TIME: INTERMITTENT

TER CHECKSHEET NO. 112

LICENSEE REFERENCE(S): 649, 9

FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HVC-865, -864)

LICENSEE SUBMITTAL: SCEW(S): C-52

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S, (R), M, I, QM, RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

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Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 112

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------|---------------------------------------|
| I.a Qualified | <u>II.C</u> Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 112

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:

X = DEFICIENCY

Documented Evidence of Qualification Adequate _____
Adequate Similarity Between Equipment and Test Specimen Established _____
Aging Degradation Evaluated Adequately _____
Qualified Life or Replacement Schedule Established (If Required) _____
Program Established to Identify Aging Degradation _____
Criteria Regarding Aging Simulation Satisfied (If Required) _____
Criteria Regarding Temperature/Pressure Exposure: _____
 o Peak Temperature Adequate _____
 o Peak Pressure Adequate _____
 o Duration Adequate _____
 o Required Profile Enveloped Adequately _____
 o Steam Exposure (If Required) Adequate _____
Criteria Regarding Spray Satisfied _____
Criteria Regarding Submergence Satisfied _____
Criteria Regarding Radiation Satisfied _____
Criteria Regarding Test Sequence Satisfied _____
Criteria Regarding Test Failures or Severe Anomalies _____
 (If Any) Satisfied _____
Criteria Regarding Functional Testing Satisfied _____
Criteria Regarding Instrument Accuracy Satisfied _____
Test Duration Margin (1 hour + Function Time) Satisfied _____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I) _____

NRC QUALIFICATION CATEGORY

DESIGNATION:

X = CATEGORY

I.a Equipment Qualified _____
I.b Equipment Qualification Pending Modification _____
II.a Equipment Qualification Not Established _____
II.b Equipment Not Qualified _____
II.c Equipment Satisfies All Requirements Except Qualified Life _____
 or Replacement Schedule Justified X
III.a Equipment Exempt From Qualification _____
III.b Equipment Not in the Scope of the Qualification Review _____
IV Documentation Not Made Available _____

*See review of equipment item nos 49 and 51
for evaluation*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 113

EQUIPMENT ITEM NO. 113

SOLENOID VALVE LOCATED IN THE CONTAINMENT

ASCO MODEL NP8320A175E

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 113

LICENSEE REFERENCE(S): 649, 9

FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HCV-1107A, HCV-1108A,
HCV-438A, HCV-438C)

LICENSEE SUBMITTAL: SCEW(S): C-52, -53

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QI, RT, P, H, CS, A, S, (R), M, I, QM, RPN EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

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2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

~~5a, 5b, 5c, 5d, 5e, 5f,
5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



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FRC Task No. 504

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 113

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.

☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.

☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.

☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.

☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.

☐ Corrective action specified by the Licensee:

☐ Equipment replacement with qualified equipment

☐ Equipment modification

☐ Equipment relocation above submergence level

☐ Relocate or shield equipment from radiation source

☐ Verify qualification by additional (testing/analysis)

☐ Equipment relocation to a mild environment

☐ Qualification testing of equipment in progress

☐ Other (_____)

☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)

☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

I.a Qualified

I.b Modification

II.a Qualification Not Established

II.b Not Qualified

II.c Qualified Life Deficiency

III.a Exempt

III.b Not in Scope

IV Documentation Not Available



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 113

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	_____
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	<u>X</u>
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____

*See review of equipment item no's 49 and 61
for detailed evaluation.*



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 114

EQUIPMENT ITEM NO. 114

SOLENOID VALVE LOCATED IN THE CONTAINMENT

VALCOR MODEL V526589115

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 114

LICENSEE REFERENCE(S): 1835

FUNCTION (PLANT ID): HYDROGEN ANALYZER ISOLATION VALVES (HCV-820B, HCV-821B)

LICENSEE SUBMITTAL: SCEW(S): C1-29

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:

(See Section 3 of this TER for Legend)

R, T, QT, RT, P, H, CS, A, S (R), M, I, QM RPN, EXN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents

Checksheet Page No.

Equipment Item

1a

Summary of Licensee Responses to the NRC SER

1b

Equipment Environmental Qualification Summary Forms

2

Licensee Response to NRC SER

~~3a, 3b, 3c, 3d~~

System Consideration Review

~~4a, 4b, 4c, 4d, 4e, 4f~~

Equipment Environmental Qualification Review

5a, 5b, 5c, 5d, 5e, 5f,
~~5g, 5h, 5i, 5j~~

Installed TMI Lessons Learned Implementation
Equipment Summary

~~6a, 6b~~

Maintenance and Replacement Schedule Summary

~~7a, 7b, 7c~~



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 114

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE:

- ☒ The Licensee (has/~~has not~~) provided a response to the SER concerns.
- ☐ The Licensee (has/has not) specifically stated that the equipment is qualified and/or will function when exposed to the applicable DBE environmental service conditions.
- ☒ The Licensee has presented information which shows there are no outstanding qualification deficiencies.
- ☐ The Licensee (has/has not) proposed a corrective action for this equipment item whose qualification has not been fully established.
- ☐ Justification for interim operation (has/has not) been provided by the Licensee for this equipment item.
- ☐ Corrective action specified by the Licensee:
- ☐ Equipment replacement with qualified equipment
 - ☐ Equipment modification
 - ☐ Equipment relocation above submergence level
 - ☐ Relocate or shield equipment from radiation source
 - ☐ Verify qualification by additional (testing/analysis)
 - ☐ Equipment relocation to a mild environment
 - ☐ Qualification testing of equipment in progress
 - ☐ Other (_____)
- ☐ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.
- ☐ The Licensee (has/has not) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action _____.)
- ☐ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF RESULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM ONLY: (See Section 3 of this TER for Legend)

- | | |
|------------------------------------------------|--------------------------------|
| <input checked="" type="radio"/> I.a Qualified | II.c Qualified Life Deficiency |
| I.b Modification | III.a Exempt |
| II.a Qualification Not Established | III.b Not in Scope |
| II.b Not Qualified | IV Documentation Not Available |



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EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS

DESIGNATION:
X = DEFICIENCY

Documented Evidence of Qualification Adequate	_____
Adequate Similarity Between Equipment and Test Specimen Established	_____
Aging Degradation Evaluated Adequately	_____
Qualified Life or Replacement Schedule Established (If Required)	_____
Program Established to Identify Aging Degradation	_____
Criteria Regarding Aging Simulation Satisfied (If Required)	_____
Criteria Regarding Temperature/Pressure Exposure:	
o Peak Temperature Adequate	_____
o Peak Pressure Adequate	_____
o Duration Adequate	_____
o Required Profile Enveloped Adequately	_____
o Steam Exposure (If Required) Adequate	_____
Criteria Regarding Spray Satisfied	_____
Criteria Regarding Submergence Satisfied	_____
Criteria Regarding Radiation Satisfied	_____
Criteria Regarding Test Sequence Satisfied	_____
Criteria Regarding Test Failures or Severe Anomalies (If Any) Satisfied	_____
Criteria Regarding Functional Testing Satisfied	_____
Criteria Regarding Instrument Accuracy Satisfied	_____
Test Duration Margin (1 hour + Function Time) Satisfied	_____
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	_____

NRC QUALIFICATION CATEGORY

DESIGNATION:
X = CATEGORY

I.a	Equipment Qualified	<u>X</u>
I.b	Equipment Qualification Pending Modification	_____
II.a	Equipment Qualification Not Established	_____
II.b	Equipment Not Qualified	_____
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Justified	_____
III.a	Equipment Exempt From Qualification	_____
III.b	Equipment Not in the Scope of the Qualification Review	_____
IV	Documentation Not Made Available	_____



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 114

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X; NUREG-0588, Cat. I ; NUREG-0588, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>EQUIPMENT DESCRIPTION</u>			
Equipment Type	Solenoid Valve	Solenoid Valve	
Manufacturer's Name (5.2.2/-/-)	Valcor	Valcor Engineering	
Model Number (5.2.2/-/-)	V526605295 68	V52600-5291-2	
Serial Number			
Features/Mounting (5.2.6/-/-)			
Connections/Interfaces (5.2.6/-/-)	not stated		
Location/Elevation			
Equipment ID No.	see pg. 1a		
<u>QUALIFICATION REPORT</u> (8.0/5.0/5.0)			
Report ID Number	PGR 1835 QR-52600- 5940-2	QR-52600-5940-2	
Report Date		05-July-1979	
Issued by		Valcor Engineering Corp.	
Prepared for		Isomedix Inc.	
Referenced Reports		IFR-V877-01	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		Type Test	
<u>QUALIFICATION TEST PROGRAM</u>			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Insulation Resistance Tests	
Operating Conditions (-/2.2.10/2.2.10)		108 VAC	
Load/Cycles/Voltage/ Current/Freq.		44 psig N ₂	



EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 114

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	:	: Pass Functional Tests, : Demonstrate Satisfactory : Operability	: : :
Accuracy (5.2.5/-/-)	:	: ND	: :
Number of Specimens	:	: 1	: :
Test Instruments Calibrated	:	: Yes	: :
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	: H ² analyzer : isolation : valves	:	: : :
Test Duration (5.2.1/-/-)	:	: 31 Days	: :
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	:	:	: :
Required Function Time	: see pg. 12.	:	: :
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	:	:	: : :
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	:	: TA/OPER/RAD/SEIS/STM+CHSP	: : :
1. Representative Sample	:	:	: :
2. Baseline Data	:	:	: :
3. Performance Extremes	:	:	: :
4. Thermal Aging	:	:	: :
5. Radiation Aging	:	:	: :
6. Wear Aging	:	:	: :
7. Vibration/Seismic	:	:	: :
8. DBE Exposure	:	:	: :
9. Post-DBE Exposure	:	:	: :
10. Inspection	:	:	: :
Aging (5.2.4, 7.0/4.0/4.0)	:	: 318 deg.F, 172 Hr. To : Simulate	: : :
Thermal Aging/Basis	:	: 40 Yrs. @ 120 deg.F	: :
Material Aging Evaluation (7.0/-/-)	:	: MR52600-515-2 : Additional 442 Hr.@318°F : to age polyimide to 40 Yr.	: : :
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	:	: Coil Materials	: :
Radiation Aging, Type	:	: GAMMA	: :



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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	:	: 50 x 10 ⁶	:
Radiation Aging, Dose Rate	:	: 0.75 Mrd/h	:
Radiation Aging, Method	:	: Test	:
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	:	:	:
Operational Aging (-/4.2/-)	:	: 7500 cycles 44psig N ₂	:
Other Age Conditioning (-/4.2/-)	:	: Seismic Simulation	:
Qualified Life Claimed/ Established (5.2.4/4.10/-)	: 40 yrs.	: 40 Yr./40 Yr.	:
Normal Ambient Temperature	:	:	:
Normal Ambient Radiation	:	:	:
Normal Ambient Humidity	:	:	:
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	:	:	:
On-Going Analysis of Failures and Degradation (7.0/-/-)	:	:	:
Margin (General) (6.0/3.0/3.0)	:	:	:
Margin (NUREG-0588, Cat. I) (-/3.2/-)	:	:	:
1. Temperature (+15°F)	:	:	:
2. Pressure (+10%, 10 psig max)	:	:	:
3. Radiation (not required)	:	:	:
4. Time (+10%, +1 hour + function time minimum)	:	:	:



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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
<u>ACCIDENT CONDITIONS</u>	:	:	:
LOCA/MSLB/HELB/Uncontrolled	:	:	:
(4.1, 4.2, 4.3.1, 4.3.3/	:	:	:
1.1, 1.2, 1.5/1.1, 1.2, 1.5)	:	:	:
Radiation Type	:	GAMMA	:
Radiation Dose (rd)	:	:	:
(4.1.2/1.4/1.4)	$\sim 10^6 \text{ rd.}$	150×10^6	:
Radiation Dose Rate (rd/hr)	:	:	:
Radiation Qual. Method	:	0.75×10^6 , Test	:
(5.3.1/-/-)	:	:	:
Proximity to Concentrated Radiation	:	:	:
(4.1.2/1.4.6/1.4.6)	:	:	:
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	:	:	:
Radiation Dose (Normal + Accident) (4.1.2/-/-)	$\sim 10^6 \text{ rd.}$	$200 \times 10^6 \text{ rad}$:
Plateout Dose Considered (-/1.48/1.48)	:	NA	:
Gamma + Beta Dose (rd)	:	NA	:
(4.1.2/1.4.7/1.4.7)	:	:	:



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 114

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUEMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
<u>ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS</u>			
Rate of Temp./Press. Increase		Not Stated But Within 3 - 5 Min.	
Peak: °F/psig/RH/Time	280/50/-/100sec	346/113/100/3h	
Decrease To: °F/psig/RH/Time	280/50/140/10/8 hr.	335/113/100/3h	
Decrease To: °F/psig/RH/Time		315/69/100/4h	
Decrease To: °F/psig/RH/Time		272/28/100/4h	
Equipment Surface Tempera- ture (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)		245/13/100/27.5d	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	-	Test (Simultaneous)	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	1700ppm boron	2200 ppm Boron H ₃ BO ₃ 0.064m Na ₂ S ₂ O ₃ NaOH, ph=10.5	
Spray Density (gpm/ft ²)	not stated	0.15 gpm/ft ²	
Spray Duration	not stated	44,640 min.	
Submergence Duration (4.1.3/2.2.5/2.2.5)			
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)			



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NOTES:

1. It was determined by analysis that polyimide would require additional thermal aging of 442 hr. @ 318°F to simulate 40 yrs @ 120°F. All other coil materials were subsequently overaged during the additional thermal aging.

5. CONCLUSIONS

The tabulations in Section 4.2 represent a summary of the results of the equipment environmental qualification (EEQ) assessment conducted in accordance with the methodology presented in Section 3. The evaluations are based on the available qualification documentation provided by the Licensee, complemented in several cases by other relevant technical information. The major qualification deficiencies that have been identified and the results of the evaluation are shown in the Equipment Environmental Qualification Summary Forms (Tables 4-1, 4-2, 4-3, and 4-4).

Sections 4.3, 4.4, and Appendix C of this report present a detailed evaluation of (1) the Licensee's qualification methodology, (2) the equipment environmental qualification of each equipment item, and (3) the Licensee's response to the NRC SER.

On March 18, 1982, the Licensee provided the following response concerning TMI Action Plan equipment [32]:

"Request B.1.a.

Identification of all TMI Action Plan equipment installed as of January 1, 1981 is requested.

Response

The only safety related equipment installed or upgraded as of January 1, 1981 in response to the TMI Action Plan and subject to a harsh environment were the power supplies for the pressurizer power operated relief valves (PORVs), the PORV block valves, and position indicators for these valves. This equipment was installed in response to TMI Action Plan Item II.G.1.

Request B.1.b.

Identification of TMI Action Plan equipment installed with implementation dates after January 1, 1981 is requested.

Response

All of the TMI Action Plan equipment installed after January 1, 1981 was described in the District's letter to the Commission dated February 1, 1982.

Request B.1.c.

The correlation of these equipment items with the specific sections of NUREG-0737 (4) presented below (as applicable) is requested.

II.E.1.2, II.E.4.2, II.E.3.1, II.G.1, II.F.2, II.D.3, II.B.3, II.E.4.1.

Response

The equipment installed in response to NUREG-0737, Items II.E.1.2, II.G.1, II.F.2, II.D.3, and II.B.3 was addressed in the District's letter to the Commission dated February 1, 1982. For NUREG-0737 Items II.E.4.2, II.E.3.1, and II.E.4.1, the request is not applicable. For TMI Action Plan Item II.E.4.2, Containment Isolation Dependability, no modifications to existing equipment were required and any equipment requiring modification has been addressed in previous submittals. Modifications performed in response to Items II.E.3.1 and II.E.4.1 did not add electrical equipment inside a harsh environment.

Request B.1.d.

For all installed TMI Action Plan equipment identified, a System Component Evaluation Worksheet (SCEW) (in accordance with 79-01B format) is requested.

Response

The District's letter of February 1, 1982 provided SCEW's for TMI equipment or provided a schedule for submitting SCEW's.

Request B.1.e

The approximate installation date for the TMI Action Plan equipment items is requested so that the appropriate qualification criteria (NUREG-0588 or DOR Guidelines) can be used in the EEQ evaluation.

Response

Enclosure 15 to the District's letter to the Commission dated August 26, 1981 identifies the District's schedule for installation of TMI Action Plan equipment.

Request B.2.

The qualification documents, e.g., the actual test reports and associated correspondence cited as evidence of qualification listed on the SCEW sheets, for all identified TMI Action Plan equipment are requested. (The identification of those reports considered to be proprietary is requested so that proper control of documents can be maintained.)

Response

The qualification documents for the SCEW's provided with the District's letter of February 1, 1982 are attached. The rest of the qualification documents will be submitted with their respective SCEW's consistent with the schedule detailed in the February 1, 1982 letter.

Request B.3.

Where the licensee has a standard Owners' Group position with respect to a NUREG-0737 technical area or has requested extensions of implementation dates, this information is requested in order to incorporate it into the review.

Response

The instrumentation for detecting inadequate core cooling being developed in response to NUREG-0737, Item II.F.2, is the only Owners' Group effort in which the District is participating that requires environmental qualification. The District's letter of February 1, 1982 addressed the Owners' Group schedule for this task."

6. REFERENCES

The references listed in this section of the report were used to develop the Equipment Environmental Qualification evaluation for this plant. The references have been separated into two lists: (1) Plant-Specific References and (2) Plant Generic References. All non-generic documents are listed on the "Plant-Specific References" list. All qualification documents that could be applicable to equipment installed in several plants were listed on the "Plant Generic References" list. These documents include topical reports, test reports, component and material analyses, etc. cited by the Licensee as evidence of qualification in accordance with the documentation reference instructions established by IE Bulletin 79-01B. Since these documents were compiled by a computer data base, the citation numbering was computer generated and the same document has the same generic reference number in all Technical Evaluation Reports prepared under this equipment qualification program.

Throughout the text of the report, references are designated by a bracketed number; the reference numbers are not presented in sequential order.

PLANT-SPECIFIC REFERENCES

1. W. C. Jones
Letter to K. V. Seyfrit, NRC. Subject: Update
to Response to IE Bulletin 79-01B (Attached)
Omaha Public Power District, 31-Oct-80
2. Clarification of TMI Action Plan Requirements
USNRC, 00-Nov-80
NUREG-0737
3. W. C. Jones
Letter to K. V. Seyfrit, NRC. Subject: Revision to
October 31, 1980 Response to IE Bulletin 79-01B
Omaha Public Power District, 30-Jan-81
4. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Fort Calhoun
USNRC, 29-May-81
5. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Response to SER for Fort
Calhoun Station and Revised Full Submittal Incorporating
This Information
Omaha Public Power District, 26-Aug-81
6. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Environmental
Qualification of Safety-Related Electrical Equipment;
Fort Calhoun Station, with Attachments
Omaha Public Power District, 14-Jan-82
LIC-82-019
7. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Fort Calhoun Station;
TMI Action Plan Documentation and Update to August 26, 1981
Submittal
Omaha Public Power District, 01-Feb-82
LIC-82-043
8. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Transmittal of
Requested Information to Franklin Research Center
Omaha Public Power District, 08-Feb-82
LIC-82-048

9. T. R. Hays, Jr.
Letter to R. F. Mehaffey, OPPD. Subject: Extended
Qualification of ASCO MP-1 Solenoid Valves
Automatic Switch Co., 10-Jul-80
10. G. E. Benzenberg
Letter to R. Mehaffey, OPPD. Subject: Characteristics
of 9090-12 Sensor
Alison Control Inc., 15-Feb-80
11. E. N. Dahlstedt
Letter to J. Fluehr, OPPD. Subject: Ambient Temperature
Considerations for Nuclear Class 1E Motors
General Electric, 06-Feb-78
12. J. R. Bendokaiis
Letter to E. Erickson, OPPD. Subject: Material
Breakdown for D1200G and D2400X Switches
NAMCO Controls, 11-Mar-80
13. R. Natell and P. M. Orlosky
Gamma Irradiation of Insulators
Western New York Nuclear Research, 00-Nov-70
T. N. J-593-6
14. W. C. Federick
Letter to R. F. Mehaffey, OPPD. Subject: Electric
Penetration Assemblies, Fort Calhoun
Conax Corp., 23-Jan-81
15. W. J. Raiter
Specification for Type Qualification of Electrical
Penetration Sub-Assemblies for Omaha Public Power District
Conax Corp., 06-Nov-69
IPS-12, Rev. B
16. W. S. Rautio
Letter to S. Stevens, OPPD. Subject: Electric Penetrations,
Fort Calhoun Unit 1
Conax Corp., 31-May-79
17. Elastomer Radiation Results
Dow Corning
18. J. T. Braun
Letter to R. Mehaffey, OPPD. Subject: Performance of Dow
Corning 3145 Adhesive/Sealant During LOCA
Dow Corning, 24-Mar-80

19. P. S. Malloy
Letter to W. Jones, OPPD. Subject: Transmittal of
Laboratory Report
Fisher Controls Co., 10-Jul-72
20. J. Z. Sherk
Letter to R. Knoll, MetEd. Subject: Electrical
Terminal Block Testing
General Electric, 10-Oct-78
GP-8-58
21. Certification of Qualification Testing
Cerro Wire & Cable, 28-Sep-71
Tech. Spec. #2
22. C. C. Diglio
Letter to R. Mehaffey, OPPD. Subject: Postulated
Performance of Pyrotol III
Rockbestos Co., 19-May-80
23. C. C. Diglio
Letter to R. Mehaffey, OPPD. Subject: Postulated Resistance
to Material Degradation of Pyrotol III
Rockbestos Co., 27-Oct-80
24. B. L. Jones
Letter to T. C. Ball, Commonwealth Electric
Subject: Certification of Cables
Anaconda Wire & Cable Co., 16-Sep-71
25. T. H. Ling
Letter to R. Mehaffey, OPPD. Subject: Qualification Test Results
Anaconda Wire & Cable, 23-May-80
26. J. A. Lewis
Certificate of Qualification to San Onofre
Generating Station Unit 1
Foxboro Co., 07-Oct-76
27. R. J. Breen
Letter to R. J. Mueller, OPPD. Subject: Fort Calhoun -
Nuclear Transmitter
Foxboro Co., 18-Apr-79
28. S. J. Mintinn
Memo to R. Mehaffey, OPPD. Subject: Rating
of 'OP' Micro and '51ML' Micro
Lakeland Engineering Eqpt., 27-Feb-80

29. Instructions: Custom 8000 Horizontal Induction Motors;
Dripproof, Splashproof or Weather-Protected Type I
General Electric
GEH-3160E
30. Study for Omaha Public Power District to Determine Contents
of Winding and Insulation and to Provide Radiation Data
Where Available
General Electric, 04-Mar-80
OPPD P. O. 47462
31. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Fort Calhoun Station;
Environmental Qualification Schedule
Omaha Public Power District, 30-Nov-81
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APPENDIX A - ENVIRONMENTAL SERVICE CONDITIONS

The specific environmental service conditions corresponding to different plant locations that were used in this technical evaluation are stated in this appendix, based upon the information presented in the Licensee's submittal [5, 6].

The temperature and pressure profiles contained herein form the basis for the temperature and pressure noted by the Licensee in the "Environment Required" column on the Licensee's Equipment Qualification Report Evaluation sheets.

This appendix contains the following curves:

- Figure A-1. Containment Temperatures Following LOCA (Licensee Figure 1) [5]
- Figure A-2. Containment Pressure - Time Curves - Sheet No. 1 (Licensee Figure 2) [5]
- Figure A-3. Fort Calhoun Cycle IV, 1.0 x Double Ended Slot Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-1B) [5]
- Figure A-4. Fort Calhoun Cycle IV, 1.0 x Double Ended Slot Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-1F) [5]
- Figure A-5. Fort Calhoun Cycle IV, 0.6 x Double Ended Slot Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-3B) [5]
- Figure A-6. Fort Calhoun Cycle IV, 0.6 x Double Ended Slot Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-3F) [5]
- Figure A-7. Fort Calhoun Cycle IV, 1.0 x Double Ended Guillotine Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-4B) [5]
- Figure A-8. Fort Calhoun Cycle IV, 1.0 x Double Ended Guillotine Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-4F) [5]

Figure A-9. Fort Calhoun Cycle IV, 0.6 x Double Ended Guillotine Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-6B) [5]

Figure A-10. Fort Calhoun Cycle IV, 0.6 x Double Ended Guillotine Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-6F) [5]

Figure A-11. Fort Calhoun Containment Main Steam Line Break Temperature (°F) Versus Time After Break (Sec) for Worst Case Energy Release [6]

Based on these considerations, each equipment item was evaluated with respect to the environmental service conditions presented in this appendix.

The Licensee's methodology for the development of environmental service conditions was stated in References 5 and 6 as follows:

"ENCLOSURE #1

Environmental Design Conditions

When considering the Design Basis Events of a LOCA and high energy pipe breaks, the following adverse environments are postulated:

Environment No. 1 - Containment

Temperature:	*Figure 1 - 288°F****
Pressure:	*Figure 2 - 60 psig
Humidity	100% R.H.
Chemical Spray:	Chemical spray of boric acid solution of at least 1700 ppm boron (minimum concentration specified per Technical Specification 2.3)
Radiation:	**3 x 10 ⁶ rads
Reactor Pressure:	***

* From 'Containment Pressure Analysis', Section 14.16 of FSAR and from 'Design Evaluation', Section 6.2.5 of FSAR. The temperature transient is based on a large primary coolant system pipe break. As can be seen from Figures 1 and 2 (attached), 'the maximum containment pressure is 57 psig at a temperature of 285°F. If it is assumed that hydrogen does not burn as it is produced but accumulates and reacts at the containment peak pressure, the effect is to increase the peak pressure by approximately 2.4 psi.'

** Section 6.1.3, page 6.1-3, of the FSAR states 'Engineered safeguards system control electrical equipment located within containment is specified at a gamma level of 1R/Hr for 40 years.' This is approximately 3.417×10^5 rads. The 40 year integrated dose plus LOCA dose (3×10^6 rads), as specified for the Franklin Institute Cable Tests, is used for conservatism.

*** Graphs are provided from Cycle IV LOCA analysis to show that reactor trips will occur (i.e., low pressurizer pressure at 1750 psia with uncertainties) at time $T=0+$ prior to any environmentally produced failures. These curves should demonstrate the adequacy of the reactor trip system to function during the very initial stages of a LOCA.

**** See Enclosure 14 MSLB Analysis.

ENCLOSURE #2

Main Steam/Feedwater Penetration Room (Room 81)

Temperature: 216°F*

Pressure: Maximum differential of 1.2 p.s.i.**

Humidity: 100% R.H.

Chemical: NONE

Radiation: Normal (Outside Containment)

* The 216° temperature was calculated by incorporating the factors set forth in Appendix M - Volume 7 of the F.S.A.R. - 'Postulate High Energy Line Rupture Outside the Containment'. More specifically, considering the worst case of a main steam line circumferential rupture, the maximum possible pressurization of Room 81 would be 1.2 p.s.i.g.. This is well below the room design differential pressure of 1.5 p.s.i. Considering the Rm. 81 environment to consist of completely saturated steam after the postulated break, and using a differential pressure of 1.5 p.s.i. (Here 1.5 p.s.i., or the room's design differential pressure, is used for conservatism instead of the calculated peak differential pressure of 1.2 p.s.i.) a temperature of 216°F, as read from the saturated steam tables, is the resultant.

** F.S.A.R. - Volume #7 Appendix M - 'Postulated High Energy Line Rupture Outside the Containment'." [5]

"The MSLB pressure analysis was performed to verify the containment design pressure was not exceeded and contained a number of conservative assumptions. These included limited credit for known heat sinks within containment and failure of gravity operated main steam line reverse flow check valves. Credit for either or both of these would result in a less severe environment. The District has concluded the presently installed equipment is adequate for the MSLB environment. This conclusion is based upon the short duration (35 seconds) that the MSLB temperature exceeds the LOCA peak temperature, the heat transfer characteristics of protective coatings on safety-related electrical equipment, and the additional conservatism in the MSLB analysis. In addition, the Fort Calhoun Station is equipped with a containment spray system which meets single failure criteria." [6]

Accident Conditions Inside Primary Containment

For PWR plants, the DOR Guidelines state that the environmental service conditions inside containment for the loss-of-coolant accident (LOCA) should be established by the Licensee based on the FSAR analysis. In addition, for plants equipped with automatic containment spray systems not subject to single component failure or delayed initiation, the Guidelines state that equipment qualified for the LOCA environment is also considered qualified for the postulated main-steam-line break accident (MSLB).

The Licensee also provided the following response with respect to temperature margins applied to the primary containment accident profile [5]:

"The District has updated the System Component Evaluation Work Sheet to reflect the 305°F. This increase in qualification temperature did not raise any safety concerns. The updated system component work sheets are provided for review.

The District provided an analysis (Enclosure 16) as part of its November 1, 1980 submittal on IE Bulletin 79-01B. This enclosure has been updated to factor the containment spray system into the analysis. Based upon the analysis findings, the District feels that instrument qualification to LOCA temperature profiles adequately qualifies equipment for the MSLB."

With regard to submergence outside containment, the Licensee stated [5]:

"In the Fort Calhoun Station the only area outside containment which is subject to flooding in a post-accident situation is Room 81, which will flood to approximately 1.4 feet (1037.4 feet building elevation). This was addressed on the System Component Evaluation Work Sheets. For equipment labeled N/A, flooding is 'Not Applicable' since flooding is not expected to occur in that room or a break in that room will affect the ability to safely shutdown the reactor. No further action should be required on this item."

With regard to chemical spray, the Licensee stated [5]:

"The District has reviewed the subject of chemical spray and has determined no safety concern exists. Please note that during the review it was discovered that an error had been made and that the FSAR chemical spray concentration is 1700 ppm boron in a boric acid solution. This represents a boric acid solution of 9760 ppm or approximately a 1% solution.

The following table lists the equipment in containment by manufacturer and identifies the chemical spray concentration to which it was tested.

<u>MANUFACTURER</u>	<u>EQUIPMENT</u>	<u>BORON TESTING</u>
NAMCO	Limit Switch	PH 10-11
ASCO	Solenoid	3000 ppm Boron PH 10
Joy	Vent Fan	1700 ppm Boric Acid (See Enclosure 7, Footnote 4)
Conax	Penetrations	1900 ppm Boric Acid (See Enclosure 7, Footnote 5)
Dow Corning	RTV	Letter that chemical spray has no effect to PH of 10
Splices (GHRD)	Heat Shrink Tubing	1% solution PH 9.5
Hoffman	Junction Boxes	Paint prevents corrosion - Not an active device
Rockbestos	Cable	1900 ppm Boron
Anaconda	Cable	1900 ppm Boron
Foxboro	MCA Transmitters	No Test (See Enclosure 7, Footnote 2)
	EIO Transmitters	1.5% Solution
Limitorque	Valve Operations	1.5% Solution
States	Terminal Blocks	No Test (See Enclosure 10)
	Vent Fan Splices	No Test (See Enclosure 9 and SCEWS)
Allison Controls	Temperature Sensor	No Test but inbedded in stainless steel tube. Chemical spray should not cause a problem.

The only types of equipment which do not have a complete test for chemical spray are the Joy fans, Conax penetrations, Hoffman junction boxes, Foxboro transmitters, vent fan splices and States terminal blocks. The concerns on Joy vent fans, Conax penetrations, and Foxboro transmitters are addressed in Enclosure 7 of attachment 2. The vent fan splices are addressed in Enclosure 9. The terminal blocks are coated with RTV and are not considered a problem as discussed in Enclosure 10. The Hoffman junction boxes serve only to protect the terminal blocks. It should also be noted that the manufacturer of the Joy vent fans has addressed corrosion effects and has indicated there would be no problem in a 10% caustic solution.

The Fort Calhoun spray system is initially an acid solution and becomes buffered upon recirculation. The acid and basic solution are mild, with no problem expected."

With respect to radiation values inside primary containment, the Licensee stated [5]:

"The District determined radiation levels for containment using the method provided in Appendix B of the DOR Guidelines. This served as the basis for the values supplied in Enclosure 11 of attachment 2. The calculations have been included in Enclosure 11. The 3×10^6 R was also the original design basis level used in the FSAR. The SCEWS have been updated to reflect this calculated radiation level.

Normal plant background radiation for equipment was assumed to be the FSAR value of 1R/Hour for 40 years or 3.5×10^5 R. This was not considered to be insignificant compared to the 10^6 to 10^7 R accident doses.

As required by Bulletin 79-01B specific calculations were made for submergence. For these a plant specific geometry was established and the code, 'ISOSHL'D' was run using the NUREG 0588 source terms. These calculations are presently being reviewed to verify all assumptions and values."

A-7

FIGURE No. 1

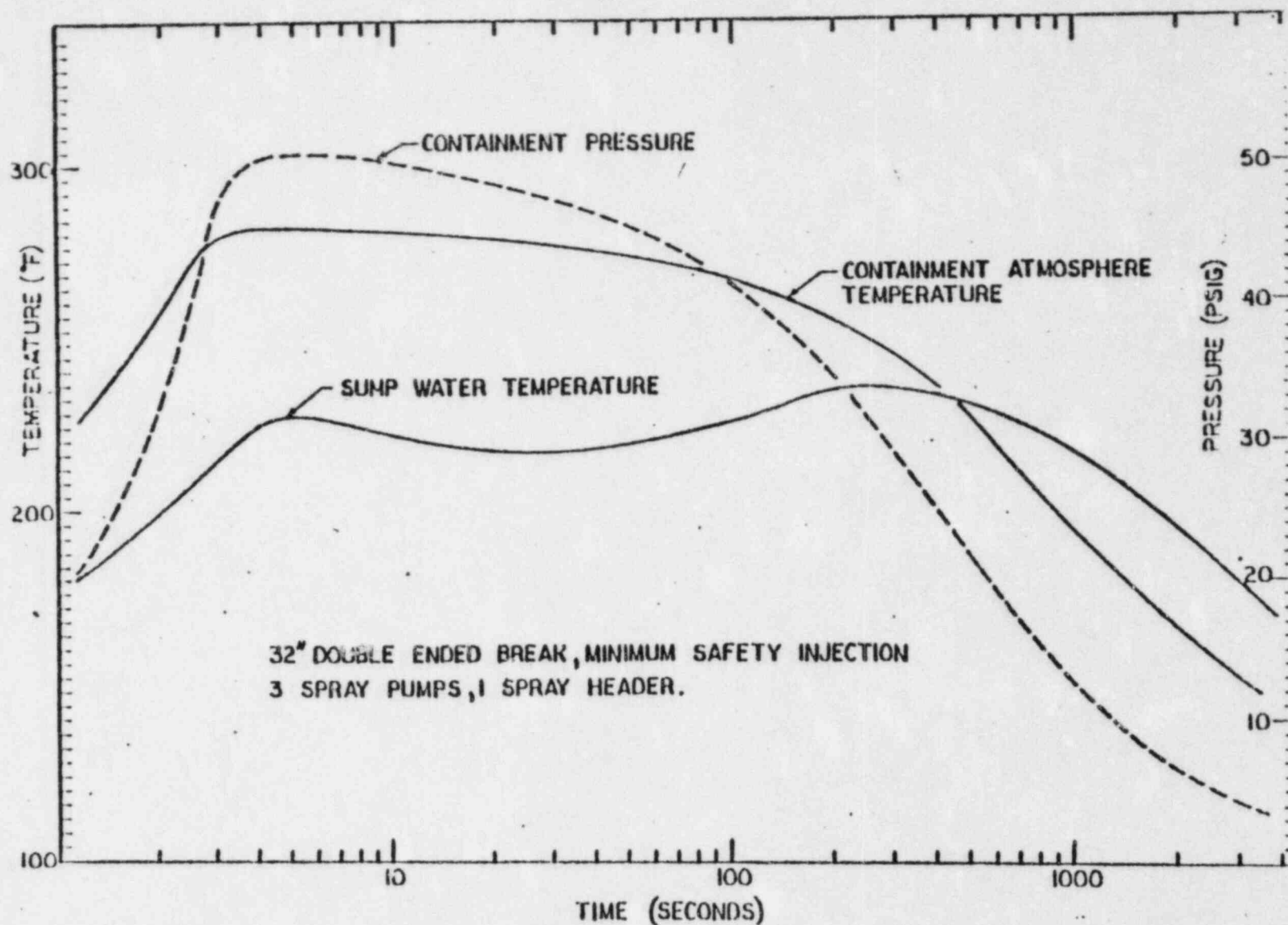


Figure A-1. Containment Temperatures Following LOCA (Licensee Figure 1) [5]

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FIGURE SUPPLIED
BY THE LICENSEE

FIGURE SUPPLIED
BY THE LICENSEE

FIGURE No. 2

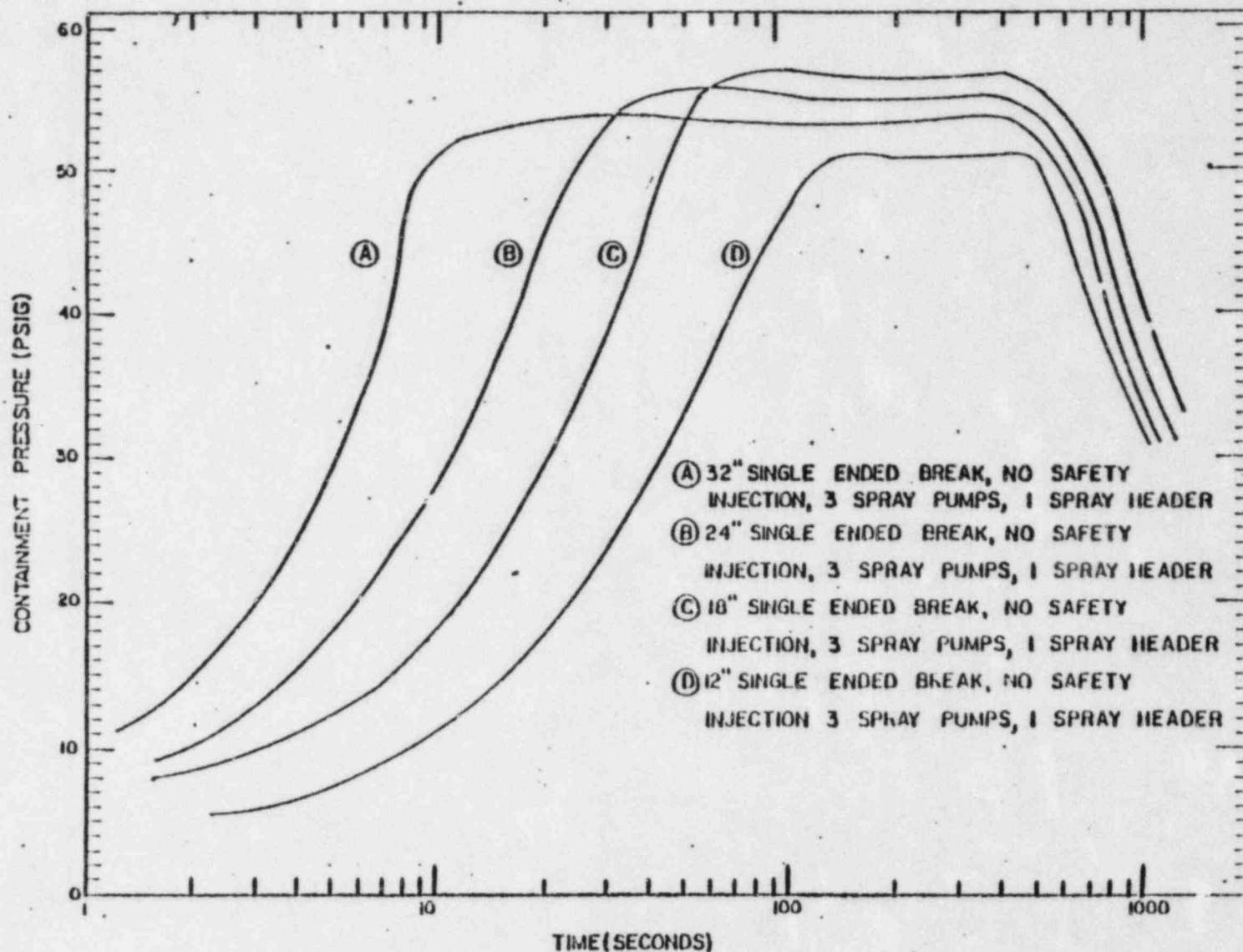


FIGURE II-1B
FORT CALHOUN CYCLE IV
1.0 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG
PRESSURE IN CENTER HOT ASSEMBLY NODE

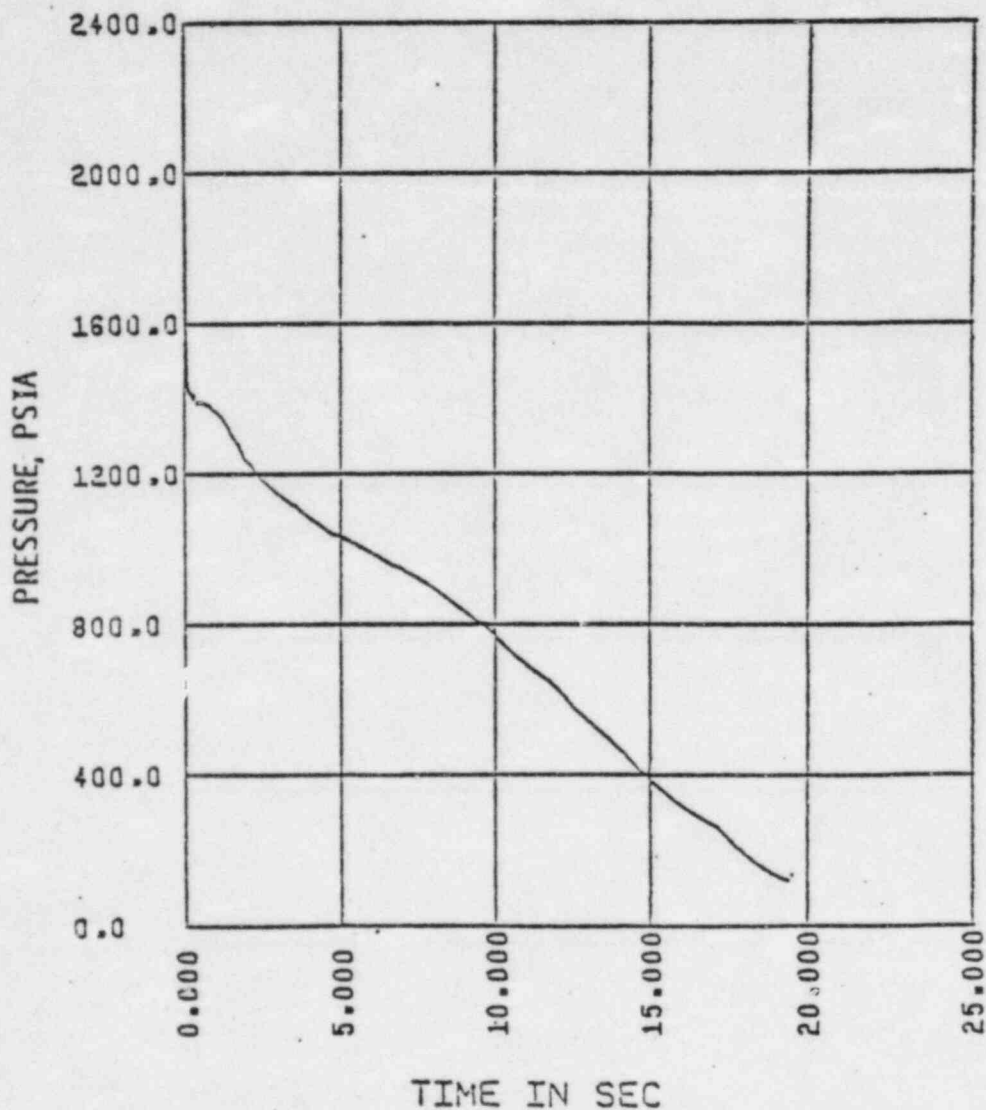


Figure A-3. Fort Calhoun Cycle IV, 1.0 x Double Ended Slot Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-1B) [5]

FIGURE SUPPLIED
BY THE LICENSEE

FIGURE II-1F
FORT CALHOUN CYCLE IV
1.0 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG
CONTAINMENT PRESSURE

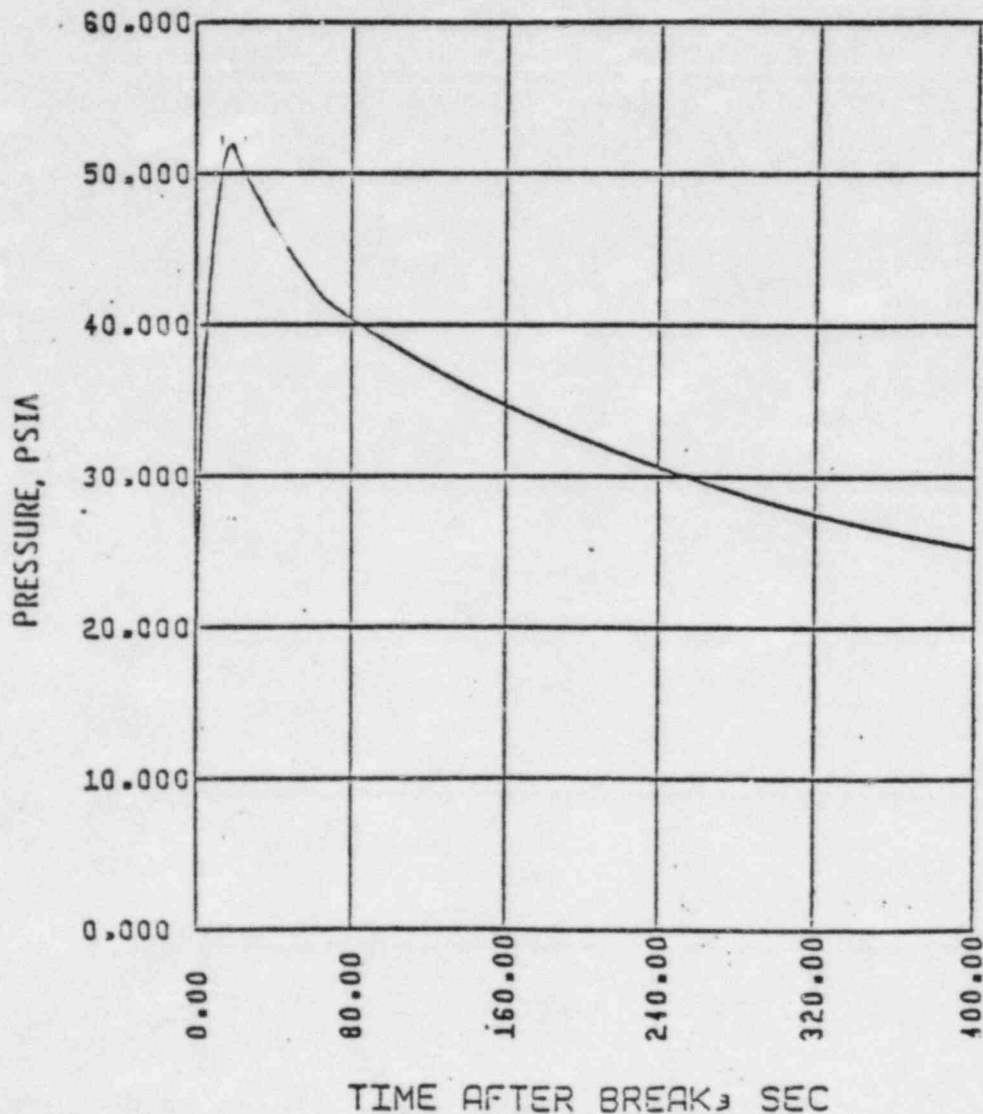


Figure A-4. Fort Calhoun Cycle IV, 1.0 x Double Ended Slot Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-1F) [5]

FIGURE II-3B
FORT CALHOUN CYCLE IV
0.6 x DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG
PRESSURE IN CENTER HOT ASSEMBLY NODE

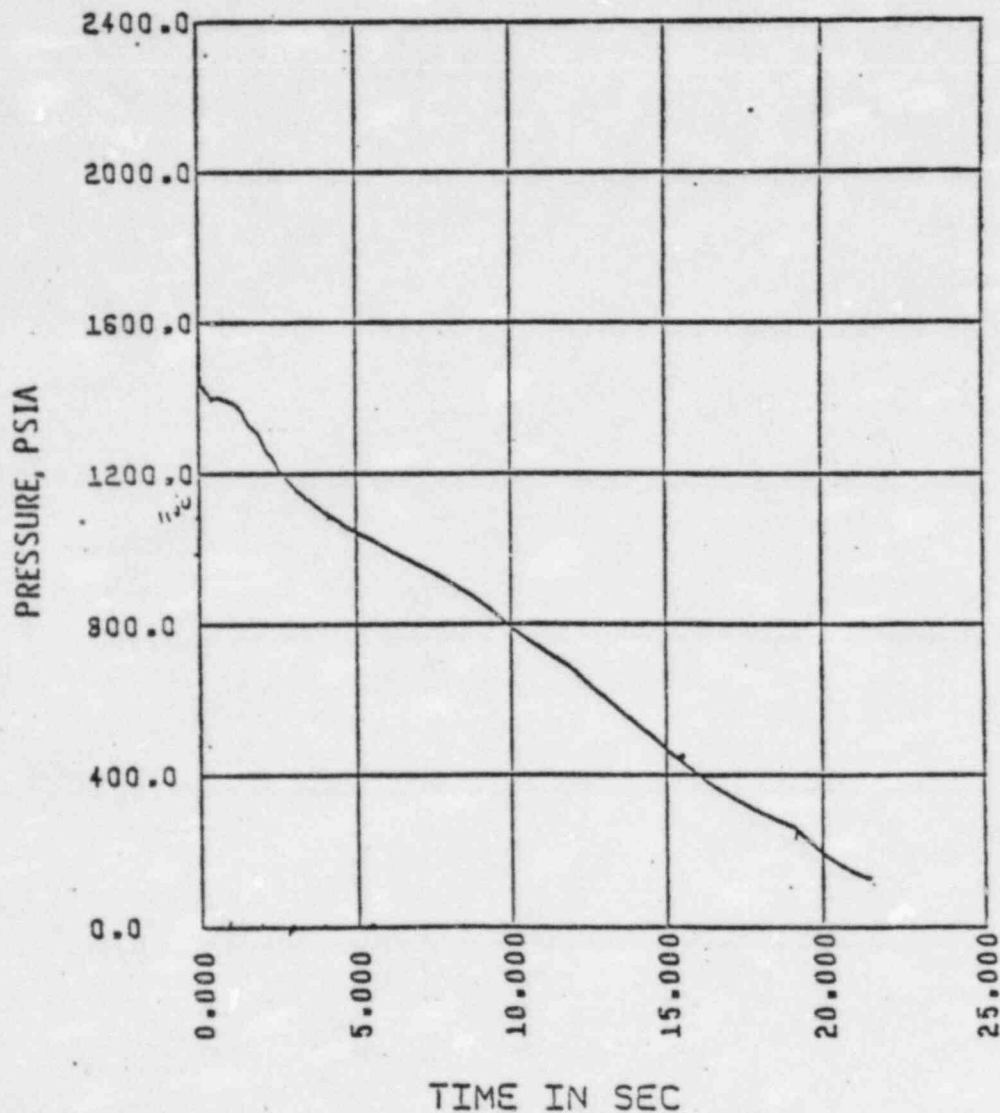


Figure A-5. Fort Calhoun Cycle IV, 0.6 x Double Ended Slot Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-3B) [5]

FIGURE SUPPLIED
BY THE LICENSEE

FIGURE II-3F
FORT CALHOUN CYCLE IV
0.6 X DOUBLE ENDED SLOT BREAK IN PUMP DISCHARGE LEG
CONTAINMENT PRESSURE

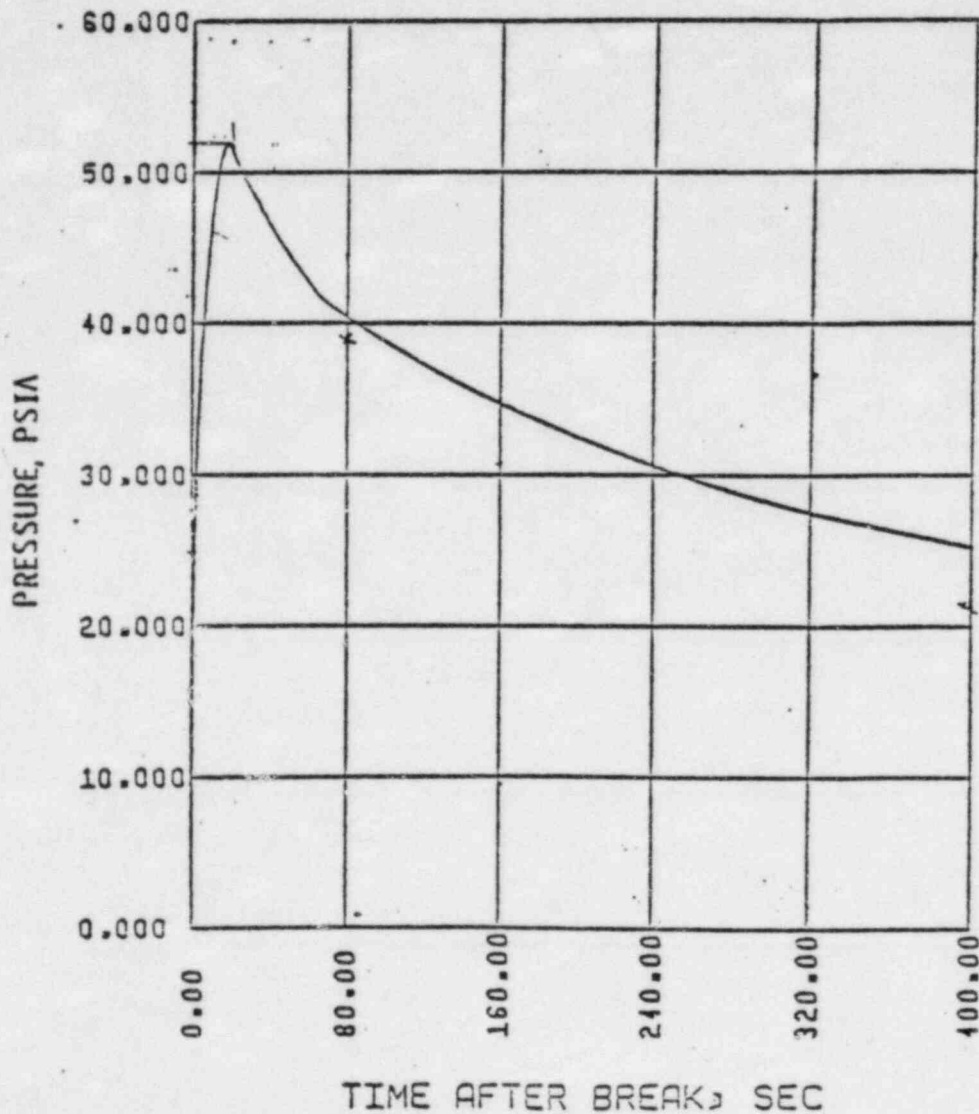


Figure A-6. Fort Calhoun Cycle IV, 0.6 x Double Ended Slot Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-3F) [5]

FIGURE II-4B
FORT CALHOUN CYCLE IV
1.0 x DOUBLE ENDED GUILLOTINE BREAK IN PUMP DISCHARGE LEG
PRESSURE IN CENTER HOT ASSEMBLY NODE

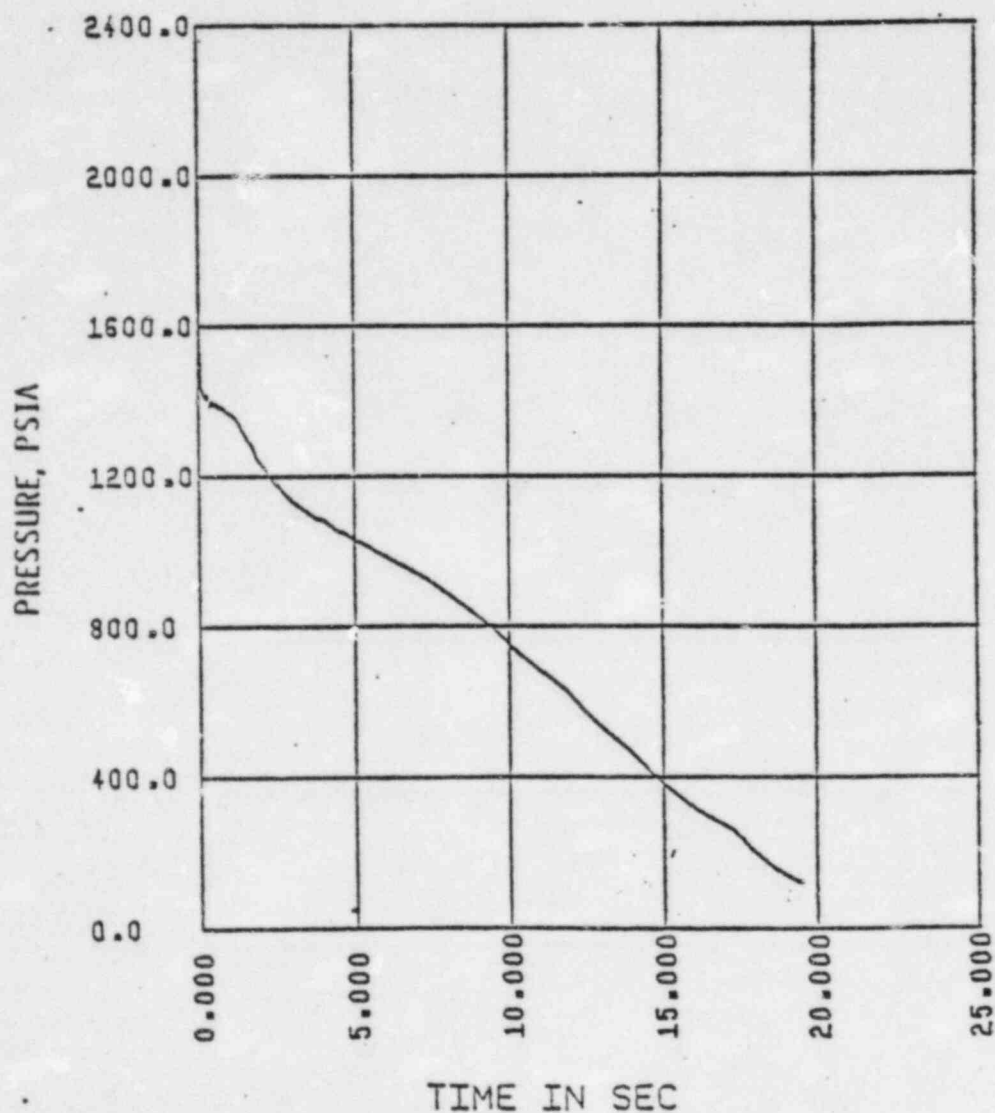


Figure A-7. Fort Calhoun Cycle IV, 1.0 x Double Ended Guillotine Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-4B) [5]

FIGURE SUPPLIED
BY THE LICENSEE

FIGURE II-4F
FORT CALHOUN CYCLE IV
1.0 x DOUBLE ENDED GUILLOTINE BREAK IN PUMP DISCHARGE LEG
CONTAINMENT PRESSURE

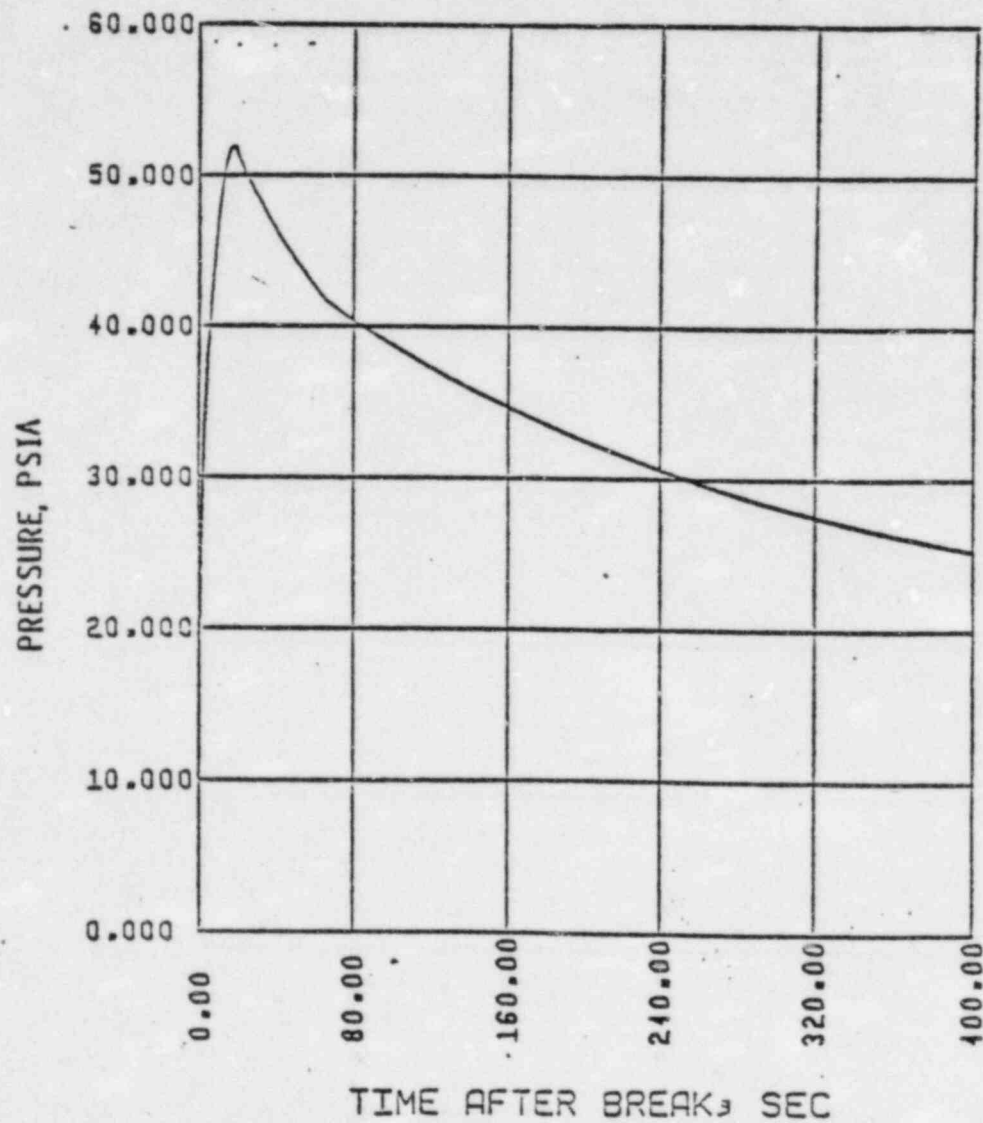


Figure A-8. Fort Calhoun Cycle IV, 1.0 x Double Ended Guillotine Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-4F) [5]

FIGURE II-6B
FORT CALHOUN CYCLE IV
0.6 x DOUBLE ENDED GUILLOTINE BREAK IN PUMP DISCHARGE LEG
PRESSURE IN CENTER HOT ASSEMBLY NODE

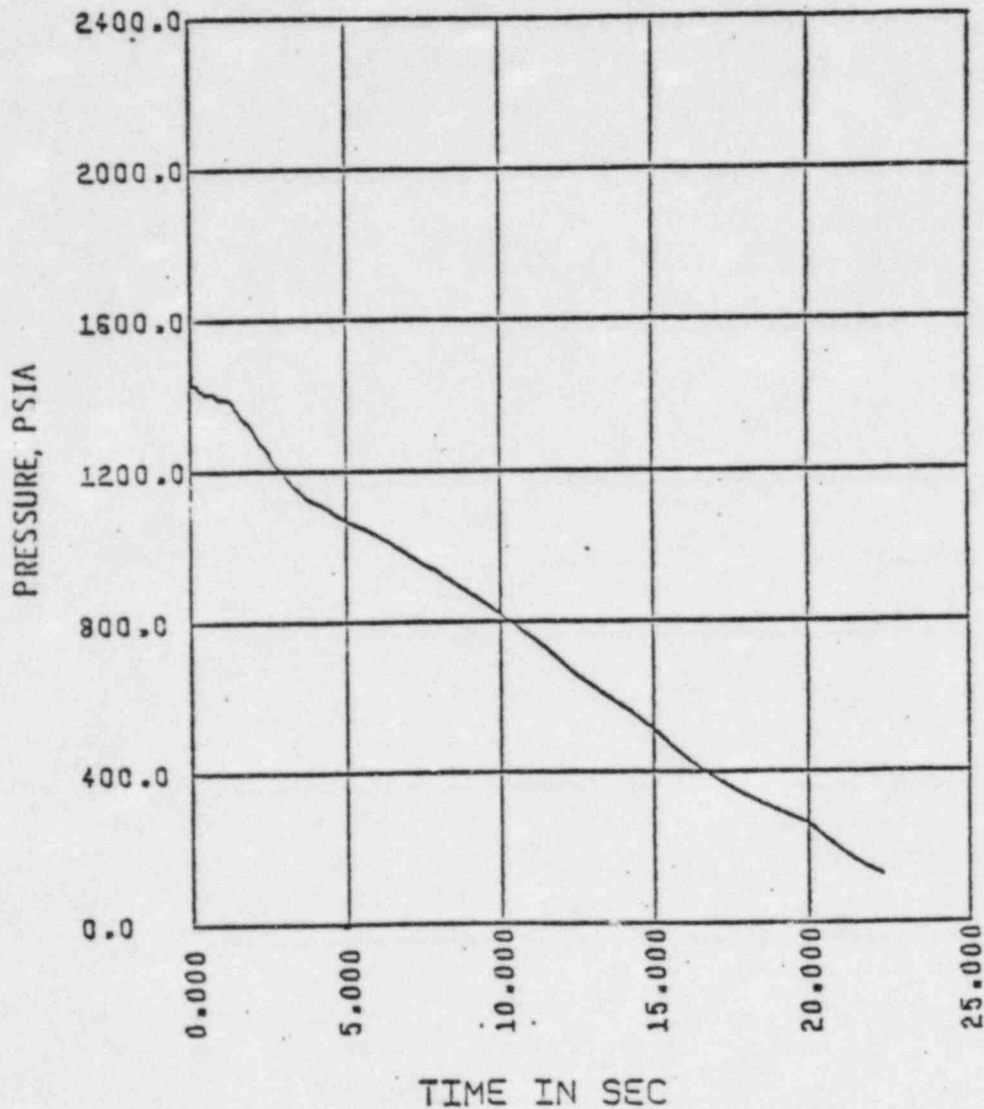


Figure A-9. Fort Calhoun Cycle IV, 0.6 x Double Ended Guillotine Break in Pump Discharge Leg, Pressure in Center Hot Assembly Node (Licensee Figure II-6B) [5]

FIGURE II-6F
FORT CALHOUN CYCLE IV
0.6 x DOUBLE ENDED GUILLOTINE BREAK IN PUMP DISCHARGE LEG
CONTAINMENT PRESSURE

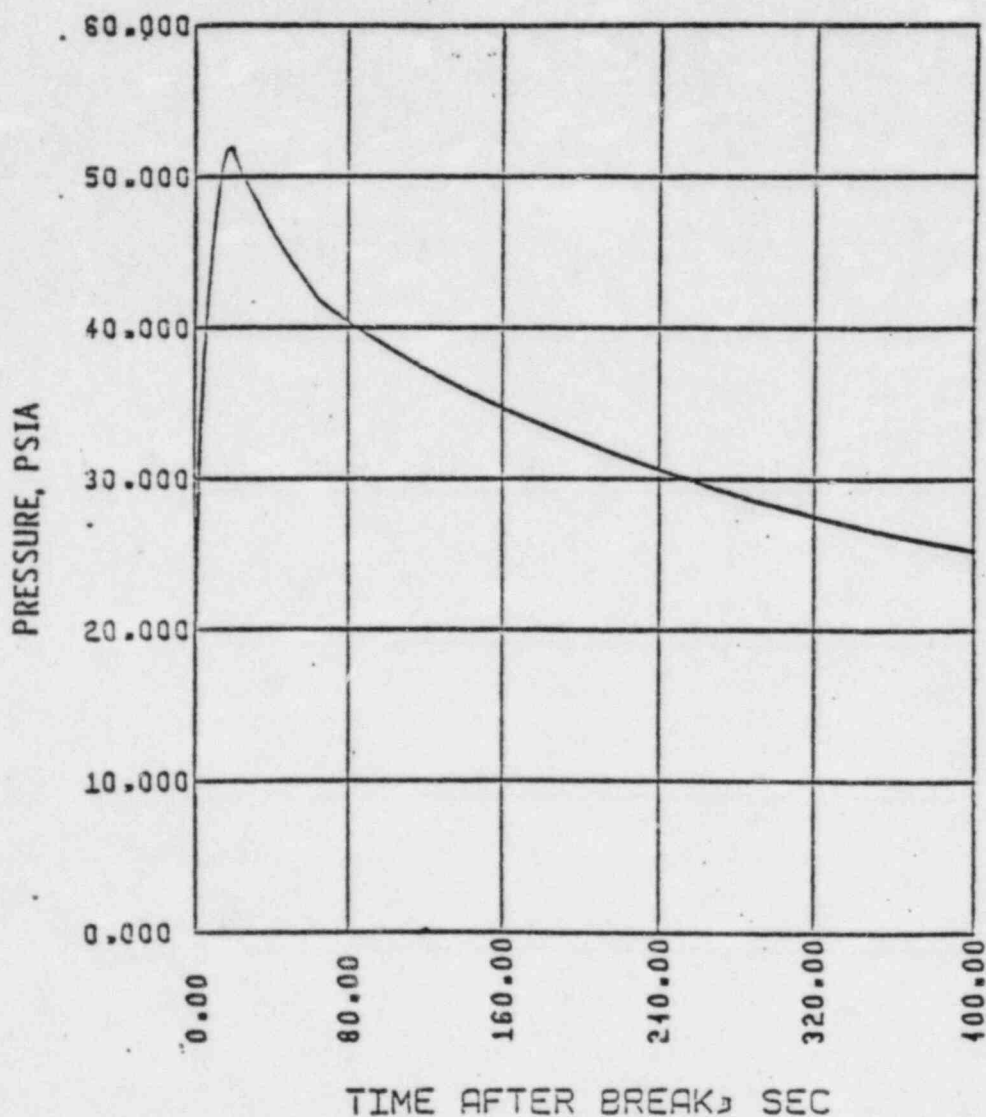


Figure A-10. Fort Calhoun Cycle IV, 0.6 x Double Ended Guillotine Break in Pump Discharge Leg, Containment Pressure (Licensee Figure II-6F) [5]

A-17

FIGURE SUPPLIED
BY THE LICENSEE

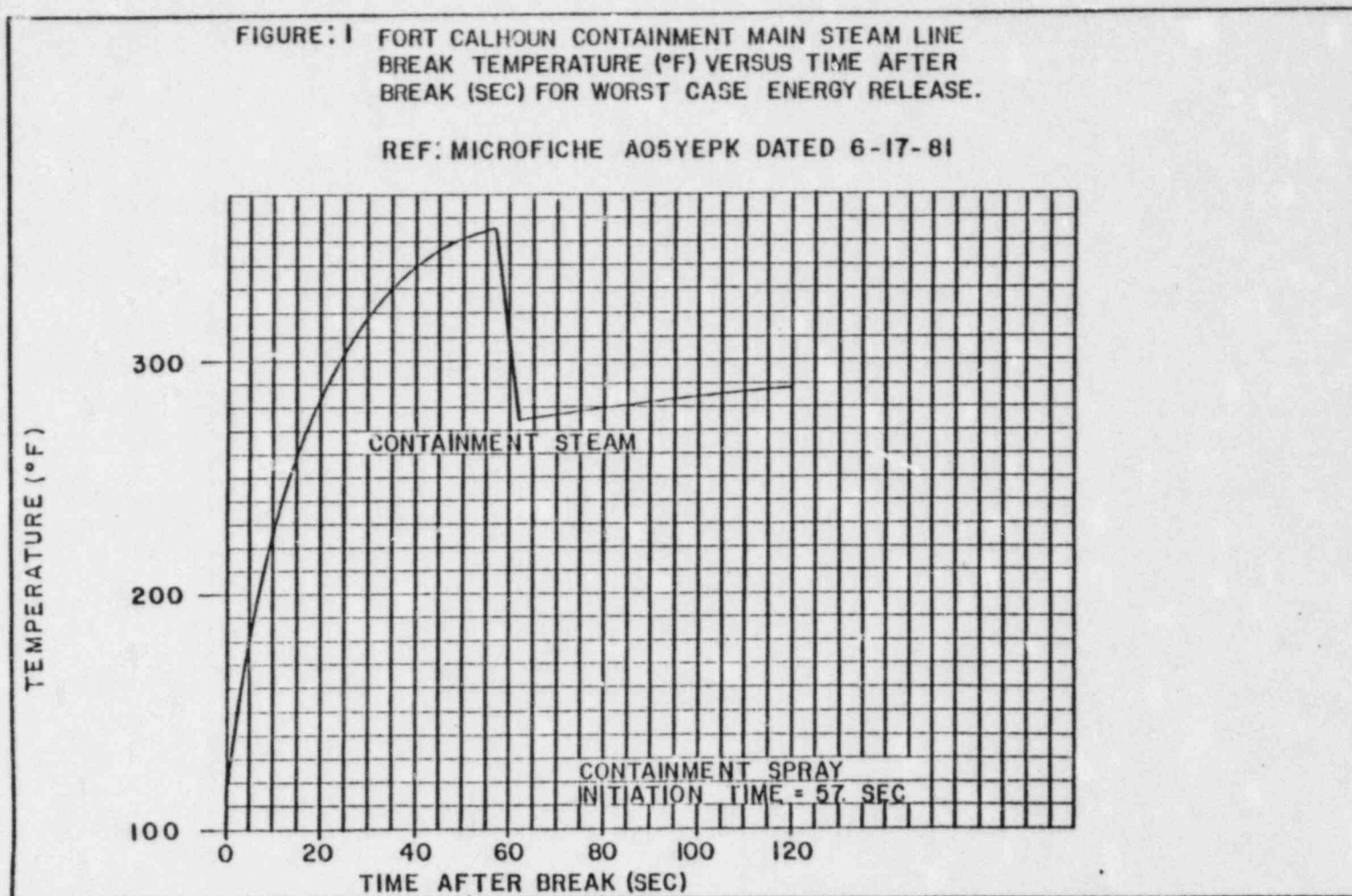


Figure A-11. Fort Calhoun Containment Main Steam Line Break Temperature (°F) Versus Time After Break (Sec) for Worst Case Energy Release [6]

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APPENDIX B - LISTING OF SAFETY-RELATED ELECTRICAL EQUIPMENT

The following table lists the groupings of safety-related electrical equipment items for the Fort Calhoun Station. Equipment items provided in the table are used in the detailed equipment environmental qualification evaluation presented in Section 4.4 and summarized in Section 4.2. This table was generated from the lists of equipment provided by the Licensee [1, 3, 5, 35, 36, 42].

The Licensee identified an extensive list of safety-related electrical equipment in various locations of the plant. The equipment listed by the Licensee was analyzed, and all identical equipment located within plant areas that are exposed to the same environmental service conditions was grouped together and designated an "equipment item." In this report, the term "equipment item" refers to a specific type of electrical equipment, designated by manufacturer and model, which is representative of all identical equipment in a plant area exposed to the same environmental service conditions (e.g., Flow Transmitter, Fischer & Porter, Model 10B2496, located within containment). This analysis resulted in a reduced listing of equipment (equipment items) that formed the basis for the review. This appendix contains the tabulation of the equipment items, locations, function, plant identification numbers, required operating time, and applicable qualification documentation references.

EQUIPMENT ITEM NO. 1
FLOW TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL E13DH
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 1
LICENSEE REFERENCE(S): 2115, 919, 1157, 711, 26, 27, 7
FUNCTION (PLANT ID): HPSI FLOW INDICATION (FT 313, FT 316, FT 319, FT 322)
LICENSEE SUBMITTAL: SCEW(S): C-0

EQUIPMENT ITEM NO. 2
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL E11GM
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 2
LICENSEE REFERENCE(S): 2115, 919, 1157, 26, 7
FUNCTION (PLANT ID): PRESSURIZER PRESSURE TRANSMITTER (PT-102 A, B, C, D;
PT-103-X; PT-103-Y)
LICENSEE SUBMITTAL: SCEW(S): C-21, -22
FUNCTION (PLANT ID): STEAM GENERATOR PRESSURE TRANSMITTERS (PT-902 A, B, C,
D; PT-905 A, B, C, D)
LICENSEE SUBMITTAL: SCEW(S): C-20

EQUIPMENT ITEM NO. 3
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL NE13AH
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 3
LICENSEE REFERENCE(S): 1157, 919, 1171
FUNCTION (PLANT ID): PRESSURIZER LEVEL (101X & Y)
LICENSEE SUBMITTAL: SCEW(S): C-35A

EQUIPMENT ITEM NO. 4
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT
FOXBORO MODEL NE13DM, NE13DH
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 4
LICENSEE REFERENCE(S): 1171, 1157, 919, 7
FUNCTION (PLANT ID): STEAM GENERATOR LEVEL INDICATION (LT-901 A, B, C, D;
LT-904 A, B, C, D)
LICENSEE SUBMITTAL: SCEW(S): C-35

EQUIPMENT ITEM NO. 5
 PRESSURE SWITCH LOCATED IN THE CONTAINMENT
 BARKSDALE MODEL D2TM15055
 REQUIRED OPERATING TIME: CONTINUOUS
 TER CHECKSHEET NO. 5
 LICENSEE REFERENCE(S): NOT CITED
 FUNCTION (PLANT ID): SIGNAL TO CLOSE IA ISOLATION VALVE ON LOW PRESSURE
 (PC-1849)
 LICENSEE SUBMITTAL: SCEW(S): C-30

EQUIPMENT ITEM NO. 6
 TEMPERATURE SENSOR LOCATED IN THE CONTAINMENT
 ALISON CONTROL MODEL AST60SS
 REQUIRED OPERATING TIME: CONTINUOUS
 TER CHECKSHEET NO. 6
 LICENSEE REFERENCE(S): NOT CITED
 FUNCTION (PLANT ID): TEMPERATURE MONITORING OF CHARCOAL FILTERS (TE-866,
 TE-867)
 LICENSEE SUBMITTAL: SCEW(S): C-16, -17, -18

EQUIPMENT ITEM NO. 7
 LIMIT SWITCH LOCATED IN THE CONTAINMENT
 NAMCO MODEL EA18011302
 REQUIRED OPERATING TIME: CONTINUOUS
 TER CHECKSHEET NO. 7
 LICENSEE REFERENCE(S): 898
 FUNCTION (PLANT ID): POSITION INDICATION FOR VALVES (VARIOUS)
 LICENSEE SUBMITTAL: SCEW(S): C-26I, L, M, N, O, P, G, H, J, K, C;
 -126, -126A, -26D, -26E, -26F)

EQUIPMENT ITEM NO. 8
 LIMIT SWITCH LOCATED IN ROOM 13
 FISHER CONTROLS MODEL 304
 REQUIRED OPERATING TIME: 1000 HOURS
 TER CHECKSHEET NO. 8
 LICENSEE REFERENCE(S): NOT CITED
 FUNCTION (PLANT ID): POSITION INDICATOR FOR WASTE DISPOSAL VALVES (HCV500A,
 B; HCV508A, B; HCV509A, B; HCV507A, B)
 LICENSEE SUBMITTAL: SCEW(S): R1-10
 FUNCTION (PLANT ID): POSITION INDICATOR FOR STEAM GENERATOR FEEDWATER &
 BLOWDOWN VALVES (HCV-1387B, HCV-1388B)
 LICENSEE SUBMITTAL: SCEW(S): R1-8
 FUNCTION (PLANT ID): POSITION INDICATOR FOR LOW PRESSURE SAFETY INJECTION
 VALVE (FCV-326, HCV-341)

EQUIPMENT ITEM NO. 8 (CONT.)

LICENSEE SUBMITTAL: SCEW(S): R1-6

FUNCTION (PLANT ID): POSITION INDICATION (HCV349, HCV350)

LICENSEE SUBMITTAL: SCEW(S): R43

FUNCTION (PLANT ID): POSITION INDICATOR FOR COMPONENT COOLING VALVES
(HCV-467B, D; HCV-438B, D)

LICENSEE SUBMITTAL: SCEW(S): R1-4

FUNCTION (PLANT ID): POSITION INDICATOR FOR CHEMICAL VOLUME CONTROL SYSTEM
VALVES (HCV-204, HCV-206)

LICENSEE SUBMITTAL: SCEW(S): R1-2

EQUIPMENT ITEM NO. 9

LIMIT SWITCH LOCATED IN ROOM 21

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 9

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): RADWASTE WATER SYSTEM VALVE POSITION INDICATION
(HCV-2808C, D; -2810C, D; -2812C, D; -2813C, D)

LICENSEE SUBMITTAL: SCEW(S): I-16

FUNCTION (PLANT ID): COMPONENT COOLING WATER VALVE POSITION INDICATION
(HCV-2808A, B; -2810A, B; -2812A, B; -2813A, B)

LICENSEE SUBMITTAL: SCEW(S): I-15

EQUIPMENT ITEM NO. 10

LIMIT SWITCH LOCATED IN ROOM 22

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 10

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): RADWASTE WATER SYSTEM VALVE POSITION INDICATION
(HCV-2809C, D; -2811C, D; -2814C, D; -2815C, D)

LICENSEE SUBMITTAL: SCEW(S): I-17

FUNCTION (PLANT ID): POSITION INDICATION FOR COMPONENT COOLING VALVES
(HCV-2809A, B; -2811A, B; -2814A, B; -2815A, B)

LICENSEE SUBMITTAL: SCEW(S): I-7

EQUIPMENT ITEM NO. 11

LIMIT SWITCH LOCATED IN ROOM 59

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 11

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): COOLANT WATER INLET VALVES TO SAFETY INJECTION TANKS
LEAKAGE COOLER (HCV-425B, D)

LICENSEE SUBMITTAL: SCEW(S): R2-2

FUNCTION (PLANT ID): NITROGEN SYSTEM ISOLATION VALVES (HCV-2603A, HCV-2604A)

LICENSEE SUBMITTAL: SCEW(S): R2-8

FUNCTION (PLANT ID): CONTAINMENT SPRAY HEADER ISOLATION VALVES (HCV-344,
HCV-345)

LICENSEE SUBMITTAL: SCEW(S): R2-6

FUNCTION (PLANT ID): CONTAINMENT HVAC ISOLATION VALVES (HCV-742A, B, C, D)

LICENSEE SUBMITTAL: SCEW(S): R2-4

EQUIPMENT ITEM NO. 12

LIMIT SWITCH LOCATED IN ROOM 60

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 12

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): CONTAINMENT HVAC ISOLATION VALVES (PCV-742F, H; HCV-746B)

LICENSEE SUBMITTAL: SCEW(S): R3-2

EQUIPMENT ITEM NO. 13

LIMIT SWITCH LOCATED IN ROOM 69

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 13

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): POSITION INDICATION FOR COMPONENT COOLING OUTLET VALVES
TO CONTAINMENT AIR COOLING UNIT (HCV-400C, -401C, -402C,
-403C)

LICENSEE SUBMITTAL: SCEW(S): R4-4

FUNCTION (PLANT ID): DEMINERALIZED WATER ISOLATION VALVE POSITION INDICATION
(HCV-1559A, B; HCV-1560A, B)

LICENSEE SUBMITTAL: SCEW(S): R4-8

FUNCTION (PLANT ID): INSTRUMENT AIR ISOLATION VALVE POSITION INDICATION
(PCV-1849)

LICENSEE SUBMITTAL: SCEW(S): R4-10

FUNCTION (PLANT ID): PLANT AIR ISOLATION VALVE POSITION INDICATION (HCV-1749)

LICENSEE SUBMITTAL: SCEW(S): R4-12

EQUIPMENT ITEM NO. 14

LIMIT SWITCH LOCATED IN ROOM 81

FISHER CONTROLS MODEL 304

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 14

LICENSEE REFERENCE(S): NOT CITED

FUNCTION (PLANT ID): CCW INLET & DISCHARGE VALVE POSITION INDICATION
(HCV-2898A, B; HCV-2899A, B)

LICENSEE SUBMITTAL: SCEW(S): S-1

FUNCTION (PLANT ID): MAIN STEAM SAFETY RELIEF VALVE POSITION INDICATION
(MS-291, 292)

LICENSEE SUBMITTAL: SCEW(S): S-13

FUNCTION (PLANT ID): RAW WATER VALVE POSITION INDICATION (HCV-2898C, D;
-2899C, D)

LICENSEE SUBMITTAL: SCEW(S): S-15

EQUIPMENT ITEM NO. 15

LIMIT SWITCH LOCATED IN ROOM 69

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 15

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): COMPONENT COOLING WATER TO CONTAINMENT AIR COOLING UNITS
VALVE ACTUATORS POSITION INDICATION (HCV-400A-D;
-401A-D; -402A-D; -403A-D)

LICENSEE SUBMITTAL: SCEW(S): R4-3

FUNCTION (PLANT ID): RAW WATER INLET VALVES TO CONTAINMENT AIR COOLERS
POSITION INDICATION (HCV-400E, F; -401E, F; -402E, F;
-403E, F)

LICENSEE SUBMITTAL: SCEW(S): R4-14

EQUIPMENT ITEM NO. 16

LIMIT SWITCH LOCATED IN ROOM 21

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 16

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): SAFETY INJECTION RADWASTE TREATMENT DISCHARGE VALVE
POSITION INDICATION (HCV-383-1, -383-2)

LICENSEE SUBMITTAL: SCEW(S): I-14

EQUIPMENT ITEM NO. 17
 LIMIT SWITCH LOCATED IN ROOM 21
 NAMCO MODEL EA180
 REQUIRED OPERATING TIME: 1000 HOURS
 TER CHECKSHEET NO. 17
 LICENSEE REFERENCE(S): 898
 FUNCTION (PLANT ID): SAFETY INJECTION PUMP ISOLATION VALVE POSITION
 INDICATION (HCV-2917, -2927)
 LICENSEE SUBMITTAL: SCEW(S): I-5

EQUIPMENT ITEM NO. 18
 LIMIT SWITCH LOCATED IN ROOM 22
 NAMCO MODEL EA180
 REQUIRED OPERATING TIME: 1000 HOURS
 TER CHECKSHEET NO. 18
 LICENSEE REFERENCE(S): 898
 FUNCTION (PLANT ID): SAFETY INJECTION PUMP ISOLATION VALVE POSITION
 INDICATION (HCV-2907, -2908)
 LICENSEE SUBMITTAL: SCEW(S): I-6

EQUIPMENT ITEM NO. 19
 LIMIT SWITCH LOCATED IN ROOM 13
 NAMCO MODEL EA180
 REQUIRED OPERATING TIME: 1000 HOURS
 TER CHECKSHEET NO. 19
 LICENSEE REFERENCE(S): 898
 FUNCTION (PLANT ID): SAFETY INJECTION ISOLATION VALVE POSITION INDICATION
 (HCV-306, -307)
 LICENSEE SUBMITTAL: SCEW(S): RI-15

EQUIPMENT ITEM NO. 20
 LIMIT SWITCH LOCATED IN ROOM 21
 NAMCO MODEL D2400X
 REQUIRED OPERATING TIME: 1000 HOURS
 TER CHECKSHEET NO. 20
 LICENSEE REFERENCE(S): 12
 FUNCTION (PLANT ID): HPSI PUMP DISCHARGE HEADER ISOLATION VALVE POSITION
 INDICATION (HCV-304, -305)
 LICENSEE SUBMITTAL: SCEW(S): I-13

EQUIPMENT ITEM NO. 21

LIMIT SWITCH LOCATED IN ROOM 60

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 21

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): SAMPLING SYSTEM ISOLATION VALVE POSITION INDICATION
(HCV-2504B, -2506B, -2507B)

LICENSEE SUBMITTAL: SCEW(S): R3-4

EQUIPMENT ITEM NO. 22

LIMIT SWITCH LOCATED IN THE CONTAINMENT

NAMCO MODEL EA180

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 22

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): VALVE POSITION INDICATION (PCV-742A)

LICENSEE SUBMITTAL: SCEW(S): C-33

EQUIPMENT ITEM NO. 23

LIMIT SWITCH LOCATED IN THE CONTAINMENT

NAMCO MODEL EA180

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 23

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): VALVE POSITION INDICATION (PCV-742A, B; HCV-725A, B)

LICENSEE SUBMITTAL: SCEW(S): C-31

EQUIPMENT ITEM NO. 24

LIMIT SWITCH LOCATED IN ROOM 69

NAMCO MODEL EA180

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 24

LICENSEE REFERENCE(S): 898

FUNCTION (PLANT ID): CONTAINMENT PURGE ISOLATION VALVE POSITION INDICATION
(PCV-742B, -742)

LICENSEE SUBMITTAL: SCEW(S): R4-6

EQUIPMENT ITEM NO. 25
LIMIT SWITCH LOCATED IN ROOM 21
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 25
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): SAFETY INJECTION ISOLATION VALVE POSITION INDICATION
(HCV-2947, -2948)
LICENSEE SUBMITTAL: SCEW(S): I-12
FUNCTION (PLANT ID): SAFETY INJECTION DISCHARGE LINE ISOLATION VALVE POSITION
INDICATION (HCV-2918, -2928)
LICENSEE SUBMITTAL: SCEW(S): I-11

EQUIPMENT ITEM NO. 26
LIMIT SWITCH LOCATED IN ROOM 22
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 26
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): LPSI ISOLATION VALVE POSITION INDICATION (HCV-2937,
-2938, -2967, -2968, -2977, -2978)
LICENSEE SUBMITTAL: SCEW(S): I-10
FUNCTION (PLANT ID): CONTAINMENT SPRAY PUMP ISOLATION VALVE POSITION
INDICATION (HCV-2957 & -2958)
LICENSEE SUBMITTAL: SCEW(S): I-8, -9

EQUIPMENT ITEM NO. 27
LIMIT SWITCH LOCATED IN ROOM 59
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 27
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): HYDROGEN CONTAINMENT SAMPLING VALVE POSITION INDICATION
(HCV-883A, -884A)
LICENSEE SUBMITTAL: SCEW(S): R7-2

EQUIPMENT ITEM NO. 28
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM AND FEEDWATER PENETRATION
ROOM (ROOM 81)
LIMITORQUE MODEL SMB
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 28
LICENSEE REFERENCE(S): 663
FUNCTION (PLANT ID): ACTUATES FEEDWATER INLET VALVE TO STEAM GENERATOR
(HCV-1385, -1386)
LICENSEE SUBMITTAL: SCEW(S): S-9

EQUIPMENT ITEM NO. 29
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM AND FEEDWATER PENETRATION ROOM (ROOM 81)
LIMITORQUE MODEL SMB
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 29
LICENSEE REFERENCE(S): 1590, 662
FUNCTION (PLANT ID): ACTUATES FEEDWATER INLET VALVE TO STEAM GENERATOR (HCV-1384)
LICENSEE SUBMITTAL: SCEW(S): S-16

EQUIPMENT ITEM NO. 30
SOLENOID VALVE LOCATED IN ROOM 59
VALCOR MODEL V52660529568
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 30
LICENSEE REFERENCE(S): 1835
FUNCTION (PLANT ID): HYDROGEN ANALYZER ISOLATION VALVES (HCV-820A, -821A, -883B, -884B)
LICENSEE SUBMITTAL: SCEW(S): R7-1

EQUIPMENT ITEM NO. 31
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM AND FEEDWATER PENETRATION ROOM (ROOM 81)
LIMITORQUE MODEL SMB000
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 31
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): MAIN STEAM REMOTE OPERATED SAFETY VALVE (HCV-1041C, HCV-1042C)
LICENSEE SUBMITTAL: SCEW(S): S20

EQUIPMENT ITEM NO. 32
MOTORIZED VALVE ACTUATOR LOCATED IN ROOM 13
LIMITORQUE MODEL SMB000
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 32
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): ACTUATES CHARGING SYSTEM INLET VALVE TO HPSI HEADER (HCV-308)
LICENSEE SUBMITTAL: SCEW(S): R1-11

EQUIPMENT ITEM NO. 33
MOTORIZED VALVE ACTUATOR LOCATED IN ROOM 13
LIMITORQUE MODEL SMB2
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 33
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): ACTUATES SHUTDOWN COOLING LINE ISOLATION VALVE (HCV-347)
LICENSEE SUBMITTAL: SCEW(S): R1-12

EQUIPMENT ITEM NO. 34
MOTORIZED VALVE ACTUATOR LOCATED OUTSIDE CONTAINMENT
LIMITORQUE MODEL SMBO
REQUIRED OPERATING TIME: 21 MINUTES
TER CHECKSHEET NO. 34
LICENSEE REFERENCE(S): 662
FUNCTION (PLANT ID): CONTAINMENT SUMP RECIRCULATION TO HPSI, LPSI, &
CONTAINMENT SPRAY (HCV-383-3, -383-4)
LICENSEE SUBMITTAL: SCEW(S): C-15

EQUIPMENT ITEM NO. 35
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMBO
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 35
LICENSEE REFERENCE(S): 162, 662
FUNCTION (PLANT ID): ACTUATES HIGH PRESSURE INJECTION VALVES (HCV-311, -312,
-314, -315, -317, -318, -320, -321)
LICENSEE SUBMITTAL: SCEW(S): C-100

EQUIPMENT ITEM NO. 36
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMBO
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 36
LICENSEE REFERENCE(S): 1590, 662
FUNCTION (PLANT ID): OPEN ON SAFETY INJECTION ACTUATION SIGNAL FOR HPSI TO
LOOPS (HCV-2914, -2934, -2954, -2974)
LICENSEE SUBMITTAL: SCEW(S): C-14

EQUIPMENT ITEM NO. 37
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT
LIMITORQUE MODEL SMBO
REQUIRED OPERATING TIME: 10-12 SECONDS
TER CHECKSHEET NO. 37
LICENSEE REFERENCE(S): 1590, 662

EQUIPMENT ITEM NO. 37 (CONT.)

FUNCTION (PLANT ID): OPEN ON SAFETY INJECTION ACTUATION SIGNAL FOR LPSI TO
LOOPS (HCV-327, -329, -331, -333)

LICENSEE SUBMITTAL: SCEW(S): C-1

EQUIPMENT ITEM NO. 38

MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT

LIMITORQUE MODEL SMB00

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 38

LICENSEE REFERENCE(S): 662

FUNCTION (PLANT ID): PORV ISOLATION (HCV-150, HCV-151)

LICENSEE SUBMITTAL: SCEW(S): C-150

EQUIPMENT ITEM NO. 39

MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT

LIMITORQUE MODEL SMB3

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 39

LICENSEE REFERENCE(S): 662, 590, 662

FUNCTION (PLANT ID): SHUTDOWN COOLING LINE ISOLATION (HCV-348)

LICENSEE SUBMITTAL: SCEW(S): C-2

EQUIPMENT ITEM NO. 40

MOTORIZED VALVE ACTUATOR LOCATED IN ROOM 7

LIMITORQUE MODEL SMB3

REQUIRED OPERATING TIME: 1000 HOURS

TER CHECKSHEET NO. 40

LICENSEE REFERENCE(S): 662

FUNCTION (PLANT ID): ACTUATES VOLUME CONTROL TANK DISCHARGE VALVE (LCV-218-3)

LICENSEE SUBMITTAL: SCEW(S): R5-1

EQUIPMENT ITEM NO. 41

ELECTRIC MOTOR LOCATED IN ROOMS 21 & 22

GENERAL ELECTRIC MODEL 5K818837A38

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 41

LICENSEE REFERENCE(S): 29, 11, 30

FUNCTION (PLANT ID): DRIVES LOW PRESSURE SAFETY INJECTION PUMP 1A (SI-1A,
SI-1B)

LICENSEE SUBMITTAL: SCEW(S): I-1

EQUIPMENT ITEM NO. 42
ELECTRIC MOTOR LOCATED IN ROOMS 21 & 22
GENERAL ELECTRIC MODEL 5K815524A51
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 42
LICENSEE REFERENCE(S): 29, 11, 30
FUNCTION (PLANT ID): DRIVES HIGH PRESSURE SAFETY INJECTION PUMPS (SI-2A,
SI-2B, SI-2C)
LICENSEE SUBMITTAL: SCEW(S): I-3

EQUIPMENT ITEM NO. 43
ELECTRIC MOTOR LOCATED IN ROOMS 21 & 22
GENERAL ELECTRIC MODEL 5K815526A35
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 43
LICENSEE REFERENCE(S): 11, 30, 29
FUNCTION (PLANT ID): DRIVES CONTAINMENT SPRAY PUMPS (SI-3A, SI-3B, SI-3C)
LICENSEE SUBMITTAL: SCEW(S): I-4

EQUIPMENT ITEM NO. 44
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT
RELIANCE ELECTRIC MODEL 60301200
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 44
LICENSEE REFERENCE(S): 3367
FUNCTION (PLANT ID): DRIVES CONTAINMENT VENTILATION FANS (VA-3A, -3B)
LICENSEE SUBMITTAL: SCEW(S): C-19

EQUIPMENT ITEM NO. 45
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT
RELIANCE ELECTRIC MODEL 483920MM
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 45
LICENSEE REFERENCE(S): 3367
FUNCTION (PLANT ID): DRIVES CONTAINMENT COOLING FAN (NA-7C & -7D)
LICENSEE SUBMITTAL: SCEW(S): C-32

EQUIPMENT ITEM NO. 46
ELECTRIC MOTOR LOCATED IN ROOM 81
TRANE MODEL SCMZ304
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 46
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): DRIVES CONTROL ROOM AIR CONDITIONING UNIT BLOWER
(VA-46A, -46B)
LICENSEE SUBMITTAL: SCEW(S): S-4

EQUIPMENT ITEM NO. 47
ELECTRIC MOTOR LOCATED IN ROOM 81
ILG INDUSTRIES MODEL 20P CENT FAN
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 47
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): CONTROL ROOM FRESH AIR INLET FAN MOTOR (VA-63)
LICENSEE SUBMITTAL: SCEW(S): S-5

EQUIPMENT ITEM NO. 48
ELECTRIC MOTOR LOCATED IN ROOM 69
ALLIS CHALMERS MODEL 030
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 48
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): COMPONENT COOLING WATER PUMP MOTOR (AC-3A, AC-3B, AC-3C)
LICENSEE SUBMITTAL: SCEW(S): R4-1

EQUIPMENT ITEM NO. 49
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A189E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 49
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HCV-2504A, HCV-2506A,
HCV-2507A)
LICENSEE SUBMITTAL: SCEW(S): C-29E

EQUIPMENT ITEM NO. 50
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8316E37E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 50
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): PILOT SOLENOIDS FOR MAIN STEAM ISOLATION VALVES
(HCV-1041A)
LICENSEE SUBMITTAL: SCEW(S): S-11

EQUIPMENT ITEM NO. 51
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8316A77E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 51
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): TEST SOLENOIDS FOR MAIN STEAM ISOLATION VALVES
(HCV-1042A)
LICENSEE SUBMITTAL: SCEW(S): S-11

EQUIPMENT ITEM NO. 52
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP831655E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 52
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATES PNEUMATIC VALVE (PCV-742A, -742C)
LICENSEE SUBMITTAL: SCEW(S): C-29A

EQUIPMENT ITEM NO. 53
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL 8320A175E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 53
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATES VALVES (HCV-883A, HCV-884A)
LICENSEE SUBMITTAL: SCEW(S): C-29C

EQUIPMENT ITEM NO. 54
SOLENOID VALVE LOCATED IN ROOM 59
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 54
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): OPERATES H2 CONTAINMENT SAMPLING VALVES (HCV883B,
HCV884B)
LICENSEE SUBMITTAL: SCEW(S): R7-1

EQUIPMENT ITEM NO. 55
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 55
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER INLET VALVES
(HCV-1107B, -1108B)
LICENSEE SUBMITTAL: SCEW(S): S-7

EQUIPMENT ITEM NO. 56
SOLENOID VALVE LOCATED IN ROOM 13
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 56
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATES LOW PRESSURE SAFETY INJECTION VALVES (FCV-326,
HCV-341)
LICENSEE SUBMITTAL: SCEW(S): R1-5

EQUIPMENT ITEM NO. 57
SOLENOID VALVE LOCATED IN ROOM 59
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 57
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATES NITROGEN SYSTEM ISOLATION VALVES (HCV-2603A,
HCV-2604A)
LICENSEE SUBMITTAL: SCEW(S): R2-7

EQUIPMENT ITEM NO. 58
SOLENOID VALVE LOCATED IN ROOM 69
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 58
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR INSTRUMENT AIR ISOLATION (PCV-1849)
LICENSEE SUBMITTAL: SCEW(S): R4-9
FUNCTION (PLANT ID): VALVE ACTUATORS FOR PLANT AIR ISOLATION (HCV-1749)
LICENSEE SUBMITTAL: SCEW(S): R4-11
FUNCTION (PLANT ID): VALVE ACTUATORS RADWASTE RAW WATER INLET TO CONTAINMENT
AIR COOLERS (HCV-400E, F; -401E, F; -402E, F; -403E, F)
LICENSEE SUBMITTAL: SCEW(S): R4-13

EQUIPMENT ITEM NO. 59
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8320A175E
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 59
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER INLET VALVES
(HCV-1107B, -1108B)
LICENSEE SUBMITTAL: SCEW(S): S-6

EQUIPMENT ITEM NO. 60
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 60
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): HPSI FLOW VALVE ACTUATION (TCV-202, HCV-241)
LICENSEE SUBMITTAL: SCEW(S): C-28C
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-425A, -425C, -467A, -467C, -746A,
-2956, -2976, -2603B, -2604B, -1387A, -1388A)
LICENSEE SUBMITTAL: SCEW(S): C-28D, E, H, J, L, N
FUNCTION (PLANT ID): VALVE ACTUATION (PCV-742E, -742G, -2909, -2949, -2969;
HCV-2929)
LICENSEE SUBMITTAL: SCEW(S): C-28F, -29D

EQUIPMENT ITEM NO. 61
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 61
LICENSEE REFERENCE(S): 649, 9
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-238, -239, -240)
LICENSEE SUBMITTAL: SCEW(S): C-128, -128A

EQUIPMENT ITEM NO. 62
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 62
LICENSEE REFERENCE(S): 649, 3392
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-545)
LICENSEE SUBMITTAL: SCEW(S): C-28A

EQUIPMENT ITEM NO. 63
SOLENOID VALVE LOCATED IN ROOM 13
ASCO MODEL WPHT831429
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 63
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): PILOT OPERATOR (HCV-349, HCV-350)
LICENSEE SUBMITTAL: SCEW(S): R42

EQUIPMENT ITEM NO. 64
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 64
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-2808C, D; -2810C, D; -2812C, D;
-2813C, D)
LICENSEE SUBMITTAL: SCEW(S): I-28

EQUIPMENT ITEM NO. 65
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 65
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): INLET & OUTLET VALVES FOR SAFETY INJECTION & SPRAY PUMP
BEARING COOLERS (HCV-2808A, B; -2810A, B; -2812A, B;
-2813A, B; -2809C, D; -2811C, D; -2814C, D; -2815C, D)
LICENSEE SUBMITTAL: SCEW(S): I-24, -26

EQUIPMENT ITEM NO. 66
SOLENOID VALVE LOCATED IN ROOM 60
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 66
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT HVAC ISOLATION
(PCV-742F, H; HCV-746B)
LICENSEE SUBMITTAL: SCEW(S): R3-1

EQUIPMENT ITEM NO. 67
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 67
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS INLET & OUTLET VALVE FOR CONTROL ROOM
AIR CONDITIONING UNITS (HCV-2898C, -2898D; HCV-2899C,
-2899D; HCV-2898A, -2898B; HCV-2899A, -2899B)
LICENSEE SUBMITTAL: SCEW(S): S-14

EQUIPMENT ITEM NO. 68
SOLENOID VALVE LOCATED IN ROOM 13
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 68
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION ISOLATION (HCV-306,
HCV-307)
LICENSEE SUBMITTAL: SCEW(S): R1-14
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CHEMICAL VOLUME CONTROL SYSTEM
(HCV-204, HCV-206)
LICENSEE SUBMITTAL: SCEW(S): R1-1
FUNCTION (PLANT ID): VALVE ACTUATORS FOR COMPONENT COOLING (HCV-467B, D;
HCV-438B, D)
LICENSEE SUBMITTAL: SCEW(S): R1-3

EQUIPMENT ITEM NO. 69
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 69
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR HPSI HEADER ISOLATION VALVES
(HCV-383-1, -383-2; HCV-304, -305)
LICENSEE SUBMITTAL: SCEW(S): I-2, -30

EQUIPMENT ITEM NO. 70
SOLENOID VALVE LOCATED IN ROOM 59
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 70
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT SPRAY HEADER ISOLATION
VALVE (HCV-344, -345)
LICENSEE SUBMITTAL: SCEW(S): R2-5
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT HVAC ISOLATION
(A/HCV-742, B/HCV-742, C/HCV-742, D/HCV-742)
LICENSEE SUBMITTAL: SCEW(S): R2-3
FUNCTION (PLANT ID): VALVE ACTUATORS FOR COMPONENT COOLING LEAKAGE (HCV-425B,
-425D)
LICENSEE SUBMITTAL: SCEW(S): R2-1

EQUIPMENT ITEM NO. 71
SOLENOID VALVE LOCATED IN ROOM 69
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 71
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR DEMINERALIZED WATER ISOLATION VALVES
(HCV-1559A, B; HCV-1560A, B)
LICENSEE SUBMITTAL: SCEW(S): R4-7
FUNCTION (PLANT ID): VALVE ACTUATORS FOR COMPONENT COOLING WATER TO
CONTAINMENT AIR COOLING UNITS (HCV-400A-D; HCV-401A-D;
HCV-402A-D; HCV-403)
LICENSEE SUBMITTAL: SCEW(S): R4-2

EQUIPMENT ITEM NO. 72
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL LB8316C44
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 72
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION INLET AND DISCHARGE
ISOLATION VALVES (HCV-2947, -2948, -2957, -2958, -2917,
-2927)
LICENSEE SUBMITTAL: SCEW(S): I-24, -23, -18

EQUIPMENT ITEM NO. 73
SOLENOID VALVE LOCATED IN ROOM 22
ASCO MODEL LB8316C44
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 73
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION INLET AND DISCHARGE
ISOLATION VALVES (HCV-2937, -2938, -2907, -2967, -2968,
-2977, -2978)
LICENSEE SUBMITTAL: SCEW(S): I-21, -20, -22

EQUIPMENT ITEM NO. 74
SOLENOID VALVE LOCATED IN ROOM 69
ASCO MODEL NP831655E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 74
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR CONTAINMENT HVAC ISOLATION
(PCV-74 2B, D)
LICENSEE SUBMITTAL: SCEW(S): R4-5

EQUIPMENT ITEM NO. 75
SOLENOID VALVE LOCATED IN ROOM 21
ASCO MODEL HT8321A5
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 75
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAFETY INJECTION DISCHARGE ISOLATION
VALVES (HCV-2918, -2928)
LICENSEE SUBMITTAL: SCEW(S): I-19

EQUIPMENT ITEM NO. 76
SOLENOID VALVE LOCATED IN ROOM 22
ASCO MODEL HT8321A5
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 76
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATOR FOR SI-2B DISCHARGE ISOLATION VALVE
(HCV-2908)
LICENSEE SUBMITTAL: SCEW(S): I-25

EQUIPMENT ITEM NO. 77
SOLENOID VALVE LOCATED IN ROOM 13
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 77
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR STEAM GENERATOR FEEDWATER AND
BLOWDOWN (HCV-1387B, HCV-1388B)
LICENSEE SUBMITTAL: SCEW(S): R1-7
FUNCTION (PLANT ID): VALVE ACTUATORS FOR WASTE DISPOSAL (HCV-500A, B; -506A,
B; -507A, B; -508A, B; -509A, B)
LICENSEE SUBMITTAL: SCEW(S): R1-9

EQUIPMENT ITEM NO. 78
SOLENOID VALVE LOCATED IN ROOM 60
ASCO MODEL NP8320A189E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 78
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR SAMPLING SYSTEM ISOLATION
(HCV-2504B, -2506B, -2507B)
LICENSEE SUBMITTAL: SCEW(S): R3-3

EQUIPMENT ITEM NO. 79
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 79
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): REMOTE OPERATION OF PNEUMATIC VALVE (HCV-742A, HCV-742B,
HCV-725A, HCV-725B)
LICENSEE SUBMITTAL: SCEW(S): C-29B

EQUIPMENT ITEM NO. 80
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: INTERMITTENT
TER CHECKSHEET NO. 80
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): MAIN STEAM SAFETY RELIEF VALVE OPERATOR (MS-291, -292)
LICENSEE SUBMITTAL: SCEW(S): C-12

EQUIPMENT ITEM NO. 81
SOLENOID VALVE LOCATED IN THE CONTAINMENT
VALCOR MODEL V70900213
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 81
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE ACTUATION (HCV-438A, -438C, -881, -882, -883A,
HCV-884A, -864, -865, -1107A, -1108A)
LICENSEE SUBMITTAL: SCEW(S): C-27

EQUIPMENT ITEM NO. 82
SOLENOID VALVE LOCATED IN THE CONTAINMENT
TARGET ROCK MODEL 80B0017
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 82
LICENSEE REFERENCE(S): 3587
FUNCTION (PLANT ID): REACTOR COOLANT SYSTEM VENT VALVES (HCV-176, -177, -178,
-179, -180, -181)
LICENSEE SUBMITTAL: SCEW(S): TMI-1

EQUIPMENT ITEM NO. 83
I AND C PANEL LOCATED IN ROOM 81
JOHNSON CONTROLS, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT REQUIRED
TER CHECKSHEET NO. 83
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): CONTROL ROOM HVAC CONTROL PANELS (AI-106A & AI-106B)
LICENSEE SUBMITTAL: SCEW(S): S-3

EQUIPMENT ITEM NO. 84
E/P TRANSDUCER LOCATED IN ROOM 13
FISHER CONTROLS MODEL 546
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 84
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): POSITION SIGNAL FOR LOW PRESSURE SAFETY INJECTION VALVE
(FCV-326, HCV-341)
LICENSEE SUBMITTAL: SCEW(S): RI-13

EQUIPMENT ITEM NO. 85
ELECTRICAL INSTRUMENT CABLE LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING
CERRO WIRE AND CABLE, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 85
LICENSEE REFERENCE(S): 2997, 21, 22, 23

EQUIPMENT ITEM NO. 85 (CONT.)

FUNCTION (PLANT ID): INSTRUMENT CABLE FOR TEMPERATURE, FLOW, & PRESSURE
INDICATION (W-57, W-59)

LICENSEE SUBMITTAL: SCEW(S): C-9

EQUIPMENT ITEM NO. 86

ELECTRICAL POWER CABLE LOCATED IN AUXILIARY BUILDING ROOM 69

CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 86

LICENSEE REFERENCE(S): 2997, 2, 3

FUNCTION (PLANT ID): COMPONENT COOLING WATER PUMP POWER CABLE (W11)

LICENSEE SUBMITTAL: SCEW(S): C-12B

EQUIPMENT ITEM NO. 87

ELECTRICAL POWER CABLE LOCATED IN THE CONTAINMENT

CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECKSHEET NO. 87

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): CONTAINMENT VENTILATION COOLING FAN POWER CABLE (W10)

LICENSEE SUBMITTAL: SCEW(S): C-12

EQUIPMENT ITEM NO. 88

ELECTRICAL POWER CABLE LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING

CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 88

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): POWER CABLE (W-14, -16, -17, -18, -19, -21)

LICENSEE SUBMITTAL: SCEW(S): C-11

EQUIPMENT ITEM NO. 89

ELECTRICAL CONTROL CABLE LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING

CERRO WIRE AND CABLE, MODEL NOT STATED

REQUIRED OPERATING TIME: NOT SPECIFIED

TER CHECKSHEET NO. 89

LICENSEE REFERENCE(S): 2997, 21, 22, 23

FUNCTION (PLANT ID): CONTROL CABLE (W-37, -38, -39, -40, -41, -42)

LICENSEE SUBMITTAL: SCEW(S): C-10

EQUIPMENT ITEM NO. 90
ELECTRICAL POWER CABLE LOCATED IN THE AUXILIARY BUILDING
ANACONDA WIRE AND CABLE MODEL TRIPLEXED 5KV
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 90
LICENSEE REFERENCE(S): 2996, 1347, 347, 24, 25
FUNCTION (PLANT ID): POWER CABLE (W-3)
LICENSEE SUBMITTAL: SCEW(S): C-13

EQUIPMENT ITEM NO. 91
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
AMP MODEL AMP CAT. NO. 321230
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 91
LICENSEE REFERENCE(S): 3381, 2990
FUNCTION (PLANT ID): SOLENOID, TRANSMITTER CABLE SPLICE
LICENSEE SUBMITTAL: SCEW(S): C-36

EQUIPMENT ITEM NO. 92
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
MANUFACTURER AND MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 92
LICENSEE REFERENCE(S): 2999, 3377
FUNCTION (PLANT ID): SPLICES AT ELECTRICAL PENETRATIONS FOR SOLENOID VALVES &
INSTRUMENTATION
LICENSEE SUBMITTAL: SCEW(S): C-6

EQUIPMENT ITEM NO. 93
ELECTRICAL SEALANT LOCATED IN THE CONTAINMENT
DOW-CORNING MODEL RTV3144
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 93
LICENSEE REFERENCE(S): 3381, 18, 17
FUNCTION (PLANT ID): SEALING OF TERMINAL BLOCKS & CABLE SPLICES
LICENSEE SUBMITTAL: SCEW(S): C-4

EQUIPMENT ITEM NO. 94
TERMINAL LUGS LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING
BURNDY MODEL HYLUG INSULUG
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 94
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): POWER, CONTROL, & INSTRUMENT TERMINATIONS ON TERMINAL
BLOCKS
LICENSEE SUBMITTAL: SCEW(S): C-5

EQUIPMENT ITEM NO. 95
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
MANUFACTURER AND MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 95
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): 480V POWER CABLES FOR CONTAINMENT VENT FANS
LICENSEE SUBMITTAL: SCEW(S): C-34

EQUIPMENT ITEM NO. 96
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
MANUFACTURER AND MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 96
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): MOTOR LEADS PENETRATION FOR CONTAINMENT VENT FANS
LICENSEE SUBMITTAL: SCEW(S): C-37

EQUIPMENT ITEM NO. 97
TERMINAL BLOCK LOCATED IN THE CONTAINMENT
STATES MODELS M25014, M25016, M25018, M25112
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 97
LICENSEE REFERENCE(S): 20
FUNCTION (PLANT ID): CONTROL & INSTRUMENT TERMINATIONS
LICENSEE SUBMITTAL: SCEW(S): C-7

EQUIPMENT ITEM NO. 98
JUNCTION BOX LOCATED IN THE CONTAINMENT AND AUXILIARY BUILDING
HOFFMAN, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT SPECIFIED
TER CHECKSHEET NO. 98
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): MECHANICAL PROTECTION OF TERMINAL BLOCKS & WIRE
TERMINATIONS
LICENSEE SUBMITTAL: SCEW(S): C-8

EQUIPMENT ITEM NO. 99
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT
CONAX, MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 99
LICENSEE REFERENCE(S): 3377, 3375, 3371
FUNCTION (PLANT ID): POWER, CONTROL & INSTRUMENT CABLE PENETRATIONS
LICENSEE SUBMITTAL: SCEW(S): C-3

EQUIPMENT ITEM NO. 100
CONDUCTOR SEAL ASSEMBLY LOCATED IN THE CONTAINMENT
CONAX, MODEL NOT STATED
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 100
LICENSEE REFERENCE(S): 816, 1049
FUNCTION (PLANT ID): SEALING OF WIRES FOR MOTORS L-SWITCHES, PUMPS, VALVE
OPERATORS
LICENSEE SUBMITTAL: SCEW(S): C-300

EQUIPMENT ITEM NO. 101
LIMIT SWITCH LOCATED IN ROOM 81
NAMCO MODEL EA18011302
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 101
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): VALVE POSITION INDICATION (YCV-1045, YCV-1045A,
YCV-1045B, FCV-1368, FCV-1369, HCV-1107B,
1108B SOLENOIDS #1 & #2)
LICENSEE SUBMITTAL: SCEW(S): S-204

EQUIPMENT ITEM NO. 102
LIMIT SWITCH LOCATED IN ROOM 21
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 102
LICENSEE REFERENCE(S): 898
FUNCTION (PLANT ID): HPSI PUMP DISCHARGE HEADER ISOLATION VALVE POSITION
INDICATION (HVC-304, -305)
LICENSEE SUBMITTAL: SCEW(S): I-13

EQUIPMENT ITEM NO. 103
ELECTRICAL CABLE SPLICE LOCATED IN THE CONTAINMENT
RAYCHEM MODEL RAYCHEM BREAKOUT KITS
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 103
LICENSEE REFERENCE(S): 1851
FUNCTION (PLANT ID): SPLICES FOR INTERFACING IN ALL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C-300, -301, -302

EQUIPMENT ITEM NO. 104
HYDROGEN ANALYZER LOCATED IN ROOM 59
COMSIP DELPHI MODEL DELPHI IV HYDROGEN ANALYZER
REQUIRED OPERATING TIME: 100 DAYS
TER CHECKSHEET NO. 104
LICENSEE REFERENCE(S): 2070

EQUIPMENT ITEM NO. 104 (CONT.)

FUNCTION (PLANT ID): CONTAINMENT ATMOSPHERE HYDROGEN ANALYZERS (VA-81A, -81B)
LICENSEE SUBMITTAL: SCEW(S): S-200

EQUIPMENT ITEM NO. 105

ELECTRICAL CABLE LOCATED IN THE REACTOR AND AUXILIARY BUILDINGS
ROCKBESTOS MODEL FIRE WALL III
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 105
LICENSEE REFERENCE(S): 1391
FUNCTION (PLANT ID): INTERCONNECTING - CABLES FOR ALL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): S-303, -250, -304

EQUIPMENT ITEM NO. 106

RADIATION DETECTOR LOCATED IN THE CONTAINMENT
VICTOREEN MODEL 878
REQUIRED OPERATING TIME: CONTINUOUS
TER CHECKSHEET NO. 106
LICENSEE REFERENCE(S): 2883
FUNCTION (PLANT ID): HIGH RANGE CONTAINMENT RADIATION AREA MONITOR (RM-091A,
-091B)
LICENSEE SUBMITTAL: SCEW(S): C-200

EQUIPMENT ITEM NO. 107

SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL X2063816RF
REQUIRED OPERATING TIME: 100 DAYS
TER CHECKSHEET NO. 107
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): HYDROGEN ANALYZER CONTAINMENT SAMPLE VALVE (HCV-883C,
-883D, -883E, -883F, -883G, -883H, -820C, -820D, -820E,
-820F, -820G, -820H)
LICENSEE SUBMITTAL: SCEW(S): C-26J

EQUIPMENT ITEM NO. 108

SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO, MODEL NOT STATED
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 108
LICENSEE REFERENCE(S): 649, 9
FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HCV-883A, -884A)
LICENSEE SUBMITTAL: SCEW(S): C-51

EQUIPMENT ITEM NO. 109
SOLENOID VALVE LOCATED IN ROOM 22
ASCO MODEL NP8320A185E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 109
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): INLET & OUTLET VALVES FOR SAFETY INJECTION & SPRAY PUMPS
BEARING COOLERS (HCV-2809A, B; -2811A, B; -2814A, B;
-2815A, B)
LICENSEE SUBMITTAL: SCEW(S): I-27

EQUIPMENT ITEM NO. 110
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8320A185V
REQUIRED OPERATING TIME: INTERMITTENT
TER CHECKSHEET NO. 110
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER VALVES
(YCV-1045A, -1045B)
LICENSEE SUBMITTAL: SCEW(S): S-203

EQUIPMENT ITEM NO. 111
SOLENOID VALVE LOCATED IN ROOM 81
ASCO MODEL NP8314C29E
REQUIRED OPERATING TIME: INTERMITTENT
TER CHECKSHEET NO. 111
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): VALVE ACTUATORS FOR AUXILIARY FEEDWATER VALVES
(FCV-1368, -1369, YCV-1045)
LICENSEE SUBMITTAL: SCEW(S): S-201, -202, -200

EQUIPMENT ITEM NO. 112
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8321A185E
REQUIRED OPERATING TIME: INTERMITTENT
TER CHECKSHEET NO. 112
LICENSEE REFERENCE(S): 649, 9
FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HVC-865, -864)
LICENSEE SUBMITTAL: SCEW(S): C-52

EQUIPMENT ITEM NO. 113
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP8320A175E
REQUIRED OPERATING TIME: 1000 HOURS
TER CHECKSHEET NO. 113
LICENSEE REFERENCE(S): 649, 9

EQUIPMENT ITEM NO. 113 (CONT.)

FUNCTION (PLANT ID): REMOTE OPERATION OF VALVES (HCV-1107A, HCV-1108A,
HCV-438A, HCV-438C)

LICENSEE SUBMITTAL: SCEW(S): C-52, -53

EQUIPMENT ITEM NO. 114

SOLENOID VALVE LOCATED IN THE CONTAINMENT

VALCOR MODEL V526589115

REQUIRED OPERATING TIME: CONTINUOUS

TER CHECK SHEET NO. 114

LICENSEE REFERENCE(S): 1835

FUNCTION (PLANT ID): HYDROGEN ANALYZER ISOLATION VALVES (HCV-820B, HCV-821B)

LICENSEE SUBMITTAL: SCEW(S): C1-29

APPENDIX C - PLANT SAFETY-RELATED SYSTEMS AND DISPLAY INSTRUMENTATION

C.1 LIST OF SAFETY-RELATED SYSTEMS

In accordance with IE Bulletin 79-01B or NUREG-0588, the Licensee was required to (1) establish a list of systems and equipment required to mitigate the consequences of a loss-of-coolant accident (LOCA) and a high energy line break (HELB) and (2) identify components needed to perform the functions of safety-related display information, post-accident sampling and monitoring, and radiation monitoring.

The list of safety-related systems provided by the Licensee was reviewed by the NRC staff against a staff-developed master list. The NRC staff had developed a generic master list based upon a review of plant safety analyses and emergency procedures. The systems list was established on the basis of the functions that must be performed for accident mitigation (without regard to location of equipment relative to hostile environments). The instrumentation selected included that needed to monitor overall plant performance as well as to monitor the performance of systems on the list.

Based on the Licensee's submittal, the NRC staff concluded that the information on safety-related systems included in the submittal was insufficient to verify that those systems are all the systems required to achieve or support: (1) emergency reactor shutdown, (2) containment isolation, (3) reactor core cooling, (4) containment heat removal, (5) core residual heat removal, and (6) prevention of significant release of radioactive material to the environment. The staff acknowledged the Licensee's effort to include only those safety-related systems located in a potentially harsh environment. However, the review required the listing of all safety-related systems, both inside and outside potentially harsh environments.

In Reference 5, the Licensee provided the following response to the SER:

"SER Section 3.1. Completeness of Safety-Related Equipment

Finding

Based on the licensee's submittal, the staff has concluded that the information on safety-related systems included in the submittal is insufficient to verify that those systems are all the systems required to achieve or support: (1) emergency reactor shutdown, (2) containment isolation, (3) reactor core cooling, (4) containment heat removal, (5) core residual heat removal, and (6) prevention of significant release of radioactive material to the environment.

Response

The required information is provided in attachment 2, the section entitled 'Report on Bulletin 79-01B'. This section has been updated to provide the necessary information."

Evaluation

The master list of systems provided by the Licensee in Appendix A can be categorized into the six safety functions as follows:

<u>Function</u>	<u>System¹</u>
Emergency Reactor Shutdown	Reactor Protection
	Engineered Safeguards Actuation
	Chemical and Volume Control
	Reactor Coolant
Containment Isolation	Main Steam
	Main Feedwater
	Containment Ventilation
	Auxiliary Feedwater
	Chemical and Volume Control
	Safety Injection
	Residual Heat Removal
	Containment Spray
	Containment Ventilation
	Containment Sump
	Component Cooling Water
	Raw Water
	Demineralized Water
Reactor Core Cooling	Safety Injection
	Residual Heat Removal
	Instrument Air

1. The NRC staff recognized that there are differences in nomenclature of systems because of plant vintage and engineering design; consequently, some systems performing identical or similar functions may have different names. In those instances it was necessary to verify the function of the system(s) with the responsible IE regional reviewer and/or the licensee.

<u>Function</u>	<u>System¹</u>
Containment Heat Removal	Containment Spray
	Containment Heat Removal and Fission Product Removal
	Long Term Core Cooling
Core Residual Heat Removal	Residual Heat Removal
	Reactor Coolant
	Main Feedwater
	Auxiliary Feedwater
	Main Steam
	Component Cooling Water
	Raw Water
	Demineralized Water
Prevention of Significant Release of Radioactive Material to Environment	Containment Heat Removal and Fission Product Removal
	Containment Hydrogen Purge
	Containment Radiation Monitoring
	Containment Radiation Sampling
Supporting Systems	Emergency Power
	Control Room Ventilation
	Safety Equipment Area Ventilation



The Licensee has satisfactorily responded to the NRC's concern in the SER. This item is considered resolved.

C.2 SAFETY-RELATED INSTRUMENTATION

In Section 3.1 of the NRC SER dated May 29, 1981 [4], the NRC made the following statement:

"Display instrumentation which provides information for the reactor operators to aid them in the safe handling of the plant was not specifically identified by the licensee. A complete list of all display instrumentation mentioned in the LOCA and HELB emergency procedures must be provided. Equipment qualification information in the form of summary sheets should be provided for all components of the display instrumentation exposed to harsh environments. Instrumentation which is not considered to be safety related but which is mentioned in the emergency procedure should appear on the list. For these instruments, (1) justification should be provided for not considering the instrument safety related and (2) assurance should be provided that its subsequent failure will not mislead the operator or adversely affect the mitigation of the consequences of the accident. The environmental qualification of post-accident sampling and monitoring and radiation monitoring equipment is closely related to the review of the TMI Lessons-Learned modifications and will be performed in conjunction with that review."

In Reference 5, the Licensee provided the following response:

"The District has also updated Enclosure 3 - Master List References to include justification for exclusion of instrumentation from qualification and assurance that failure will not lead to misinformation to the operator. In addition, the following Table 1 [see Table C-1 of this TER] identifies the display instruments and systems in the master list to expedite the review process. This did not affect the submittal significantly."

Evaluation

In view of the Licensee's response quoted above, this item is considered resolved.

Table C-1. Display Instrumentation Listed in LOCA and HELB
Emergency Procedures [5]

Table 1		Master List Reference	Master List Location
Channel Number	Indication/System	Reference	
LCS-218	VCT Level	1, 6	4-9
LT-219	VCT Level	1, 6	4-9
FT-212	Letdown Flow	1, 6	4-9
PT-103X	Pressurizer Pressure	5	4-9
PT-103Y	Pressurizer Pressure	5	4-9
LT-101X	Pressurizer Level	3, 5	4-9
LT-101Y	Pressurizer Level	3, 5	4-9
FT-236	Charging Pump Flow	2	4-9
FT-416	CCW Flow Out of Containment Air Cooling Units	-	4-26 ¹
FT-417	CCW Flow Out of Containment Air Cooling Units	-	4-26 ¹
FT-418	CCW Flow Out of Containment Air Cooling Units	-	4-26 ¹
FT-419	CCW Flow Out of Containment Air Cooling Units	-	4-26 ¹
TE 866	Charcoal Filter Temperature	5	4-37 ²
TE 867	Charcoal Filter Temperature	5	4-37 ²
A/PC 765	RPS Containment Pressure Trip	9, 10	4-38
B/PC-765	RPS Containment Pressure Trip	9, 10	4-38
C/PC-765	RPS Containment Pressure Trip	9, 10	4-38
D/PC-765	RPS Containment Pressure Trip	9, 10	4-38
A/PC742-1,2	ESF Containment Pressure Initiation	10	4-38
B/PC 742-1, 2	ESF Containment Pressure Initiation	10	4-38
C/PC742-1,2	ESF Containment Pressure Initiation	10	4-38
D/PC 742-1,2	ESF Containment Pressure Initiation	10	4-38
FT-342	Containment Spray Flow	7	4-57
FT-343	Containment Spray Flow	7	4-57
PT-309	HPSI Discharge Pressure	7	4-57
PT-310	HPSI Discharge Pressure	7	4-57
FT-313	HPSI Flow	5	4-59
FT-316	HPSI Flow	5	4-59

FIGURE SUPPLIED
BY THE LICENSEE

Table C-1 (Cont.)

FT-391	HPSI Flow	5	4-59
FT-322	HPSI Flow	5	4-59
FT-328	LPSI Flow	7	4-59
FT-330	LPSI Flow	7	4-59
FT-332	LPSI Flow	7	4-59
FT-332	LPSI Flow	7	4-59
FT-334	LPSI Flow	7	4-60
A/LC-383-1	SIRWT Level Switch	1	4-60
B/LC-383-1	SIRWT Level Switch	1	4-60
C/LC-383-1	SIRWT Level Switch	1	4-60
D/LC-383-1	SIRWT Level Switch	1	4-60
A/LC-383-1	SIRWT Level Switch	1	4-60
A/LC-383-2	SIRWT Level Switch	1	4-60
B/LC-383-2	SIRWT Level Switch	1	4-60
C/LC-383-2	SIRWT Level Switch	1	4-60
D/LC-383-2	SIRWT Level Switch	1	4-60
PC-1849	Instrument Air Pressure Switch	2	4-61
A/T-112-C	RCS Cold Leg Temp.	3	4-86
B/T-112C	RCS Cold Leg Temp.	3	4-86
C/T-112C	RCS Cold Leg Temp.	3	4-86
D/T-112D	RCS Cold Leg Temp.	3	4-87
A/T-112H	RCS Hot Leg Temp.	3	4-87
B/T-112H	RCS Hot Leg Temp.	3	4-87
D/T-112H	RCS Hot Leg Temp.	3	4-87
A/T-122C	RCS Cold Leg Temp.	3	4-88
B/F122C	RCS Cold Leg Temp.	3	4-88
C/T-122C	RCS Cold Leg Temp.	3	4-88
D/T-122C	RCS Cold Leg Temp.	3	4-88A/T-122H
A/T-122H	RCS Hot Leg Temp.	3	4-89B/T-122H
C/T-122H	RCS Hot Leg Temp.	3	4-89
D/T-122H	RCS Hot Leg Temp.	3	4-89
PT-105	Wide Range Pressurizer Pressure	3	4-90
PT-115	Wide Range Pressurizer Pressure	3	4-90
A/PT-102	Pressurizer Pressure	4, 10	4-91
B/PT-102	Pressurizer Pressure	4, 10	4-91
C/PT-102	Pressurizer Pressure	4, 10	4-91

FIGURE SUPPLIED
BY THE LICENSEE

Table C-1 (Cont.)

D/PT-102	Pressurizer Pressure	4, 10	4-91
LT-132	Pressurizer Quench Tank Level	6	4-93
TE-133	Pressurizer Quench Tank Temp	6	4-93
A/LT 901	S G A Level	4, 10	4-101
B/LT 901	S G A Level	4, 10	4-101
C/LT 901	S G A Level	4, 10	4-101
D/LT 901	S G A Level	4, 10	4-101
A/PT 902	S G A Pressure	4, 10	4-101
B/PT 902	S G A Pressure	4, 10	4-101
C/PT 902	S G A Pressure	4, 10	4-101
D/PT 902	S G A Pressure	4, 10	4-102
A/LT 904	S G B Level	4, 10	4-102
B/LT 904	S G B Level	4, 10	4-102
C/LT 904	S G B Level	4, 10	4-102
D/LT 904	S G B Level	4, 10	4-102
A/PT 905	S G B Pressure	4, 10	4-102
B/PT 905	S G B Pressure	4, 10	4-102
C/PT 905	S G B Pressure	4, 10	4-103
D/PT 905	S G B Pressure	4, 10	4-103
FT 1109	S G A Aux Feed Flow	3	4-103
FT1110	S G B Aux Feed Flow	3	4-103
LT-504	Containment Sump Level	6	4-106
LC-505	Containment Sump Level	6	4-106
LC-568	SI Pump Room Sump Level	7	4-106
LC-569	SI Pump Room Sump Level	7	4-106
LC-570	SI Pump Room Sump Level	7	4-107
LC-571	SI Pump Room Sump Level	7	4-107
LT-384	Containment Wide Range Sump Level	3	4-27A
YE-861	Containment Dew Point Initiation	6	4-27A

¹ Presently under investigation to determine qualification.

² Scheduled to be replaced.

FIGURE SUPPLIED
BY THE LICENSEE

APPENDIX D - REVIEW OF LICENSEE'S RESPONSE TO NRC EEQ
SER CONCERNING JUSTIFICATION FOR INTERIM OPERATION

1. BACKGROUND

The NRC Safety Evaluation Report (SER) concerning equipment environmental qualification (EEQ) states [4]:

"Subsection 4.2 identified deficiencies that must be resolved to establish the qualification of the equipment; the staff requires that the information lacking in this category be provided within 90 days of receipt of this SER. Within this period, the licensee should either provide documentation of the missing qualification information which demonstrates that such equipment meets the DOR guidelines or NUREG-0588 or commit to a corrective action (requalification, replacement, relocation, and so forth) consistent with the requirements to establish qualification by June 30, 1982. If the latter option is chosen, the licensee must provide justification for operation until such corrective action is complete."

On January 19, 1982, FRC representatives met with NRC Division of Licensing personnel at NRC offices to discuss the potential for FRC to assist the staff in the technical review of licensees' statements regarding justification for interim plant operation submitted in response to outstanding qualification deficiencies in the NRC EEQ SERs. The results of the meeting were as follows: (1) FRC was requested to proceed immediately with the technical review of licensees' justification for interim operation, (2) the format was established, and (3) the criteria for the review were established. These criteria are presented in Section 2 of this appendix.

On January 21, 1982, the NRC provided the following modification to Final Assignment 13 concerning this subject:

"The FRC review will consist of:

- o Review the licensee's justification of interim operation and provide FRC independent analysis which shows whether or not licensee provided technically sound rationale as a basis for justification for continued plant operation.

- o On January 27, 1982, FRC shall provide a list of those power reactors that have provided technically sound justification for continued operation. FRC shall also provide a list of those power reactors which have not provided technically sound justification for continued operation. In addition to the lists, FRC may provide any additional information which in FRC's judgment is necessary to support the conclusions regarding justification for continued operation."

On January 25, 1982, the NRC was provided with the completed review of the licensees' statements presented as a basis for justification for interim operation in response to the NRC EEQ SER.* On February 5, 1982, at the NRC's request, the NRC was provided with actual examples of licensees' responses to the NRC EEQ SER that provide adequate rationale as a basis for justification for interim operation.**

2. GENERAL DISCUSSION

In general, licensee-submitted justifications for interim operation are based on systems considerations, equipment operability evaluations, or failure-modes-and-effects analyses.

Systems considerations often involve the availability of backup equipment capable of performing the particular safety function of concern. The backup equipment is either environmentally qualified, unqualified but not exposed to a harsh environment at the same time as the primary equipment, or located so that it is unlikely that both the primary and backup equipment would be simultaneously exposed to a severe environment. In general, these systems discussions should consider (1) the possibility of a single-active failure

* C. J. Crane

Letter to R. A. Clark, NRC. Subject: Transmittal of FRC Review of Licensees' Responses to NRC EEQ SER Concerning Justification for Interim Operation
FRC, 25-Jan-82

** C. J. Crane

Letter to R. A. Clark, NRC. Subject: Transmittal of Actual Examples of Licensees' Responses to NRC EEQ SER Which Provide Adequate Rationale as a Basis for Justification of Interim Operation
FRC, 5-Feb-82

disabling the backup equipment, (2) any major differences in the characteristics of the primary and backup equipment (unless it is obvious that the equipment is essentially identical), (3) the possibility of electrical failure of the primary equipment causing an adverse effect on other safety-related equipment or power supplies, and (4) in the case of display instrumentation, the possibility of an operator being misled by the failed primary equipment. Where equipment has not been demonstrated to be qualified, some justifications discuss administrative procedures or revised operating procedures in effect. Depending upon the specific equipment involved, each of the above considerations need not be discussed in every instance, but, in general, a complete systems discussion would consider the above points.

Where equipment qualification evaluations were used, licensees generally (1) received additional information from manufacturers, (2) applied engineering judgment, (3) performed material analysis, and/or (4) used partial test data in support of the original qualification documentation. Where these evaluations were performed, the licensees determined that, although full qualification was not documented, there was sufficient evidence to suggest that the equipment would perform its intended safety function, thereby justifying interim operation until qualified equipment is installed.

Some licensees provided detailed failure-modes-and-effects analyses of electrical circuitry to demonstrate that, under all identified failure modes, the safety function of the equipment could still be accomplished.

Other justifications involved a combination of qualification information and systems information. For example, if a licensee has qualification information (such as a generic test report or other partial qualification documentation) that tends to confirm the ability of the equipment to remain operable for a specified period of time, justification for interim operation often was based upon a discussion of the required safety function being performed prior to the potential failure. This type of discussion often applies to equipment which performs a short-term trip or isolation function in the early stages of an accident.

3. PLANT-SPECIFIC REVIEW

As a result of the review, this plant was evaluated and the results documented on the "Summary of Review of Licensee's 90-Day Response" form reproduced below:

"EQUIPMENT ENVIRONMENTAL QUALIFICATION (EEQ)
Review of Licensees' Resolution of Outstanding Issues
From NRC Equipment Environmental Qualification
Safety Evaluation Reports

SUMMARY OF REVIEW OF LICENSEE 90-DAY RESPONSE

Utility: Omaha Public Power District
Plant Name: Fort Calhoun
NRC Docket No. 50-285
NRC TAC No. 42491
NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 504

References:

- a. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Response to SER for Fort Calhoun Station and revised full submittal incorporating this information
Omaha Public Power District, 26-Aug-81
- b. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Fort Calhoun
NRC, 29-May-81

The Licensee has submitted technical information in Reference a in response to the NRC SER [b] on environmental qualification. FRC has reviewed these documents [a, b]. As a result of this review, FRC concludes that the Licensee has stated that the equipment items are environmentally qualified; or has provided a technically sound rationale or other additional information which in FRC's judgment provides a basis for justification for continued operation; with the following exceptions:

<u>Equipment Item</u>	<u>Equipment Description/ Function</u>	<u>SCEW Sheet No.</u>	<u>Status Code</u>	<u>Basis for Deficiency</u>
None				

The Licensee's response to the SER addressed and provided resolution of deficiencies identified in the SER and provided adequate rationale as a basis for justification for interim operation. The basis provided in most cases was that equipment which lacked qualification would function in harsh environments."

APPENDIX E - REQUEST FOR ADDITIONAL INFORMATION

This appendix contains the Request for Additional Information (RAI) that was developed during the course of the review and issued to the NRC for forwarding to the Licensee. The RAI was revised throughout the review to reflect the Licensee's response(s) to the initial RAI.

The reader is cautioned that the numbers in brackets refer to citations found in the list of references at the end of this appendix and not to the citations listed in Section 6, References, of the TER.

REQUEST FOR ADDITIONAL INFORMATION

EQUIPMENT ENVIRONMENTAL QUALIFICATION (EEQ)
REVIEW OF LICENSEES' RESOLUTION OF OUTSTANDING ISSUES
FROM NRC EQUIPMENT ENVIRONMENTAL QUALIFICATION SAFETY
EVALUATION REPORTS (SER) AND TMI ACTION PLAN INSTALLED EQUIPMENT

Omaha Public Power District
Fort Calhoun

NRC Docket No. 50-285

December 16, 1981

NRC TAC No. 42491

Rev. 1, February 3, 1982
Rev. 2, February 24, 1982
Rev. 3, April 2, 1982
Rev. 4, May 25, 1982
Rev. 5, June 4, 1982

BACKGROUND

Franklin Research Center (FRC) of Philadelphia, Pa. is providing assistance to the U.S. Nuclear Regulatory Commission (NRC) for the equipment environmental qualification (EEQ) review of operating reactors. FRC will perform an EEQ review of the Licensee's 90-day response to outstanding issues from the NRC Equipment Environmental Qualification Safety Evaluation Report (SER) and the installed TMI Action Plan equipment. The review will be limited to safety-related equipment potentially exposed to a harsh environment. The results will be presented in the form of a technical evaluation report for each plant.

This request for additional information (RAI) is the result of an evaluation of the information provided by letters dated August 26, 1981 [1],* January 30, 1981 [2], and January 14, 1982 [5].^{(1)**}

By letter dated February 8, 1982, Omaha Public Power District (OPPD) transmitted the requested qualification documents and the following clarifications:⁽²⁾

- a. The Licensee has stated that, in reference to RAI section A.1.t, Micro Switch limit switches have been replaced by NAMCO limit switches and that SCEW sheets will be submitted for this equipment within 90 days.⁽²⁾
- b. With respect to RAI section A.1.s, the Licensee has identified a change in the radiation qualification documentation for Foxboro flow transmitters. The Licensee has stated that the Foxboro transmitters are known to be qualified to 1.0×10^7 rads instead of 2.2×10^8 rads as previously indicated by letter dated October 7, 1976. The Licensee has submitted both the above referenced letter and a Foxboro letter to OPPD dated April 18, 1979 with the enclosed test report summaries as listed below:⁽²⁾

T4-6061
T4-6045
T4-6040
T3-1097

T3-1013
T3-1013 supplement
T2-1075
Q9-6005⁽²⁾

*Numbers in brackets refer to citations found in the list of references.

**Throughout the text, superscript numbers in parentheses indicate the revision in which the underlined material preceding the superscript was added.

In addition to the documents requested by FRC in RAI section A below, the Licensee has submitted Conax IPS-12 and Conax letters dated 5/31/79 and 1/23/81.⁽²⁾

By letter dated February 1, 1982, OPPD transmitted information to NRC [7] concerning the schedule for submitting qualification documentation for electrical equipment installed under NUREG-0737 along with new SCEW sheets for Conax seals (6-59A) and RCS vent valves, and a revised enclosure 13 to Reference 1.⁽²⁾

By letter dated November 30, 1981 [8], OPPD transmitted information to the NRC concerning a schedule for EEQ submittals. By letter dated March 18, 1982 [9] OPPD provided (a) the TMI Action Plan information requested in Section B of the RAI and (b) the following documents:⁽³⁾

1. Report IPS-409, Conax Corp.⁽³⁾
2. Conax Corp., Bulletin SA 1000⁽³⁾
3. Conax Corp., IPS-411, Rev. A⁽³⁾
4. Conax Corp., IPS-412, Rev. A⁽³⁾
5. Conax Corp., IPS-413, Rev. C⁽³⁾
6. Conax Corp., IPS-325⁽³⁾
7. Conax, IPS-436⁽³⁾
8. Report of Test on Seismic Vibration Testing of Two (2) Namco Limit Switches⁽³⁾
9. Report No. 2375C RCGVS, Combustion Engineering⁽³⁾
10. Target Rock Corp., CN 9025⁽³⁾
11. Target Rock Corp., 2804B⁽³⁾
12. Target Rock Corp., 2375, Rev. C⁽³⁾
13. East-West Technology Corp., 92906-9⁽³⁾
14. Target Rock Corp., 2192, Rev. A⁽³⁾
15. Target Rock Corp., 2005C⁽³⁾

By letter dated March 25, 1982 [11], OPPD submittal a revision to Enclosure 13 of their August 26, 1981 letter, along with revised SCEW sheets incorporating the new qualification information.⁽⁴⁾

On April 2, 1982 [10], OPPD submitted information regarding the Licensee's response to TMI-AP requirements included in the April 2 submittal: revised SCEW sheets and page 2 of Enclosure 13 of the August 26, 1981 submittal. This submittal also included the following qualification documents:⁽⁴⁾

- a. R. Frummerman
Report Test Results on Hydrogen Flame Recombiner
Westinghouse, 26-Mar-69
WCAP-7301-1, Proprietary⁽⁴⁾
- b. R. E. Andrew, Sr. and E. A. Gieniawa
Summary of Qualification of Magnetrol Controls Using IEEE 323, 1974
and IEEE 344, 1975 Guidelines
Magnetrol International, 19-Sep-77
Report No. 34-4, Proprietary⁽⁴⁾
- c. J. V. Fitzgerald
Ozone Resisting Silicone Rubber Cable Tests for Consolidated Edison
Co.
Phelps Dodge Cable & Wire Co, 16-Apr-81
10,519⁽⁴⁾

By letter dated April 21, 1982 [12], OPPD submitted additional qualification documentation requested in Section B.2 of the RAI.⁽⁴⁾

By letter dated May 3, 1982, OPPD transmitted information regarding Conax electrical seal aging, chemical spray qualification, and containment hydrogen analyzer isolation valves. A revised enclosure 13 to the District's qualification package was also transmitted.⁽⁴⁾

By letter dated May 18, 1982 [14], OPPD submitted qualification documentation for TMI-Action Plan installed equipment; specifically:⁽⁵⁾

- 1. ASCO solenoid valves installed on the safety-grade AFW automatic actuation and indication system and the containment hydrogen monitoring system.⁽⁵⁾
- 2. NAMCO limit switches installed on the safety-grade AFW automatic actuation and indication system.⁽⁵⁾

3. Valcor solenoid valves installed on the containment hydrogen monitoring system.⁽⁵⁾

The Licensee also identified three test reports that still must be provided to FRC to meet all the requests made, and has stated that the reports will be submitted upon receipt from the vendors.⁽⁵⁾

A. FRC REVIEW OF THE LICENSEE'S 90-DAY RESPONSE TO THE NRC EEQ SER

INFORMATION REQUESTED

DATE RECEIVED BY FRC**

1. In reference to the Licensee's 90-day response [1] to the NRC SER [3], a legible single copy of each of the following qualification documents is requested in order that the FRC evaluation may proceed:
 - a. ASCO letter dated July 10, 1980 (SCEWs C-128) 2/12/82 [6]⁽²⁾
 - b. Joy Manufacturing Test Report No. X-377A 2/12/82 [6]⁽²⁾
 - c. Letter from Alison Control Inc. dated February 15, 1980 2/12/82 [6]⁽²⁾
 - d. Letter from General Electric Motor and Generator Department to OPPD dated February 6, GEZ-6211 not enclosed⁽²⁾ 2/12/82 [6]⁽²⁾
 - e. NAMCO Controls letter dated March 11, 1980 2/12/82 [6]⁽²⁾
 - f. CONAX Corporation - Gamma irradiation of Kapton insulated conductors & polysuflone sealant in CONAX electrical feedthrough assembly (#IPS-27 Rev. A)⁽²⁾ Dated 3/30/71 2/12/82 [6]⁽²⁾
 - g. CONAX Corporation - IPS-37 Rev. A⁽²⁾ Type qualification test report for electrical penetration sub-assemblies - March 8, 1971 2/12/82 [6]⁽²⁾

***This column will be completed by FRC as the requested information is received.

DATE RECEIVED BY FRC***

- h. CONAX Corporation test report of gamma radiation withstand capability of electric penetration feedthrough with TFE Teflon primary sealant (#IPS-435 Dated 5/31/79) 2/12/82 [6]⁽²⁾
- i. "Elastomer Radiation Results" Lab test data from Dow-Corning 2/12/82 [6]⁽²⁾
- j. Letter - Dow-Corning to R. Mehaffey of OPPD Dated 3/24/80 2/12/82 [6]⁽²⁾
- k. Fisher Controls Lab Report #4 Project 71AR19 dated 6/1/72; and transmittal letter dated 7/10/72⁽²⁾ 2/12/82 [5]⁽²⁾
- l. General Electric letter from Mr. J. F. Sherk to Mr. R. Kroll of Metropolitan Edison Company Dated October 10, 1978 2/12/82 [6]⁽²⁾
- m. Qualification, tech spec #2, Cerro Wire & Cable Co. Dated 9/20/71, p. 2 qualification - Post Containment Environmental Test 2/12/82 [6]⁽²⁾
- n. Rockbestos Co. letter dated 5/19/80 2/12/82 [6]⁽²⁾
- o. Rockbestos Co. letter dated 10/27/80 2/12/82 [6]⁽²⁾
- p. Anaconda letter dated 9/16/71 2/12/82 [6]⁽²⁾
- q. Anaconda letter dated 5/23/80 2/12/82 [6]⁽²⁾
- r. General Electric study for OPPD P. O. 47462 2/12/82 [6]⁽²⁾
- s. Foxboro letter to Southern California Edison Co., dated October 7, 1976⁽²⁾ 2/12/82 [6]⁽²⁾
- t. Memo - Lakeland Eng. to R. Mehaffey February 27, 1980 2/12/82 [6]⁽²⁾
- u. General Electric Instruction Bulletin GEH-3160E 2/12/82 [6]⁽²⁾
- v. ASCO report 177 2/12/82 [6]⁽²⁾

DATE RECEIVED BY FRC***

- w. Wyle Laboratory Final Report on Cable
Splices Inside Containment for Fort Calhoun
Station Unit No. 1⁽¹⁾

B. FRC REVIEW OF INSTALLED TMI ACTION PLAN ITEMS

INFORMATION REQUESTED

DATE RECEIVED BY FRC***

1. References 1, 2, and 7⁽²⁾ do not provide adequate detail with respect to identification of TMI Action Plan equipment installed as of 1/1/81.

3/22/82 [9]⁽³⁾

- a. Identification of all TMI Action Plan equipment installed as of 1/1/81 is requested.

3/22/82 [9]⁽³⁾

- b. Identification of TMI Action Plan equipment installed with implementation dates after 1/1/81 is requested.

3/22/82 [9]⁽³⁾

- c. The correlation of these equipment items with the specific sections of NUREG-0737 [4] presented below (as applicable) is requested.

3/22/82 [9]⁽³⁾

IIE1.2, IIE4.2, IIE3.1, IIG1, IIF2,
IID3, IIB3, IIE4.1.

[The correlation is needed to ensure that all items are included in the review, e.g., if a transmitter is identified as a TMI Action Plan item, are the cable and terminal blocks associated with the device also identified?]

- d. For all installed TMI Action Plan equipment identified, a System Component Evaluation Worksheet (SCEW) (in accordance with 79-01B format) is requested.

3/22/82 [9]⁽³⁾

DATE RECEIVED BY FRC***

e. The approximate installation date for the TMI Action Plan equipment items is requested so that the appropriate qualification criteria (NUREG-0588 or DOR Guidelines) can be used in the EEQ evaluation.

2/18/82 [7]⁽³⁾

2. The qualification documents, e.g., the actual test reports and associated correspondence cited as evidence of qualification listed on the SCEW sheets, for all identified TMI Action Plan equipment are requested. [The identification of those reports considered to be proprietary is requested so that proper control of documents can be maintained.]

2/18/82 [7]⁽³⁾

3. Where the Licensee has a standard Owners' Group position with respect to a NUREG-0737 technical area or has requested extensions of implementation dates, this information is requested in order to incorporate it into the review.

3/22/82 [9]⁽³⁾
2/18/82 [7]⁽³⁾

C. INSTRUCTIONS FOR TRANSMITTING INFORMATION REQUESTED

1. The schedule for completion of the FRC assignment requires that the Licensee provide the requested information within 3 weeks of the date of the RAI.

2. The Licensee may transmit the requested information as follows:

o complete package directly to the NRC project manager

or

o copy of cover letter to NRC project manager and complete package to FRC.

REFERENCES

1. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Response to SER for Fort Calhoun Station and revised full submittal incorporating this information
Omaha Public Power District, 26- g-81
2. W. C. Jones
Letter to K. V. Seyfrit, NRC. Subject: Revision to October 31, 1980 response to IE Bulletin 79-01B.
Omaha Public Power District, 30-Jan-81
3. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Fort Calhoun
NRC, 29-May-81
4. "Clarification of TMI Action Plan Requirements"
NRC, November 1980
NUREG-0737
5. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Environmental Qualification of
Safety-Related Electrical Equipment; Fort Calhoun Station, with
Attachments
Omaha Public Power District, 14-Jan-82
LIC-82-019(1)
6. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Transmittal of Requested
Information to Franklin Research Center
Omaha Public Power District, 08-Feb-82
LIC-82-048(2)
7. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Fort Calhoun Station;
TMI Action Plan Documentation and Update to August 26, 1981 Submittal
Omaha Public Power District, 01-Feb-82
LIC-82-043(2)
8. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Fort Calhoun Station--
Environmental Qualification Schedule
Omaha Public Power District, 30-Nov-81(3)

9. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Request for Additional
Information Related to the Environmental Qualification of
Safety Related Electrical Equipment Installed at Fort Calhoun
Omaha Public Power District, 18-Mar-82
LIC-82-130⁽³⁾
10. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Environmental Qualification of
Equipment Installed in Response to TMI Requirements; with Attachments
Omaha Public Power District, 02-Apr-82
LIC-82-143⁽⁴⁾
11. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Transmittal of Revised SCEWS
Concerning Environmental Qualification of Safety-Related Electrical
Equipment
Omaha Public Power District, 25-Mar-82
LIC-82-134⁽⁴⁾
12. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Response to FRC Request for
Additional Information; TMI Action Plan Installed Equipment
Omaha Public Power District, 21-Apr-82
LIC-82-163⁽⁴⁾
13. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Environmental Qualification of
Safety-Related Electrical Equipment at the Fort Calhoun Station
Omaha Public Power District, 03-May-82
LIC-82-187⁽⁴⁾
14. W. C. Jones
Letter to R. A. Clark, NRC. Subject: Environmental Qualification of
Safety Related Electrical Equipment; Equipment Installed Under the
TMI Action Plan
Omaha Public Power District, 18-May-82
LIC-82-201⁽⁵⁾