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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICE OF THE
SECRETARY

August 18, 1992

'92 AUG 18 P4:52

MEMORANDUM FOR: FILES
ALABAMA POWER COMPANY
(Joseph M. Farley Nuclear Plant, Units 1 & 2)
Docket Number 50-348/364-CIVP

FROM: Emile L. Julian, Chief
Docketing and Service Branch

SUBJECT: DOCKET TREATMENT OF APCO EXHIBITS 16, 17 AND 20 AND STAFF EXHIBIT 32 PURSUANT TO BOARD ORDER OF AUGUST 12, 1992

In accordance with the Licensing Board Memorandum and Order dated August 12, 1992, full text copies (containing proprietary information) of APCo Exhibits 16, 17 and 20 and Staff Exhibit 32 have been returned to the Board. Redacted copies of Exhibits 16, 17 and 20, containing restoration of previously deleted information were provided by the Licensing Board to the Docketing and Service Branch on August 12, 1992. These copies have been designated as "redacted version II" and have been placed in the Official Docket. Copies of the redacted version II documents will be provided to NUDOCS (the NRC's document control system).

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APCo Exhibit 16

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CONTAINS PROPRIETARY INFORMATION

TECHNICAL EVALUATION REPORT

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

ALABAMA POWER COMPANY
JOSEPH M. FARLEY NUCLEAR PLANT UNIT 1

NRC DOCKET NO. 50-348
NRC TAC NO. 42462
NRC CONTRACT NO. NRC-03-79-118

FRC PROJECT C5257
FRC ASSIGNMENT 13
FRC TASK 509

Prepared by

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

FRC Group Leader: G. J. Toman

Prepared for

Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: P. Shemanski

January 14, 1983

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Reviewed by:

Group Leader

Approved by:

Project Manager

Department Director

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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 are stamped PROPRIETARY.

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1. INTRODUCTION

1.1 PURPOSE OF THE EVALUATION

The purpose of this report is to:

- 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.

- 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.

- 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 79-01B, Supplement 3 (item 2) [13],* 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 [3] 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 DEQ 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:

- seismic and dynamic qualification
- equipment protection against natural phenomena
- equipment operational service conditions (e.g., vibration, voltage, and frequency deviations)
- equipment located where it is subjected to the outdoor environment
- equipment protection against fire hazards
- equipment protection against missiles
- equipment located in plant areas whose environment is not adversely affected by the design basis event
- 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 plant 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 plants, qualification was based on the fact that electrical components were of high industrial quality. After 1971, qualification was judged on the basis of IEEE 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" [9]. (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 79-01B, which expanded the scope of IE Bulletin 79-01 and requested additional information on environmental qualification of safety-related electrical equipment at operating facilities, excluding the 11 facilities undergoing the SEP review. This Bulletin 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" [9], 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 [14], 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.

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.

On April 20, 1982, the NRC staff issued Generic Letter No. 82-09 [15] 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

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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 evalnation report (TER) and (2) an onsite verification inspection (week of December 1, 1980) of selected safety-related electrical equipment. The main steam, auxiliary steam and auxiliary feedwater, and feedwater control systems were inspected. The inspection verified proper installation of equipment, overall interface integrity, and manufacturers' nameplate data. The manufacturer's name and model number from the nameplate data were compared to information given in the Component Evaluation Work Sheets (CES) of the Licensee's report. The site inspection is documented in report IE 50-348/80-38. No deficiencies were noted other than discrepancies identified on 14 components where actual nameplate data are different from the information in the Licensee's submittals. These discrepancies had been identified by the Licensee before the site inspection and corrective measures had been taken.

On April 29, 1980 [1], Alabama Power Company provided the NRC with an equipment environmental qualification submittal in response to IE Bulletin 79-01B for the Joseph M. Farley Nuclear Plant Unit 1.

On November 12, 1980 [2], Alabama Power Company submitted to the NRC Revision 2 to the previous response to IE Bulletin 79-01B.

On February 2 [4] and 12, 1981 [5], Alabama Power Company submitted to the NRC further equipment environmental qualification information in response to IE Bulletin 79-01B.

On February 13, 1981 [6], Alabama Power Company submitted to the NRC Revision 4 to the previous response to IE Bulletin 79-01B.

The NRC issued a Safety Evaluation Report (SER) to Alabama Power Company on May 21, 1981 [7].

Requests for information [24, 25, 26, 27] were transmitted to the NRC by FRC to obtain qualification documentation referenced by the Licensee in its submittals, TMI Action Plan information, and corrections to NUREG-0737 [3].

By letter dated August 25, 1981 [8], Alabama Power Company transmitted to the NRC a response to the SER.

In References 17, 18, 21, 22, and 23, Alabama Power Company responded to the FRC requests for additional information.

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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:

- DOR Guidelines, "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," November 1979 [9]
- NUREG-0588, Revision 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981 [16].

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

- 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 [10, 11, 12, 13]
- NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980 [3]. 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 [12] 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 OLs, 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

OLs			CPs
	CP SER	CP SER	
DOR GUIDELINES	Before 7/1/74	After 7/1/74	
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 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 [12] 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 [13] 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 [12] 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 [13] 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 [12], "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 [illegible]d those expected for coolant and steam line breaks inside containment with [illegible] consideration given to analytical uncertainties. The steam line break condition should include [illegible] 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 [12] 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 [12] 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 [12] 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 [12] 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 p the most bounding conditions. The following table summarizes these considerations:

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

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

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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 [15] 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 activities[1] 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:

- 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.

[1]Such 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).

- 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 licensees. 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.

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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?

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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 conservatisms. 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°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. 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.

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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.

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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	EPN - Equipment Relocation or Replacement, Adequate Schedule Not Provided
P - Pressure	EEN - 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	EPS - Equipment Relocation or Replacement Schedule Provided
S - Submergence	
(E) - 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

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

3.2 METHODOLOGY

The Licensee, Alabama Power Company, provided a response to the SER and additional qualification information in its submittals [8, 17, 18, 21, 22, 23] to the NRC for Farley Nuclear Plant Unit 1.

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

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

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

- 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

- Qualification deficiencies identified in the SER (see Figure 3-1)
- Licensee's response to the SER
- Licensee's statements and rationale for qualification
- Licensee's corrective action and replacement schedule
- Evaluation of qualification including identification of all deficiencies
- 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

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. ___

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 TER NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 3 of this TER for Legend)

R, T, QT, RT, P, R, CS, A, S, (R), M, I, QM, RFN, EXN, MAN, 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

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

- 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.

- 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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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. ____

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 Simulating Pertinent Accident Exposure(s)	
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.

- 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).

- 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.

- 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 intepreted 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.]

- 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.

- 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.

- 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.

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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.

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UNIT 1

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).: 16, 34, 35, 36, 37, 38)	0
I.B	EQUIPMENT QUALIFICATION PENDING MODIFICATION (EQUIPMENT ITEM NO(S).: 5, 7, 10, 12, 14, 15, 18, 19, 20, 21, 22, 24, 26, 27, 29, 30, 31, 45, 46)	19
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED (EQUIPMENT ITEM NO(S).: 1, 3, 4, 8, 9, 17, 33, 42, 43, 44)	10
II.B	EQUIPMENT NOT QUALIFIED (EQUIPMENT ITEM NO(S).: 23, 25)	2
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED (EQUIPMENT ITEM NO(S).: 6, 11, 12, 28, 32)	5
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION (EQUIPMENT ITEM NO(S).: 2)	1
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW	0
IV	DOCUMENTATION NOT MADE AVAILABLE (EQUIPMENT ITEM NO(S).: 39, 40, 41)	3
	TOTAL	46

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TABLE 4-2

QUALIFICATION DEFICIENCY SUMMARY

NRC REQUIREMENT	NUMBER OF DEFICIENT EQUIPMENT ITEMS
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE (EQUIPMENT ITEM NO(S).: 24)	1
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED (EQUIPMENT ITEM NO(S).: 1, 3, 17, 20, 25, 42, 43, 44)	8
3. AGING DEGRADATION EVALUATED ADEQUATELY (EQUIPMENT ITEM NO(S).: 1, 3, 18, 19, 21, 22, 23, 26, 26, 27, 45)	11
4. QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED) (EQUIPMENT ITEM NO(S).: 1, 3, 4, 6, 8, 9, 11, 12, 18, 19, 21, 22, 23, 26, 27, 28, 32, 33, 45)	19
5. PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION	0
6. CRITERIA REGARDING AGING SIMULATION (IF REQUIRED)	0
7. CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:	
A. = PEAK TEMPERATURE ADEQUATE	0
B. = PEAK PRESSURE ADEQUATE	0
C. = DURATION ADEQUATE	0
D. = REQUIRED PROFILE ENVELOPED ADEQUATELY	0
E. = STEAM EXPOSURE (IF REQUIRED) ADEQUATE	0
8. CRITERIA REGARDING SPRAY SATISFIED (EQUIPMENT ITEM NO(S).: 18, 19)	2
9. CRITERIA REGARDING SUBMERGENCE SATISFIED (EQUIPMENT ITEM NO(S).: 4, 8, 9, 21, 33, 45)	6

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Table 4-2 (Cont.)

TABLE 4-2

QUALIFICATION DEFICIENCY SUMMARY

NRC REQUIREMENT	NUMBER OF DEFICIENT EQUIPMENT ITEMS
10. CRITERIA REGARDING RADIATION SATISFIED---------- (EQUIPMENT ITEM NO(S).: 22, 27)	2
11. CRITERIA REGARDING TEST SEQUENCE SATISFIED---------- (EQUIPMENT ITEM NO(S).: 22)	1
12. CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED---------- (EQUIPMENT ITEM NO(S).: 23, 25)	2
13. CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED---------- (EQUIPMENT ITEM NO(S).: 18, 19)	2
14. CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED---------- (EQUIPMENT ITEM NO(S).: 18, 19, 21, 26, 27, 45)	6
15. TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED--- (EQUIPMENT ITEM NO(S).: 27)	1
16. CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, 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).: 5, 10, 13, 14, 15, 29, 30, 31, 46 }	9
2. EQUIPMENT MODIFICATION { EQUIPMENT ITEM NO(S).: 20 }	1
3. EQUIPMENT RELOCATION ABOVE SUBMERGENCE LEVEL	0
4. RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE	0
5. VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS	0
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT	0
7. QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS { EQUIPMENT ITEM NO(S).: 7, 34 }	2
8. OTHER (FOR DETAILED DESCRIPTION SEE SPECIFIC EQUIPMENT ITEMS) { EQUIPMENT ITEM NO(S).: 18, 19, 21, 22, 23, 25, 26, 27, 28, 45 }	10
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN PROVIDED (SEE SPECIFIC EQUIPMENT ITEM FOR COMPLETION DATE) { EQUIPMENT ITEM NO(S).: 5, 7, 10, 13, 14, 15, 18, 19, 22, 24, 25, 26, 27, 29, 30, 31, 46 }	17

Table 4-4

EQUIPMENT ENVIRONMENTAL QUALIFICATION DOCKAGE TYPE

NRC REQUIREMENTS	DESIGNATIONS X = DEFICIENCY	NRC EQUIPMENT TYPE NUMBERS
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE		
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED		
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 EXPOSURES		
A. - PEAK TEMPERATURE ADEQUATE		
B. - PEAK PRESSURE ADEQUATE		
C. - DURATION ADEQUATE		
D. - ACQUIRED 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. I)		
NRC QUALIFICATION CATEGORY	**DESIGNATIONS 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 EXCEPT FROM QUALIFICATION		
III.B EQUIPMENT NOT IN THE SCOPE OF THE RULE		
IV DOCUMENTATION NOT MADE AVAILABLE		
CORRECTIVE ACTION SPECIFIED	**DESIGNATIONS 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 (USE SPECIFIC EQUIPMENT LIST TO EXPLAIN)		
SCHEDULED FOR COMPLETION OF CORRECTIVE ACTION(S) HAS NOT EXPIRED		

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Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS (DESIGNATIONS X = DEFICIENCY)	FOR EQUIPMENT ITEM NUMBERS
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE	
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED	
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 REVERE ANOMALIES (IF ANY) SATISFIED	
13. CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED	
14. CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED	
15. TEST DURATION MARGIN (1 HOUR + EXTINCTION TIME) SATISFIED	
16. CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, CAT. II)	
NRC QUALIFICATION CATEGORY (DESIGNATIONS 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 RULE	
IV DOCUMENTATION NOT MADE AVAILABLE	
CORRECTIVE ACTION SPECIFIED (DESIGNATIONS X = ACTION SPECIFIED)	
1. EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT	
2. EQUIPMENT MODIFICATION	
3. EQUIPMENT RELOCATION ABOVE THE FLOOD/SPRAY LEVEL	
4. SHIELDING OR SHIELD EQUIPMENT FROM RADIATION SOURCE	
5. FURTHER QUALIFICATION OR ADDITIONAL TESTING/ANALYSES	
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT	
7. QUALIFICATION STATUS OF EQUIPMENT IN PROGRESS	
8. OTHER (___SEE SPECIFIC EQUIPMENT ITEM IN CHECKED___)	
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN ESTABLISHED	

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Table 4-4 (Cont.)

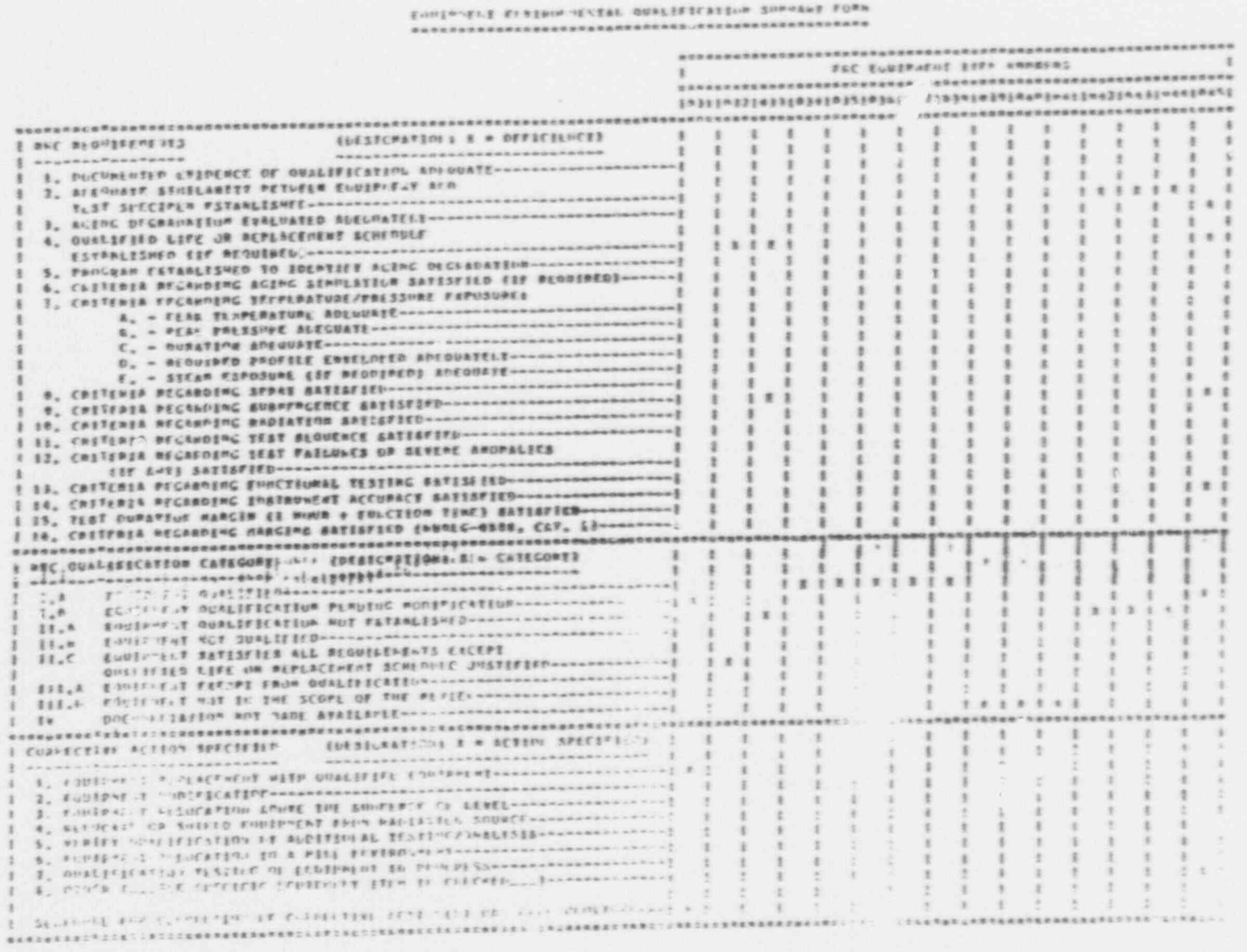

Table 4-4 (Cont.)

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

		PRC EQUIPMENT ITEM NUMBERS
		0441
NRC REQUIREMENTS (DESIGNATION: X = DEFICIENCY)		
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE		
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED		
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 EXPOSURES		
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 REVERE 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. I)		
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)		
I.A EQUIPMENT QUALIFIED		
I.B EQUIPMENT QUALIFICATION PENDING MODIFICATION	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	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___)		
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN PROVIDED	X	

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4.3 METHODOLOGY USED BY THE LICENSEE

This section includes observations concerning the Licensee's qualification methodology presented in the response [8] to the NRC SER.

4.3.1 Completeness of Safety-Related Equipment List

Section 3.1 of the NRC SER [7] identified the following concern:

"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 procedures 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 703 items of equipment which were assessed by the staff."

In response to this concern, the Licensee stated [8]:

"In accordance with the requirements of IEB 79-01B, Alabama Power Company has conducted a review of the Emergency Operating Procedures to verify that equipment utilized by the operator for accident mitigation and that could be subjected to the accident environment is adequately qualified to perform its function. This review has determined that the subject instruments are adequately qualified to perform their intended function. Component work sheets have been completed for required instrumentation in the harsh environments.

With reference to instruments which are not fully qualified for the environment resulting from a HELB inside containment, these were included in the EOP's solely as a source of additional information for the operator. These instruments could be deleted from the EOP's if qualification for HELB inside containment was the sole determining factor for incorporation. These instruments, should they fail, would not mislead the operator because operators are trained to take actions based on a

combination of plant parameters rather than indication from a single instrument. In addition, as part of the human factors review conducted by the NRC in the licensing of Farley 2, the EOP's were reviewed and approved by the NRC, taking into account the fact that some cases non-qualified instrumentation was listed. Since the EOP's for Unit 1 are identical to those of Unit 2, this review also applies to Unit 1. A listing of these instruments with appropriate justification is provided in the following attachment [see Appendix C of this TER]."

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 SER [7] identified the following concern:

"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 assumed, and requires the licensee to verify, that the containment spray 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 possiblity exists that flooding of equipment may result from MSLBs."

In response to this concern, the Licensee stated [8]:

"The Farley Unit 1 containment spray system is composed of two redundant and independent spray trains, including required auxiliary systems, which are designed so that a single active failure during the injection phase, or a single active or passive failure during the recirculation phase following a design basis event does not result in a loss of the protective function. Therefore, the containment spray system is not subject to a disabling single-component failure, and thus satisfies the requirements of Section 4.2.1 of the DOR guidelines."

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

4.3.3 Environmental Service Conditions

4.3.3.1 Temperature, Pressure, and Humidity Conditions Inside Containment

Section 3.3 of the NRC SER [7] identified the following concern:

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

	Max Temp (°F)	Max Press (psig)	Humidity (%)
LOCA	300	47.5	100
MSLB	381	44.8	100

The staff has concluded that the minimum temperature profile used in the specifications 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 temperature profile does not appear to fully envelope in all cases the saturation temperature profile recommended by the staff. The peak temperature and peak pressure conditions do not occur at the same time. The saturation temperature of 295°F at the pressure of 47.5 psig should be used instead. The licensee temperature of 272°F at 47.5 psig does not satisfy the above requirement. The licensee should update his equipment summary tables to reflect the change. If there is any equipment that does not meet the staff position, the licensee must either provide justification that the equipment will perform its intended function under the specified conditions or propose corrective action.

The licensee has provided the results of the analysis, which was performed based on the NUREG-0588, to predict the equipment surface temperature during the MSLB event. Furthermore, the licensee has also provided information to show that equipment qualification temperature is higher than expected equipment surface temperature during the MSLB event. However, the licensee has failed to list higher equipment surface temperature as the required temperature in the Component Evaluation Worksheets. The licensee is requested to update the Component Evaluation Worksheets to reflect the higher equipment surface temperature expected due to the MSLB event as the required temperature."

The Licensee responded to the NRC concern as follows [8]:

"The containment pressure/temperature analysis and calculations of the equipment surface temperature in the harsh environment were performed using the Bechtel COPATTA computer program. COPATTA was derived from the

CONTEMPT program written for the Loss-of-Fluid Test (LOFT) program. A detailed description of COPATTA is contained in Bechtel Topical Report BN-TOP-3, Revision 4, 'Performance and Sizing of Dry Pressure Containment.' This report has been reviewed and approved by the NRC.

The following discussion outlines the procedures used to model the temperature response of safety-related electrical equipment following a postulated main steam line break (MSLB). The methodology which is used to calculate the heat transfer rates to the surface of a component is taken from the NRC Interim Evaluation Model for Equipment Qualification, IEB79-01B. An outline of this methodology, which is programmed into the containment analysis code COPATTA, is given in Section II.C.1. In Section II.C.2 the modeling of a solenoid valve typical of those used in the Farley containment is shown to demonstrate the specific modeling techniques used.

II.C.1 METHODOLOGY FOR SAFETY RELATED COMPONENT THERMAL ANALYSIS IN SUPERHEATED CONTAINMENTS

Component thermal analyses may be performed to justify environmental qualification test conditions less than those calculated during the containment environmental response calculation. The thermal analysis should be performed for the potential points of component failure such as thin cross-sections and temperature-sensitive parts where thermal stressing, temperature-related degradation, steam or chemical interaction at elevated temperatures, or other thermal effects could result in failure of the component electrically or mechanically. The heat transfer rate to components is calculated as follows:

a. Condensing heat transfer rate

$$q/A = h_{cd} \cdot (T_s - T_w)$$

where q/A = component surface heat flux

h_{cd} = the larger of 4x Tagami Correlation or 4x Uchida Correlation

T_s = saturation temperature (dew point)

T_w = component surface temperature

Both the Uchida and Tagami Correlations are empirical condensing heat transfer relationships. The Uchida Correlation is based on the ratio of steam to air masses. The Tagami Correlation is based on the free containment volume and the ratio of instantaneous to maximum energy release rates.

b. Convective heat transfer

A convective heat transfer coefficient should be used when the condensing heat flux is calculated to be less than the convective heat flux. During the blowdown period, a forced convection heat transfer correlation is used. For example:

$$Nu = C\,(Re)^n$$

where Nu = Nusselt No.
Re = Reynolds No.
c,n = empirical constants dependent on geometry and Reynolds No.

The velocity used in the evaluation of Reynolds Number is determined as follows:

$$V = 25\,\frac{M_{BD}}{V_{CONT}}$$

where V = velocity in ft/sec

M_{BD} = the blowdown rate in lbm/hr

V_{CONT} = containment volume in ft^3

After the blowdown has ceased or reduced to a negligibly low value, a natural convection heat transfer correlation is acceptable. However, use of a natural convection heat transfer coefficient must be fully justified whenever used ($h_{convection} = 2.0$).

II.C.2 COMPONENT MODELING

As an example of the modeling techniques used, the model of a three-way direct-acting solenoid valve manufactured by the Automatic Switch Company is presented in this section. This solenoid valve is typical of those used in the Farley containment. Figure B [Figure 4-1 in this TER] shows several scaled views of the component including its internal construction. The critical region to be analysed here is the upper housing, a four inch diameter circular cylinder, which contains the core assembly and coil used to energize the valve.

An implicit finite difference solution of the one-dimensional multi-region transient heat conduction equation is employed to determine the component's thermal response.

Mesh points, which define the length of nodes, are placed so that they lie on the external boundaries of the component, at the interface between materials, and at equal intervals between the interfaces and boundaries.

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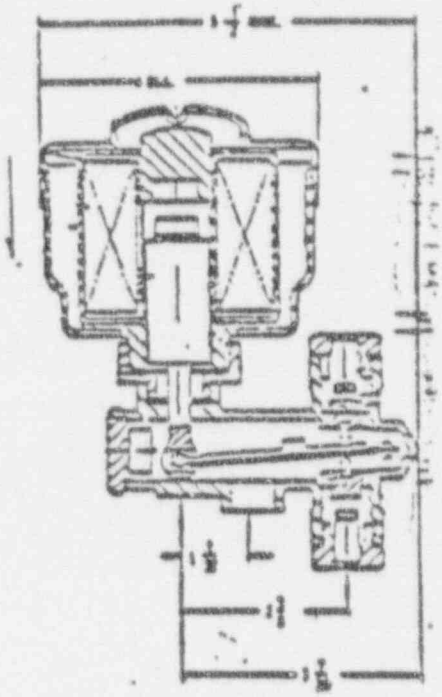
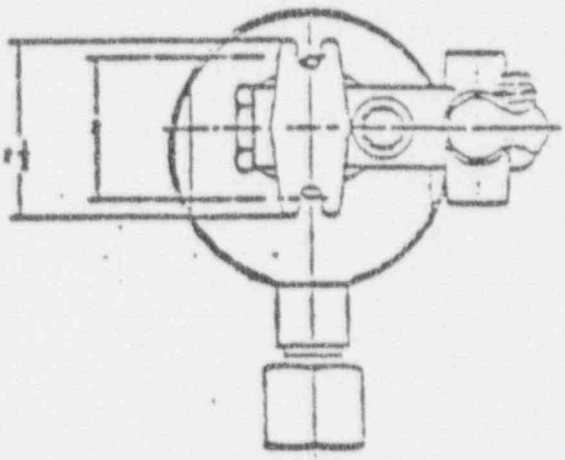
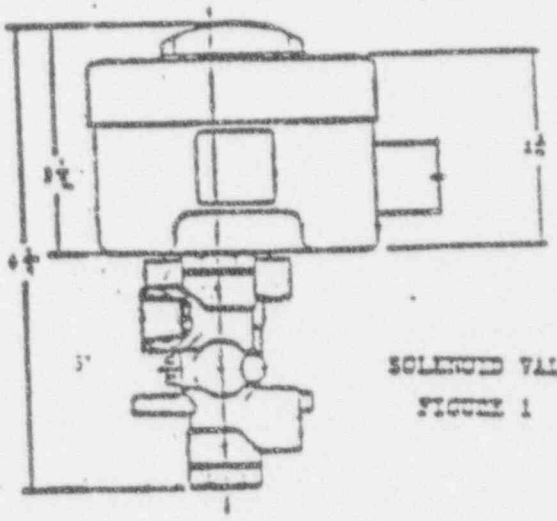


SIDE VIEW
INTERNALS



BOTTOM VIEW



SIDE VIEW

SOLENOID VALVE
FIGURE 1

FIGURE SUPPLIED
BY THE LICENSEE

Figure 4-1. Solenoid Valve (Licensee Figure 1)

The COPATTA computer code used for this analysis allows up to 20 material regions and 101 mesh points per component. A component is modeled, as appropriate, in a rectangular, a cylindrical, or a spherical geometry.

Figure 2 [Figure 4-2 in this TER] is a diagram of the valve, modeled as a cylinder with the center line on the left and the cylinder surface on the right. The material regions from left to right correspond to the steel core assembly with 15 nodes, the copper coil with 10 nodes, the steel coil housing with 10 nodes, the air gap separating the coil and housing with 40 nodes, and the painted steel upper housing with 15 nodes in the steel and 5 nodes in the paint.

Typical thermal conductivities and volumetric heat capacities for each material are also given in Figure 2. The valves characteristic length of 2.75 inches, the height of the solenoid valve, is used in the calculation of the time dependent convective heat transfer coefficient described in section IIb. As the component is symmetrical, left side centerline boundary condition is insulated (no heat transfer). The right side surface is exposed to the containment MSLB atmosphere.

The component's temperature distribution is hence calculated by the COPATTA computer code for limiting MSLB transients. From this, the maximum surface temperature of the component can be identified and used to determine if a component is qualified for the MSLB environment.

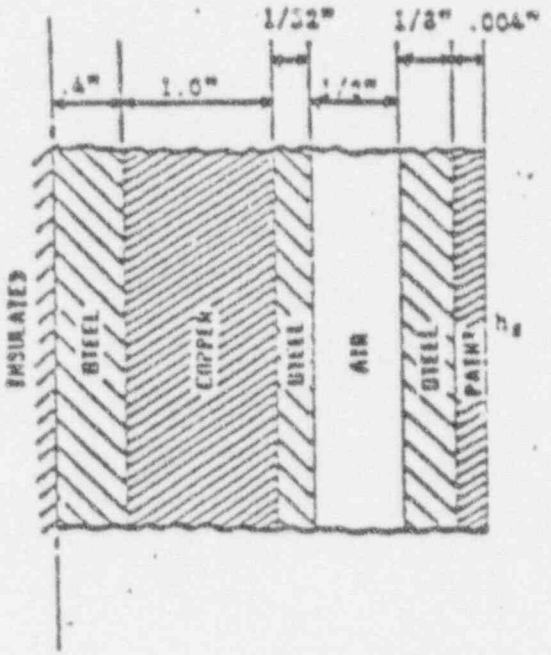
Temperatures reported as qualification temperatures were in all cases the measured ambient temperature. However, analysis shows that for the qualification test steam environment, the equipment surface temperature and ambient temperature are essentially identical. Using the calculation methodology previously described the surface temperature was calculated as a function of autoclave temperature and time. For this analysis only 1x Uchida is used to conservatively calculate the basic heat transport to the modelled components.

The component's surface temperature approaches within 3°F of the ambient temperature in no more than about 200 seconds in a saturated steam environment. This is true of all the component types modelled. Since the qualification test procedure for all components maintained the temperature above the qualification temperature for a period of at least 20 to 240 minutes, we judge the components to be qualified.

Component Evaluation Worksheets will not be updated to reflect the higher equipment surface temperature expected due to the MSLB event. These higher temperatures have been reported in Table B.1-1."

The Licensee has 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.

MODELED AS CYLINDER.



K_{PAINT} = 0.5 Btu/hr-ft-°F
C_{PAINT} = 31.2 Btu/ft³-°F

K_{STEEL} = 29.5 Btu/hr-ft-°F
C_{STEEL} = 53.6 Btu/ft³-°F

K_{AIR} = 0.017 Btu/hr-ft-°F
C_{AIR} = 0.0145 Btu/ft³-°F

K_{COPPER} = 227. Btu/hr-ft-°F
C_{COPPER} = 51.0 Btu/ft³-°F

CHARACTERISTIC LENGTH = 2.75"

SOLENOID VALVE

FIGURE 2

FIGURE SUPPLIED BY THE LICENSEE

Figure 4-2. Solenoid Valve (Licensee Figure 2)

4.3.3.2 Temperature, Pressure, and Humidity Conditions Outside Containment

Section 3.4 of the NRC SER [7] stated the following:

"The licensee has provided the temperature, pressure, and humidity associated with an HELB outside containment and applicable radiation levels associated with equipment in the proximity of recirculating fluid lines. The following area outside containment has been addressed:

(1) Auxiliary building

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 [7] stated the following:

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 5×10^7 gamma and 2×10^8 beta rads for the integrated dose. These values envelope the DOR guideline requirements and therefore are acceptable.

A required value outside containment of 1.1×10^6 in the RHR/LHSI pump room has been used by the licensee to specify limiting radiation levels outside containment. 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."

4.3.4 Chemical Spray

Section 3.6 of the NRC SER [7] identified the following concern:

"The licensee has specified that boric acid solution constitutes its chemical spray; however, the exact volume percent concentration and pH values were not provided. Therefore, for the purpose of this review, the effects of chemical spray will be considered unresolved. 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 [8]:

"In all cases the chemical spray portion of the equipment qualification tests utilized a boric acid solution concentration that meets or exceeds the Farley FSAR value of 2000 ppm boric acid. These concentrations are further delineated in Section III of this appendix."

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 [7] 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 15 ft elevation inside containment. Equipment below this level has been identified by the licensee.

The licensee stated that the components will perform their functions before becoming submerged. In this case, the licensee should provide an assessment of the failure modes associated with the submergence of the equipment. The licensee should also provide assurance that the subsequent failure of the component(s) will not adversely affect any other safety functions or mislead an operator. Additionally, the licensee should discuss operating time, across the spectrum of events, in relation to the time of submergence. If the results of the licensee's assessment are acceptable, then the component(s) may be exempt from the submergence parameter of qualification.

In addition, the licensee has identified a flood level of 3 ft 5 in. above the floor as the maximum flood level resulting from the worst-case HELB outside containment. The licensee has stated that all safety-related equipment outside containment is above this level."

In response to this concern, the Licensee stated [8]:

"Of the 56 safety related electrical components identified by the NRC as being potentially deficient for submergence, all but 16 have been relocated or verified to be above the flood level. These sixteen components are located in the containment, and include motor operated valves, solenoid valves and limit switches. In all cases, they will have performed their safety function before becoming submerged. Refer to

Table II.D-1 for a comparison of operating time vs. submergence time. A failure mode and effects analysis for the three types of components is also provided.

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

TABLE II.D-1

Component	El.	Time to Function	Time to Submergence
Q1E21ZS8149A	111'	30 sec.	1260 sec.
Q1E21ZS8149B	111'	30 sec.	1260 sec.
Q1E21ZS8149C	111'	30 sec.	1260 sec.
Q1E21V038A (MOV8808A)	111'-6"	30 sec.	1390 sec.
Q1E21V038B (MOV8808B)	112'-6"	30 sec.	1660 sec.
Q1E21V038C (MOV8808C)	113'-6"	30 sec.	1950 sec.
N1G21SV1003B	110'	30 sec.	983 sec.
N1G21ZS1003B	110'	30 sec.	983 sec.
N1G21ZS3376	109'	30 sec.	714 sec.
N1G21SV3376	109'	30 sec.	714 sec.
Q1E21SV8149AB	111'	30 sec.	1260 sec.
Q1E21SV8149BB	111'	30 sec.	1260 sec.
Q1E21SV8149CB	111'	30 sec.	1260 sec.
Q1E21ZS8808AB	111'-6"	30 sec.	1390 sec.
Q1E21ZS8808BB	112'-6"	30 sec.	1660 sec.
Q1E21ZS8808CB	113'-6"	30 sec.	1950 sec."

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 [7] identified the following concern:

"Section 7 of the DOR Guidelines does not require a qualified life to be established for all safety-related electrical equipment. However, the following actions are required:

1. Make a detailed comparison of existing equipment and the materials identified in Appendix C of the DOR guidelines. The first supplement to IEB-79-01B requires licensees to utilize the table in Appendix C 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 ag- elated 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 example, 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 the phase of their 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 [8]:

"For this review, 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.

For equipment covered by the response to IEB-79-01B where artificial (accelerated) aging methods were employed to demonstrate qualified life, the methodology in documented form has been extracted and condensed, and is presented in Section III for each type of equipment.

Where qualified life is demonstrated by methods other than accelerated aging, the methodology, together with appropriate justification for its use has been provided.

For equipment with no aging credentials, a qualified life has been established using analytical methodology based on Arrhenius models, which is acceptable to the staff. 'Weak link' age susceptible materials have been identified, and used as the basis for establishing qualified life of the equipment. Alabama Power Company will evaluate and review current surveillance and maintenance programs for possible modification for monitoring of potential age-related degradation and replacement schedules."

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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EAC ITEM NO.	COMPONENT	MANUFACTURER	MODEL NUMBER	LOCATION
1	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SMP1 SIZES 1,41	MAIN STEAM ROOM, ELEV. 134'0"
2	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SMP4	CONTAINMENT, ELEV. 111'0"
3	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SMP1 SIZES #6,000	CONTAINMENT, ELEV. 134'0" & 116'0"
4	SOLENOID VALVE	ASCO	NP SERIES	CONTAINMENT, ELEV. 129'0"
5	SOLENOID VALVE	AUTOMATIC VALVE	C5480	CONTAINMENT, ELEV. 105'0"
6	SOLENOID VALVE	ASCO	NP SERIES	CONTAINMENT
7	SOLENOID VALVE	TARGET ROCK	70A0001	CONTAINMENT
8	SOLENOID VALVE	ASCO	70A0016KF	CONTAINMENT, ELEV. 115'0"
9	SOLENOID VALVE	ASCO	NP SERIES	CONTAINMENT, ELEV. 109'0"
10	SOLENOID VALVE	ASCO	NT8300 SERIES	MAIN STEAM ROOM, ELEV. 131'0"
11	SOLENOID VALVE	ASCO	NP SERIES	MAIN STEAM ROOM, ELEV. 131'0"
12	SOLENOID VALVE	ASCO	NP SERIES	AUXILIARY BUILDING, ELEV. 131'0"
13	SOLENOID VALVE	ASCO	NT 8200 SERIES	MAIN STEAM ROOM, ELEV. 134'0"
14	SOLENOID VALVE	ASCO	NT2021013H	MAIN STEAM ROOM, ELEV. 131'0"
15	SOLENOID VALVE	ASCO	NT8200 SERIES	MAIN STEAM ROOM, ELEV. 131'0"
16	HYDROGEN RECOMBINER	WESTINGHOUSE	TYPE A	CONTAINMENT, ELEV. 155'0"
17	ELECTRIC MOTOR	JOY MANUFACTURING	TYPE P	CONTAINMENT, ELEV. 155'0"
18	RVD	ROSEMOUNT	176KF	CONTAINMENT, ELEV. 126'0"
19	RTD	ROSEMOUNT	176K3	CONTAINMENT, ELEV. 122'0"
20	RADIATION DETECTOR	VICTOREEN	0771	CONTAINMENT, ELEV. 155'0"
21	PRESSURE TRANSMITTER	BARTON	763 (LOT 1)	CONTAINMENT, ELEV. 109'0"
22	PRESSURE TRANSMITTER	FOXBORO	E11GM [illegible]	CONTAINMENT, ELEV. 106'0"
23	LEVEL SWITCH	DE LAVAL	LS36497	MAIN STEAM ROOM, ELEV. 127'0"
24	LEVEL SENSOR	DE LAVAL	XM54054423	CONTAINMENT
25	LEVEL TRANSMITTER	DE LAVAL	XM36495	CONTAINMENT, ELEV. 116'0"
26	LEVEL TRANSMITTER	BARTON	764 (LOT 1)	CONTAINMENT, ELEV. 159'0"
27	FLOW TRANSMITTER	FOXBORO	E13DK	CONTAINMENT, ELEV. 106'0"
28	LIMIT SWITCH	MARCO	EA100	CONTAINMENT
29	LIMIT SWITCH	MARCO	D24008	MAIN STEAM ROOM, ELEV. 131'0"
30	LIMIT SWITCH	MICRO SWITCH	OPLAN	MAIN STEAM ROOM, ELEV. 131'0"
31	LIMIT SWITCH	MARCO	EA170	MAIN STEAM ROOM, ELEV. 131'0"
32	LIMIT SWITCH	MARCO	EA100	CONTAINMENT, ELEV. 117'0"
33	LIMIT SWITCH	MARCO	EA100	CONTAINMENT, ELEV. 109'0"&110'0"
34	ELECTRICAL PENETRATION	GENERAL ELECTRIC	100 SERIES	CONTAINMENT, ELEV. 105'0"
35	ELECTRICAL PENETRATION	GENERAL ELECTRIC	100 SERIES	CONTAINMENT
36	TERMINAL BLOCK	STATES	TYPE ZNM	CONTAINMENT, ELEV. 116'0"
37	TERMINAL BLOCK	STATES	TYPE ZNM	CONTAINMENT
38	TERMINAL BLOCK	STATES	TYPE ZNM	MAIN STEAM ROOM, ELEV. 131'0"
39	ELECTRICAL CABLE, INSTRUMENT	BOSTON INSULATED WIRE	BD	MAIN STEAM ROOM, ELEV. 131'0"
40	ELECTRICAL CABLE, INSTRUMENT	BOSTON INSULATED WIRE	BD	CONTAINMENT, ELEV. 115'0"
41	ELECTRICAL CABLE, INSTRUMENT	BOSTON INSULATED WIRE	BD	CONTAINMENT, 115'0"
42	ELECTRICAL CABLE, CONTROL	OKONITE	SD	MAIN STEAM ROOM, ELEV. 131'0"
43	ELECTRICAL CABLE, CONTROL	OKONITE	SD	CONTAINMENT, ELEV. 115'0"
44	ELECTRICAL CABLE, CONTROL	OKONITE	SD	CONTAINMENT
45	LEVEL TRANSMITTER	BARTON	763 (LOT 1)	CONTAINMENT, ELEV. 109'0"
46	LIMIT SWITCH	MARCO	EA170	MAIN STEAM ROOM, ELEV. 129'0"

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

EQUIPMENT ITEM NO. 1
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
LIMITORQUE MODEL SMB; SIZES 1, 4T
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 1
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (MOV3350A, B, C (Q1N23V011A, B, C))
SERVICE: AUXILIARY FEEDWATER
LICENSEE SUBMITTAL: SCEW(S): C.2.16.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3232A, B, C (Q1N21V001A-B, B-B, C-B))
SERVICE: FEEDWATER SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.2 [5]

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

R, T, QV, RT, P, E, 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. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 1

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	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY

AGING

APCo RESPONSE

Type test accelerated aging techniques were used to thermally age the motor operated valves to meet the requirements of IEEE 382-72. Arrhenius techniques were used to establish a qualified life. Based on this methodology, qualified life of 40 years was established.

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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.)
EQUIPMENT DESCRIPTION			
Equipment Type	MVA	MOTORIZED VALVE ACTUATOR	
Manufacturer's Name (5.2.2/-/-)	LIMITORQUE	LIMITORQUE	
Model Number (5.2.2/-/-)	SMB, SIZES 1, 4T	SMB-0	
Serial Number	NOT STATED	189835 (O/N 600456-A)	NOTE A
Features/Mounting (5.2.6/-/-)	NOT STATED	RELIANCE CLASS RH INSUL. MOTOR, ID# 2Y267074A1EZ, TYPE P	X - NOTE B
Connections/Interfaces (5.2.6/-/-)	NOT STATED	CONTROL & POWER LEADS THRU FLEXIBLE, PRESSURE-TIGHT CONDUIT	NOTE B
Location/Elevation	MAIN STEAM ROOM / ≥131'-0"	AUTOCLAVE	
Equipment ID No.	See Pg. 1a	———	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	———	600456	
Report Date	———	751201	
Issued by	———	LIMITORQUE	
Prepared for	———	LIMITORQUE	
Referenced Reports	———	LOCKHEED 3521-4811	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	———	SIMULTANEOUS AND SEQUENTIAL TEST	-
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)	———	VALVE ACTUATION AND IR MEASUREMENTS	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	40 ft-#/460 Volts/60 Hz	NOTE B

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

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)	—	SUCCESSFUL OPERATION OF THE MVA	
Accuracy (5.2.5/-/-)	—	—	
Number of Specimens	—	1 COMPLETE MVA AND 1 ADDITIONAL MOTOR	
Test Instruments Calibrated	—	YES	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	ACTIVE	—	
Test Duration (5.2.1/-/-)	—	30 DAYS	NOTE C
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	Few Seconds	—	NOTE C
Required Function Time	1 hr (MAX.)	—	NOTE C
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	—	—	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	—	—	
1. Representative Sample		—	
2. Baseline Data		—	
3. Performance Extremes		—	
4. Thermal Aging		YES	
5. Radiation Aging		YES	
6. Wear Aging		YES	
7. Vibration/Seismic		YES	
8. DBE Exposure		YES	
9. Post-DBE Exposure		YES	
10. Inspection		YES	
Aging (5.2.4, 7.0/4.0/4.0) Thermal Aging/Basis	104 F (max.)* for 40 years Design	100 HOURS @ 180 C FOR THE MOTOR STATORS ONLY NO BASIS	X - NOTE D
Material Aging Evaluation (7.0/-/-)	NONE	NO	NOTE D
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	—	NOT STATED	
Radiation Aging, Type	NONE	GAMMA	

* Assumed

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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)	——	4 Mrd (COMPLETE UNIT)	
Radiation Aging, Dose Rate	——	1 Mrd/Hr	
Radiation Aging, Method	——	TEST (SEQUENTIAL)	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	——	NOT STATED	
Operational Aging (-/4.2/-)	——	1208 OPEN/CLOSE CYCLES+ 803 (LOCA+POST-LOCA) CYCLES + 2184 CYCLES OF MVA WITH BASE TEST MOTOR INSTALLED	
Other Age Conditioning (-/4.2/-)	——	SEISMIC/VIBRATIONAL	
Qualified Life Claimed/ Established (5.2.4/4.2.3/-)	40 years/ NONE	NONE	X - NOTE D
Normal Ambient Temperature*	104°F	——	
Normal Ambient Radiation	—	——	
Normal Ambient Humidity*	20-90%	——	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	yes	——	
On-Going Analysis of Failures and Degradation (7.0/-/-)	yes	——	
Margin (General) (6.0/3.0/3.0)	—	——	
Margin (NUREG-0588, Cat. I) (-/3.2/-)		NOT STATED, EXCEPT FOR THE POST-LOCA ADDITIONAL MVA CYCLING	
1. Temperature (+15°F)		——	
2. Pressure (+10%, 10 psig max)		——	
3. Radiation (not required)		——	
4. Time (+10%, +1 hour + function time minimum)		——	

Assumed

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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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)	HELB	LOCA	
Radiation Type	NONE	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)		200 Mrd	
Radiation Dose Rate (rd/hr)		1 Mrd/Hr	
Radiation Qual. Method (5.3.1/-/-)		TEST	
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/-/-)		204 Mrd TOTAL DOSE	
Plateout Dose Considered (-/1.48/1.48)		———	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		———	

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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	1000°F/sec; ≈ 50psi/sec for .2sec.	10F/SEC., 2.5 psig/SEC.	
Peak: °F/psig/RH/Time	308/5.8/100/ ≥ 2sec	310/78/100/30 min.	* PEAKS, SEE C
Decrease To: °F/psig/RH/Time	214/0/100/ Greater Than 2seconds	255/30/100/91 hours	
Decrease To: °F/psig/RH/Time		195/10/100/423 hours	
Decrease To: °F/psig/RH/Time		COOL TO AMBIENT	
Equipment Surface Temperature (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)	N/A	TEST PER IEEE-323-1974	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)		3000 PPM BORON(0.28 molar H_3BO_3),0.064 molar $Na_2S_2O_3$ NaOH to pH of 10.5 @ 77F	
Spray Density (gpm/ft^2)		1.2 gpm	
Spray Duration		24 hours (ASSUMED)	
Submergence Duration (4.1.3/2.2.5/2.2.5)	NONE	———	
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: "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 documen. .s).

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.

____ 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:

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

NOTES:

A. The licensee has not provided any serial and/or order number(s) on the System Component Evaluation Worksheets (SCEWs) for this equipment item.

B. The licensee has not fully identified the installed equipment (see page 5f) to the point where similarity to the test specimen can be established, nor has the licensee provided documentation from the manufacturer (Limitorque) which would establish similarity via their records.

C. The test profile and simulated accident conditions envelop the required conditions adequately. The test duration also envelopes the required accident duration.

D. The thermal aging performed in PCR #706 was limited to the thermal aging of the motor stator only. Nowhere in PCR #706 was it stated or implied that the thermal aging that was performed on the motor stator used the Arrhenius technique (or any acceptable method) as the basis for the thermal aging times and temperatures that were chosen. No additional information has been supplied by the licensee which would justify or support the claim of a 40 year qualified life. No additional features (motor-brake assemblies, type of torque or limit switch ...) have been identified, nor have any of the materials of construction been identified (i.e. teflon lead wire insulation...). In order to calculate a conservative qualified life estimate, the installed equipment, including all components and materials of construction, must be identified and analyzed.

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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:

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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 _____.)

X 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. 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)	
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	

LICENSEE RESPONSE TO NRC SER (Continued)

SUBMERGENCY OF MOV 8808 A, B, C

LOCATION AND SAFETY FUNCTION

MOV's 8808 A, B, and C are located inside containment in the accumulator injection lines.

MOV's 8808 A, B, and C are required per technical specification to be open whenever the plant is in the power operation, startup, or hot standby (above 1000 psig) mode of operation. Under these modes, power to the valve control circuits is required to be disconnected. If an isolation valve is closed, technical specifications require the valve to be immediately opened or the plant to be in hot standby within 1 hour and hot shutdown within the next 8 hours. These valves receive a confirmatory safety injection signal to automatically open the valves should they be closed within technical specification limits.

The safety function of MOV's 8808 A, B, and C is to be in the open position during the injection phase of post-LOCA operation. The technical specifications, power lockout, and confirmatory safety injection signal features ensure that these valves are not mispositioned during the injection phase of post-LOCA operation. Once open, no further mechanical movement of MOV's 8808 A, B, and C is required to accomplish a post-LOCA safety function.

The motor operators for MOV's 8808 A, B, and C are located approximately 6 feet above floor level inside containment. Therefore, submergence of the motor operators can occur following a design basis accident. The following failure mode analysis and justification have been developed assuming submergence and is a conservative approach.

FAILURE MODE ANALYSIS

The failure modes to be identified are those which could cause the valve to go closed prior to the pressurized injection of the accumulator into the reactor coolant system. This single mode needs to be identified because the valves are normally opened and the control power disconnected.

The circuit to be analyzed is shown on Figure III.3-1 and operates as follows. The valve motor is operated by the application of 575 Vac power to the motor terminals by standard reversing contactors. The contactors are controlled by a remote switch. Switch closure applies control power to the contactor coil causing the contactors to energize the valve motor and seal itself in until the valve has completed its travel. At this point, limit or torque switches located at the valve, interrupt the seal-in, de-energize the contactor coil and thereby

LICENSEE RESPONSE TO NRC SER (Continued)

FAILURE MODE ANALYSIS (CONT.)

remove power from the valve motor. Control circuits are transformer isolated and ungrounded. Furthermore, when the contactor is de-energized, only one leg of the control circuit is directly exposed to the containment. The other leg is isolated from faults caused by the containment environment, by either the control switch or by position indication lights.

Two circuits need to be analyzed for failures: the power circuit and the control circuit. The power feed to the motor is de-energized immediately after valve closure and remains de-energized throughout the submergence period. Therefore, submergence has no direct impact on the power circuit.

The control circuit is shown on Figure III.3-1. The highlighted limit switches LS1-LS3 and the torque switches TS1 and TS2 are the only valve operator components in the control circuit that could be submerged. The condition to be analyzed is whether the open valve can be spuriously moved to the closed position by submergence. LS1, LS2, LS3 and TS1 need not be addressed because they are located in the open circuit, and their status cannot cause closing of the valve. Short circuits need not be addressed for LS4 and LS5 because these switches are already closed when the valve is open.

The effect of a short circuit on limit switches, while the valve is open, would be erroneous valve position indicating only. This is the only result of a short circuit caused by submergence.

Ground path circuits need not be addressed because the closing contactor coil is open-circuited by a control switch contact.

From the foregoing analysis, the only undesired result that needs to be addressed further is the possible erroneous lighting of the indicating lights.

JUSTIFICATION FOR OPERATION

With the failure analysis conclusions indicated above safe and reliable operation can be assured for the following reasons. When in the power operation, startup, and hot standby modes, valves 8808 A, B, and C are open and no mechanical operation is required. Inadvertent closure as a result of submergence is not possible since control power is disconnected.

Should a valve be closed during the power operation, startup or hot standby mode of operation, any closed valve will open upon receipt of a safety injection signal. For a LOCA, the water level in containment will not rise above the operator prior to completion of valve opening.

Once opened, no further mechnical movement of the valves is required following

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LICENSEE RESPONSE TO NRC SER (Continued)

JUSTIFICATION FOR OPERATION (CONT.)

a LOCA. Note that associated limit switches may give an incorrect valve position indication when submerged. This incorrect position indication is acceptable since the operator is trained to utilize a combination of plant parameters rather than indication from a single instrument. With the exception of submergence, the MOV's SB08 A, B, and C are environmentally qualified. The matter of submergence has been addressed here in sufficient depth to demonstrate that the safety related position of the valves will not be compromised.

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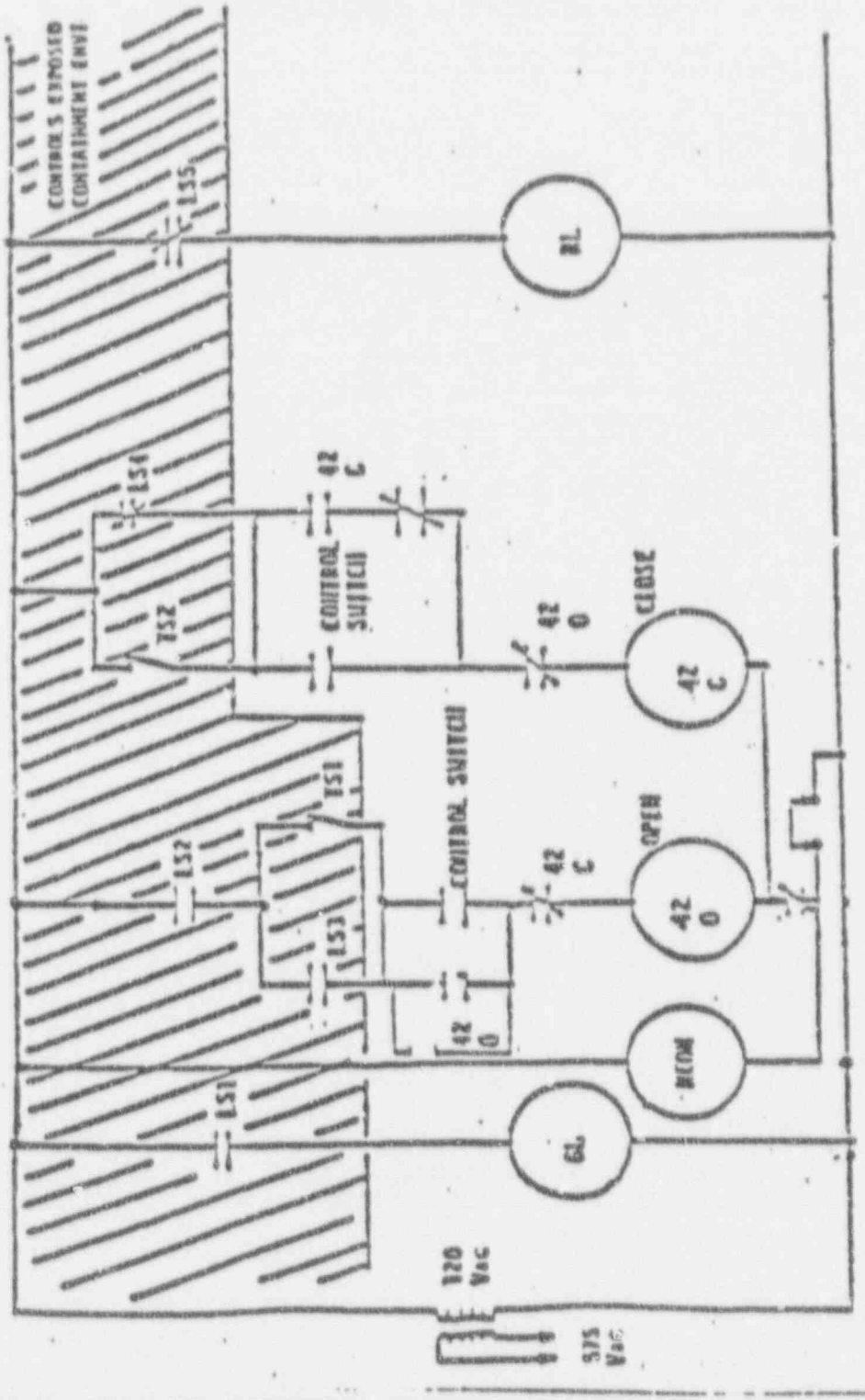
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

LICENSEE RESPONSE TO NRC SER (Continued)



MOV-8808 A,B,C- CONTROL CIRCUIT

Figure 11.e-1

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

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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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)

X Other (see page 4b)

X Resultant NRC Qualification Evaluation Category (IIIa/~~IIIb~~)

X 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 3d)

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

This equipment is locked open with power removed during power operation. It is locked in its safety position and does not have to operate to perform its safety function.

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 329

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ITEM NO. 3
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 134'6" & 116'0"
LIMITORQUE MODEL SMB; SIZES 00, 000
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 3
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (MOV3536 (Q1E23V021))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3530 (Q1E23V003))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3528A, B, C, D; (Q1E23V022A, B, C, D))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3835A, B; (Q1E23V025A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3872A, B (Q1E22V001A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.3 [5]

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

R, T, QV, RT, P, H, (CS) (A) B, (R), (M) I, QM, RPN, EQN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a, 1a2
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. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

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

X The Licensee (has/~~has not~~) provided a response to the SEP concerns.

X 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.

X 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. 3

EQUIPMENT ITEM NO. 3 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV8112 (Q1E21V249A))
SERVICE: CVCS/SAFETY INJECTION
LICENSEE SUBMITTAL: SCEW(S): C.2.9.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3660 (Q1E14V002))
SERVICE: CONTAINMENT COOLING
LICENSEE SUBMITTAL: SCEW(S): C.2.6.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3318B (Q1E14V004))
SERVICE: CONTAINMENT COOLING
LICENSEE SUBMITTAL: SCEW(S): C.2.6.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3046 (Q1P17V097))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.20.2 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3441A, B, C, D (Q1P16V207A, B, C, D))
SERVICE: WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3131 (Q1P16V081))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.4 [5]

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

R, T, CL, RT, P, M, CS, A, S, (R), M, I, UM, 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. 3

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	
II.b	Equipment Not Qualified	X
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. 2

LICENSEE RESPONSE TO NRC SER

COMPONENT: MOV's - INSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the motor operated valves to meet the requirements of IEEE 382-72. Arrhenius techniques were used to establish a qualified life. Based on this methodology, qualified life of 40 years was established.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm (Reference: Limitorque Report 600616). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of MOV's inside the containment subject to submergence, refer to Appendix A, Section II.B.
MARGIN	IEEE 382-1972 did not require any specific margins be included in establishing test parameters. However, the following margins can be identified:

a) Temperature - The 315°F qualification test condition exceeds 300°F required temperature.

b) Pressure - The 84.7 psia qualification test condition provides adequate margin above calculated Farley Unit 1 containment pressure of 62.3 psia.

c) Radiation - The 1×10^8 Rads, qualification test condition provides adequate margin above the specified Farley Unit 1 containment level of 3×10^7 Rads. Adequate Margin is thus demonstrated.

Adequate margin is thus demonstrated.

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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.)
EQUIPMENT DESCRIPTION			
Equipment Type	MVA	MOTORIZED VALVE ACTUATOR	
Manufacturer's Name (5.2.2/-/-)	LIMITORQUE	LIMITORQUE	
Model Number (5.2.2/-/-)	SMB, SIZE 3 CO, 000	SMB-0	
Serial Number	NOT STATED	189635 (O/N 600456-A)	NOTE A
Features/Mounting (5.2.6/-/-)	NOT STATED	RELIANCE CLASS RH INSUL. MOTOR, ID# 2Y267074A1E2, TYPE P	X - NOTE B
Connections/Interfaces (5.2.6/-/-)	NOT STATED	CONTROL & POWER LEADS THRU FLEXIBLE, PRESSURE-TIGHT CONDUIT	NOTE B
Location/Elevation	CONTAINMENT Elev. 134'-6" 116'-0"	AUTOCLAVE	
Equipment ID No.	See Pg. 1a	———	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	———	600456	
Report Date	———	751201	
Issued by	———	LIMITORQUE	
Prepared for	———	LIMITORQUE	
Referenced Reports	———	LOCKHEED 3521-4811	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	———	SIMULTANEOUS AND SEQUENTIAL TEST	-
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)	———	VALVE ACTUATION AND IR MEASUREMENTS	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	40 ft-#/460 Volts/60 Hz	NOTE B

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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.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	—	SUCCESSFUL OPERATION OF THE MVA	
Accuracy (5.2.5/-/-)	—	—	
Number of Specimens	—	1 COMPLETE MVA AND 1 ADDITIONAL MOTOR	
Test Instruments Calibrated	—	YES	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	ACTIVE	—	
Test Duration (5.2.1/-/-)	—	30 DAYS	NOTE C
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	12 days	—	
Required Function Time	1 hour (MAX.)	—	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	—	—	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	—	—	
1. Representative Sample		—	
2. Baseline Data		—	
3. Performance Extremes		—	
4. Thermal Aging		YES	
5. Radiation Aging		YES	
6. Wear Aging		YES	
7. Vibration/Seismic		YES	
8. DBE Exposure		YES	
9. Post-DBE Exposure		YES	
10. Inspection		YES	
Aging (5.2.4, 7.0/4.0/4.0) Thermal Aging/Basis	136 F (MAX.)* for 40 yrs Design	100 HOURS @ 180 C FOR THE MOTOR STATORS ONLY No BASIS	A - NOTED
Material Aging Evaluation (7.0/-/-)	NONE	NO	NOTE D
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	—	NOT STATED	
Radiation Aging, Type	1 M ACC. DOSE	GAMMA	

* ASSUMED

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)	———	4 Mrd (COMPLETE UNIT)	
Radiation Aging, Dose Rate	———	1 Mrd/Hr	
Radiation Aging, Method	———	TEST (SEQUENTIAL)	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	———	NOT STATED	
Operational Aging (-/4.2/-)	———	1208 OPEN/CLOSE CYCLES+ 803 (LOCA+POST-LOCA) CYCLES + 2184 CYCLES OF MVA WITH BASE TEST MOTOR INSTALLED	
Other Age Conditioning (-/4.2/-)	———	SEISMIC/VIBRATIONAL	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 years/ NONE	NONE	X-NOTED
Normal Ambient Temperature*	135°F	———	
Normal Ambient Radiation	———	———	
Normal Ambient Humidity *	20-90%	———	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	yes	———	
On-Going Analysis of Failures and Degradation (7.0/-/-)	yes	———	
Margin (General) (6.0/3.0/3.0)	———	———	
Margin (NUREG-0588, Cat. I) (-/3.2/-)		NOT STATED, EXCEPT FOR THE POST-LOCA ADDITIONAL MVA CYCLING	
1. Temperature (+15°F)		———	
2. Pressure (+10%, 10 psig max)		———	
3. Radiation (not required)		———	
4. Time (+10%, +1 hour + function time minimum)		———	

* ASSUMED

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.)
ACCIDENT CONDITIONS			
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	Gamma	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	5.0 E07 rd	200 Mrd	
Radiation Dose Rate (rd/hr)	—	1 Mrd/Hr	
Radiation Qual. Method (5.3.1/-/-)	—	TEST	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	NOT STATED	—	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	—	—	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	5.0 E09 rd	204 Mrd TOTAL DOSE	
Plateout Dose Considered (-/1.48/1.48)	—	—	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	—	—	

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NRC Contract No. NRC-03-79-118
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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.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	86°F/sec.; 1.1 psi/sec	10F/SEC., 2.5 psig/SEC.	
Peak: °F/psig/RH/Time	300/47.5/100/ 7 minutes	310/78/100/30 min.	2 PEAKS, NOTE C
Decrease To: °F/psig/RH/Time	260/25/100/ 10 minutes	255/30/100/91 hours	
Decrease To: °F/psig/RH/Time	180/12/100/ 8 hours	195/10/100/623 hours	
Decrease To: °F/psig/RH/Time	drop to ambient in 11.57 day	COOL TO AMBIENT	
Equipment Surface Temperature (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 PER IEEE-323-1974	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 plus NaOH	3000 PPM BORON(0.28 molar H_3BO_3),0.064 molar $Na_2S_2O_3$ NaOH to pH of 10.5 @ 77F	NOTE C
Spray Density (gpm/ft^2)	NOT STATED	1.2 gpm	
Spray Duration	NOT STATED	24 hours (ASSUMED)	
Submergence Duration (4.1.3/2.2.5/2.2.5)	NONE	—	
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. 3

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).

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.

____ 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:

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

A. The licensee has not provided any serial and/ order number(s) on the System Component Evaluation Worksheets (SCEWs) for this equipment item.

B. The licensee has not fully identified the installed equipment (see page 5f) to the point where similarity to the test specimen can be established, nor has the licensee provided documentation from the manufacturer (Limitorque) which would establish similarity via their records.

C. The test profile and simulated accident conditions envelop the required conditions adequately. The test duration also envelopes the required accident duration.

D. The thermal aging performed in PGR #706 was limited to the thermal aging of the motor stator only. Nowhere in PGR #706 was it stated or implied that the thermal aging that was performed on the motor stator used the Arrhenius technique (or any acceptable method) as the basis for the thermal aging times and temperatures that were chosen. No additional information has been supplied by the licensee which would justify or support the claim of a 40 year qualified life. No additional features (motor-brake assemblies, type of torque or limit switch ...) have been identified, nor have any of the materials of construction been identified (i.e. teflon lead wire insulation...). In order to calculate a conservative qualified life estimate, the installed equipment, including all components and materials of construction, must be identified and analyzed.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

CONCLUSION:

This equipment item is assigned to NRC Qualification Category II.A — Qualification Not Established because similarity between the installed and tested equipment has not been established by the licensee. If similarity can be established, then thermal aging/qualified life remains as the only issue to be resolved.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

EQUIPMENT ITEM NO. 4
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 129'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 4
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P13SV2867B, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.7 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P12SV3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.7 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1E21SV8871)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.6 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1G21SV7126)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1B31SV8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.2 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P17SV3443)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P17SV3184)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.3 [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	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. 4

EQUIPMENT ITEM NO. 4 (CONTINUED)
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P15SV3103, 3765, 3766, 3179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P15SV3103, 3180A, B, C; 3181A, B, C; 3104)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [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, RFN, 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. 4

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

X 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.

X The Licensee has presented information which shows there are no outstanding qualification deficiencies.

X 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. 4

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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)	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	X
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

0054478

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	AFCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY CHEMICAL SPRAY RADIATION QUALIFICATION METHOD MARGIN REPLACEMENT	Some solenoid valves in containment identified as having insufficient documentation of qualification have been replaced with fully qualified ASCO catalog HT-1 models. The master list and component evaluation work sheets have been revised to document the qualification of these solenoid valves. Action for the remaining outstanding solenoid valves is discussed in Section b (Rev. 3). This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. AFCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix 1, Section 11.B.

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"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

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"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

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"ALL INFORMATION ON THIS
PAGE REDACTED AS
PROPRIETARY PER LICENSING
BOARD ORDER"

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"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

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"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

0054484

"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

EQUIPMENT ITEM NO. 5
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 105'0"
AUTOMATIC VALVE MODEL C5439
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 5
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1E12SV3999A, B)
LICENSEE SUBMITTAL/ SCEW(S): C.2.6.8 [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, (VM) (SPN) EQN, SEN, QI, RPS, None, Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a
Summary of Licensee Response 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~~

0054485

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

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

X 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.

X 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.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action FIRST REFUELING 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
(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. 5

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	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 Qualification Review	
IV	Documentation Not Made Available	

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LICENSEE RESPONSE TO NRC SER

Solenoid Valves - Inside Containment

Of these solenoid valves, all but 4 have been replaced with fully qualified ASCO HP series valves, and the associated component Evaluation Work Sheets have been revised to reflect the qualification parameters. Out of remaining 4 solenoid valves, 2 have been deleted from master list and remaining 2 are used on containment isolation valves and perform their safety function prior to the effects due to the accident environs. Should failure occur, the isolation function of these valves would be maintained and such failure would not adversely affect other safety-related equipment. Furthermore, these solenoid valves have high temperature coils and contain no plastic parts. Although complete qualification testing or analysis have not been performed on the specific assemblies, adverse qualification tests have been performed on individual constituent components of the valve assembly. Based on the fact that no materials which have deleterious effects due to the harsh environments are included in these valves and that previous limited testing has successfully verified qualification, no action out of these valves is acceptable. Purchase orders have not been issued for one of these solenoid valves because a qualified direct replacement valve was available. As a result of an engineering evaluation a suitable qualified replacement solenoid valve has been determined and a purchase order will be issued upon receipt of a quotation from the original air operated valve vendor. The documentation of qualification for the replacement solenoid valve will be equal to that of the other qualified solenoid valves and the replacement will be completed at the next scheduled refueling outage. If any problems arise beyond the control of Alabama Power Company which may impact this schedule, the NRC will be notified.

Purchase orders were not issued for the remaining two solenoid valves due to the fact that a reevaluation has been performed in regard to the need for qualification of these components. These solenoid valves are utilized on the 48" containment purge ACVs. Alabama Power Company has committed to operation with these valves maintained in the closed position in all modes except mode 5 and 6 (cold shutdown and refueling). With the containment purge valves in the closed position, these subject solenoid valves are in the deenergized position. Subsequent failure of these solenoid valves will not result in opening of the purge valves and containment isolation will be maintained. Based on this evaluation, these solenoid valves have been deleted from our Master List of equipment requiring qualification.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6a

EQUIPMENT ITEM NO. 6
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 6
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1B31SV0444BA, BB; 445AA, AB)
LICENSEE SUBMITTAL: SCEW(S): TMI-3.5 [5, 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~~

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

0054490

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

X 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.

X 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. 6

0054491

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)	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	
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	

REFER TO ITEM NO. 4 FOR EVALUATION (EXCLUDING SUBMERGENCE)

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

0054492

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	APCs RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY CHEMICAL SPRAY RADIATION QUALIFICATION METHOD MARGIN REPLACEMENT	Some solenoid valves in containment identified as having insufficient documentation of qualification have been replaced with fully qualified ASCO catalog HP-1 models. The master list and component evaluation work sheets have been revised to document the qualification of these solenoid valves. Action for the remaining outstanding solenoid valves is discussed in Section D (Rev. 3). This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCs will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix 1, Section II.B.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

EQUIPMENT ITEM NO. 7
SOLENOID VALVE LOCATED IN THE CONTAINMENT
TARGET ROCK MODEL 79AB001
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 7
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): REACTOR VESSEL HEAD VENTILATION (Q1B13SV2213A, B; 2214A, B)
SERVICE: REACTOR VESSEL HEAD VENTILATION
LICENSEE SUBMITTAL: SCEW(S): TMI-2.2 [5, 22]

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

R, T, QV, RT, P, E, CS, A, S, (E), 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, 5k~~
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. 7

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X 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
X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REFUELING OUTAGE PLUS TO 6/20/82.)

___ 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. 509

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	
I.b	Equipment Qualification Pending Modification	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 Qualification Review	
IV	Documentation Not Made Available	

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY CHEMICAL SPRAY RADIATION QUALIFICATION METHOD MARGIN REPLACEMENT	Some solenoid valves in containment identified as having insufficient documentation of qualification have been replaced with fully qualified ASCO catalog HP-1 models. The master list and component evaluation work sheets have been revised to document the qualification of these solenoid valves. Action for the remaining outstanding solenoid valves is discussed in Section B (Rev. 3). This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix 1, Section II.B.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

LICENSEE RESPONSE TO NRC SER (Continued)

Chapter 4 - Summary of Outstanding Items

As discussed in Chapter 2, the following three types of equipment were installed without complete qualification documentation.

Manufacturer	Generic Name	Model	No of Items	Chapter 2 Reference
Target Rock	Solenoid valve	79ABOO1	4	Section 2
Victoreen	Radiation sensor	877-1	2	Section 4
GEMS-Delaval	Level sensor	XM-54854	2	Section 7

The Target Rock solenoid valves and GEMS-Delaval level transmitters are presently undergoing qualification testing, which is expected to be completed during the fourth and third quarter of 1982, respectively. The test report for the Victoreen radiation detectors was recently evaluated. As discussed in Chapter 2, the evaluation of the test report indicates a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. This modification will be completed during the next outage of sufficient duration to complete the planned modifications.

All of the above equipment were installed prior to the completion of the qualification test program and the evaluation of the associated test reports. Alabama Power Company installed this equipment in order to provide the state-of-the-art coincident with the implementation dates required by NUREG-0737. Alabama Power Company will continue to monitor the progress of these ongoing qualification test programs.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

EQUIPMENT ITEM NO. 8
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 111'0"
ASCO MODEL 2063816RF
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 8
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1E21SV8149AB, BB, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.9 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1G21SV1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.4 [5]

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

(R) (T) (Ω) RT, (P) (H) (CS) (A) (S) (R), M, I, (JM) (RPN) EQN, 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. 8

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

__X__ 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.

__X__ 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

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

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)	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	X
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	

REFER TO ITEM NO. 4 FOR EVALUATION

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY CHEMICAL SPRAY RADIATION QUALIFICATION METHOD MARGIN REPLACEMENT	Some solenoid valves in containment identified as having insufficient documentation of qualification have been replaced with fully qualified ASCO catalog EF-1 models. The master list and component evaluation work sheets have been revised to document the qualification of these solenoid valves. Action for the remaining outstanding solenoid valves is discussed in Section 9 (Rev. 5). This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
EMERGENCE	For a discussion of the effects of submergence, refer to Appendix 1, Section II.B.

LICENSEE RESPONSE TO NRC SER (Continued)

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

TABLE II.D-1

Component	El.	Time to Function	Time to Submergence
Q1E21ZS8149A	111'	30 sec.	1260 sec.
Q1E21ZS8149B	111'	30 sec.	1260 sec.
Q1E21ZS8149C	111'	30 sec.	1260 sec.
Q1E21V038A (MOV8808A)	111'-6"	30 sec.	1390 sec.
Q1E21V038B (MOV8808B)	112'-6"	30 sec.	1660 sec.
Q1E21V038C (MOV8808C)	113'-6"	30 sec.	1950 sec.
N1G21SV1003B	110'	30 sec.	983 sec.
N1G21ZS1003B	110'	30 sec.	983 sec.
N1G21ZS3376	109'	30 sec.	714 sec.
N1G21SV3376	109'	30 sec.	714 sec.
Q1E21SV8149AB	111'	30 sec.	1260 sec.
Q1E21SV8149BB	111'	30 sec.	1260 sec.
Q1E21SV8149CB	111'	30 sec.	1260 sec.
Q1E21ZS8808AB	111'-6"	30 sec.	1390 sec.
Q1E21ZS8808BB	112'-6"	30 sec.	1660 sec.
Q1E21ZS8808CB	113'-6"	30 sec.	1950 sec.

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

EQUIPMENT ITEM NO. 9
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 109'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 9
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1G21SV3376)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.2 [5]

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

(R) (T) (VI) RT, (F) (H) (SS) (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. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

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

X 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.

X 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. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

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)	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	X
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	

FOR EVALUATION REFER TO ITEM NO. 4

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY CHEMICAL SPRAY RADIATION QUALIFICATION METHOD BRECIE REPLACEMENT	Some solenoid valves in containment identified as having insufficient documentation of qualification have been replaced with fully qualified ASCO catalog HP-1 models. The master list and component evaluation work sheets have been revised to document the qualification of these solenoid valves. Action for the remaining outstanding solenoid valves is discussed in Section D (Rev. 5). This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix I, Section II.D.

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NRC Contract No. NRC-03-79-118
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

LICENSEE RESPONSE TO NRC SER (Continued)

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

TABLE II.D-1

Component	El.	Time to Function	Time to Submergence
Q1E21ZS 8149A	111'	30 sec.	1260 sec.
Q1E21ZS8149B	111'	30 sec.	1260 sec.
Q1E21ZS8149C	111'	30 sec.	1260 sec.
Q1E21V018A (MOVS80SA)	111'-6"	30 sec.	1390 sec.
Q1E21V018B (MOVS80SB)	112'-6"	30 sec.	1660 sec.
Q1E21V018C (MOVS80SC)	113'-6"	30 sec.	1950 sec.
N1G21SV100JB	110'	30 sec.	983 sec.
N1G21ZS100JB	110'	30 sec.	983 sec.
N1G21ZS0376	109'	30 sec.	714 sec.
N1G21SV0376	109'	30 sec.	714 sec.
Q1E21SV8149AB	111'	30 sec.	1260 sec.
Q1E21SV8149BB	111'	30 sec.	1260 sec.
Q1E21SV8149CB	111'	30 sec.	1260 sec.
Q1E21ZS8808AB	111'-6"	30 sec.	1390 sec.
Q1E21ZS8808BB	112'-6"	30 sec.	1660 sec.
Q1E21ZS8808CB	113'-6"	30 sec.	1950 sec.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

EQUIPMENT ITEM NO. 10
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL HT8300 SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 10
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N12SV3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N25SV3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.2 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N23SV3228AA, BA, CA; 3227AA, BA, CA)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1C22SV0478A, B; 0488A, B; 498A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.5 [5]

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

R, (T) (VT) RT, (P) (H) CS, (A) S, (R), (M) I, (VM) (SPN) 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. 10

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

X 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.

X 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.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REFUELING OUTAGE PRIOR TO 6/30/82.)

___ 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. 10

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	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 Qualification Review	—
IV	Documentation Not Made Available	—

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD QUALIFICATION INFORMATION MARGIN RADIATION REPLACEMENT	Some of the solenoid valves outside containment identified as requiring replacement, have been replaced with fully qualified ASCO catalog NP-1 models. Corresponding Masterlist and Component sheets have been updated to reflect qualified models. Remaining solenoid valves will be replaced by fully qualified models during the next refueling outage currently scheduled prior to June 30, 1982. The qualified components have been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11.

EQUIPMENT ITEM NO. 11
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 11
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3368AA, BA, CA; 3976A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.10 [5]

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

R, (T) (W) RT, (P) (H) CS, (A) S, (R), (M) I, (QM) (RPN)-EQN, 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, ~~3c, 3d, 3e~~
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. 11

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

X 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.

X 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
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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

0054514

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)	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	
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	

FOR EVALUATION REFER TO ITEM NO. 4 (EXCLUDING SUBMERGENCE)

1957 1 0346

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

COMPONENT: SOLENOID VALVES - OUTSIDE CONTAINMENT

NRC DEFICIENCY

AGING
TEMPERATURE
QUALIFICATION TIME
PRESSURE
HUMIDITY
QUALIFICATION METHOD
QUALIFICATION INFORMATION
MARGIN
RADIATION
ACCIDENT

APCo RESPONSE

Some of the solenoid valves outside containment identified as requiring replacement, have been replaced with fully qualified ASCO catalog NP-1 model. Corresponding Masterlist and Component sheets have been updated to reflect qualified models. Remaining solenoid valves will be replaced by fully qualified models during the next refueling outage currently scheduled prior to June 30, 1982.

The qualified components have been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

EQUIPMENT ITEM NO. 12
SOLENOID VALVE LOCATED IN THE AUXILIARY BUILDING, ELEV. 131'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 12
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N12SV3234A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.2 [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, [illegible], CS, A, S, (R), M, I, UM, 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~~

0054516

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

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

X The Licensee (has/~~has not~~) provided a response to the SER concer s.

___ 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.

X 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. 12

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)	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 Exposure	
Criteria Regarding Test Sequence Satisfied	
Criteria Regarding Test Failures or 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	

FOR EVALUATION REFER TO ITEM NO. 4 (EXCLUDING SUBMERGENCE)

8054518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

COMPONENT: SOLENOID VALVES - OUTSIDE CONTAINMENT

NRC DEFICIENCY

AGING
TEMPERATURE
QUALIFICATION TIME
PRESSURE
HUMIDITY
QUALIFICATION METHOD
QUALIFICATION INFORMATION
MARGIN
RADIATION
REPLACEMENT

APCo RESPONSE

Some of the solenoid valves outside containment identified as requiring replacement, have been replaced with fully qualified ASCO catalog (A-) models. Corresponding Masterlist and Component sheets have been updated to reflect qualified models. Remaining solenoid valves will be replaced by fully qualified models during the next refueling outage currently scheduled prior to June 30, 1982.

The qualified components have been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

EQUIPMENT ITEM NO. 13
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 130'0"
ASCO MODEL HT 8200 SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 13
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3369BC, 3369CC, 3370BC, 3370CC)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.8 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N1SV3369BA, 3370BA)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.11 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1C22SV0479A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.6A [5]

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

R, (T) (V) RT, (P) (H) CS, (A) S, (R), (M) I, (VM) (RPN) EXN, SEN EI, 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. 13

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action FOLLOWING OUTAGE PRIOR TO 6/30/82.)

___ 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

0054521

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

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	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 Qualification Review	
IV	Documentation Not Made Available	

0054522

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

COMPONENT: SOLENOID VALVES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD QUALIFICATION INFORMATION MARGIN RADIATION REPLACEMENT	Some of the solenoid valves outside containment identified as requiring replacement, have been replaced with fully qualified ASCO catalog NP-1 models. Corresponding Masterlist and Component sheets have been updated to reflect qualified models. Remaining solenoid valves will be replaced by fully qualified models during the next refueling outage currently scheduled prior to June 30, 1982. The qualified components have been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

EQUIPMENT ITEM NO. 14
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL HV2023013U
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 14
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1C22SV0489A, B; 499A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.6 [5]

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

R, (T) (V) RT, (P) (H) CS, (A) S, (R), (M) I, (JP) (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~~

0054524

0054525

DENSITY CHECK

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. 524	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

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

X The Licensees (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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action Refueling Outage Prior To 6/30/82.)

___ 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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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

COMPONENT: SOLENOID VALVES - OUTSIDE CONTAINMENT

NRC DEFICIENCY

AGING
TEMPERATURE
QUALIFICATION TIME
PRESSURE
HUMIDITY
QUALIFICATION METHOD
QUALIFICATION INFORMATION
FAILURE
RADIATION
REPLACEMENT

APCo RESPONSE

Some of the solenoid valves outside containment identified as requiring replacement, have been replaced with fully qualified ASCO catalog (P-) models. Corresponding Masterlist and Component sheets have been updated to reflect qualified models. Remaining solenoid valves will be replaced by fully qualified models during the next refueling outage currently scheduled prior to June 30, 1982.

The qualified components have been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

EQUIPMENT ITEM NO. 15
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL HT8200 SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 15
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3369CA, 3370CA)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.12 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3369AC, 3370AC)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.7 [5]

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

R, (T) (V) RT, (P) (H) CS, (A) S, (R), (M) I, (JM) (JPN) EEQ, 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. 15

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REFUELING OUTAGE PLUS TO 6/30/82.)

___ 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. 509

Page 2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

A054531

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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

COMPONENT: SOLENOID VALVES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD QUALIFICATION INFORMATION MARGIN RADIATION REPLACEMENT	Some of the solenoid valves outside containment identified as requiring replacement, have been replaced with fully qualified ASCO catalog NP-1 models. Corresponding Masterlist and Component sheets have been updated to reflect qualified models. Remaining solenoid valves will be replaced by fully qualified models during the next refueling outage currently scheduled prior to June 30, 1982. The qualified components have been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

0054532

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16a

EQUIPMENT ITEM NO. 16
HYDROGEN RECOMBINER LOCATED IN THE CONTAINMENT, ELEV. 155'0"
WESTINGHOUSE MODEL TYPE A
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO.
LICENSEE REFERENCE(S): 1571, 1572, 1573, 1574, 1575
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (KD01A, B (Q1E17G001A, B))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.7.2 [5]

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

R, T, QV, RT, P, H, (S) (A), S, (R), M, I, QM, EPN, EQN, 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~~

0054533

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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

00545534

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	

0054535

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

COMPONENT: H_2 RECOMBINERS

NRC DEFICIENCY

AGING

APC+ RESPONSE

The metallic materials used in the H_2 Recombiner Heaters are not known to be susceptible to significant degradation due to aging.

All electrical components furnished with the H_2 electric recombiner which may be exposed to post LOCA environments and which use electrical insulation were tested. The power cable, heater connector wire, heater elements, thermocouples and extension wire were subjected to thermal pressing of 80 heatup and accident cycles to simulate 60 years of operation. All of the above items plus the terminal blocks were subjected to a radiation exposure of 2×10^8 rads gamma followed by a LOCA test as described in WCAP-7709-L Supplement 3.

Due to the fact that no significant degradation was observed following the thermal cycling, radiation exposure, and LOCA cycle described in WCAP 7709-L and Supplements 1-4, the H_2 recombiner will provide adequate service for 60 years of normal operation plus 1 year post LOCA.

CHEMICAL SPRAY

Significant spray testing has been conducted on the Hydrogen Recombiner and documented in WCAP 7709-1 and Supplements 1 through 4. The following is a summary of the tests conducted.

(a) Spray Tests on Full Recombiner - Short term (30 minutes to 1 hour) tests using tap water spray were conducted with and without hydrogen in the containment atmosphere. These tests indicated no effect on the capability for recombination of hydrogen, nor was there any significant effect on the thermal performance of the recombiner.

Longer term tests using sodium tetraborate spray (2500 ppm boric acid with sodium hydroxide added to give a ph of 10) were conducted in the following manner.

1) The recombiner was energized and brought up to operating temperatures.

2) The spray system, using the above spray, was initiated. Operation of the spray and recombiner was continued for 24 hours.

3) After 24 hours, hydrogen was introduced into the atmosphere and the recombiner functional property.

These tests were conducted at operational temperature and pressure, but not accident or post-accident pressure-temperature conditions. However, operability was demonstrated after the equipment had been subjected to spray.

(b) In order to demonstrate availability in the spray environment under accident conditions, a special test model was assembled and subjected to several LOCA/spray tests. The spray solution used in the test program included the following:

(1) Sodium tetraborate spray (2500 ppm boron as boric acid with NaOH added to give a ph of 10).
(2) Sodium thiosulfate spray substituted for sodium tetraborate.

Each of the LOCA/spray tests conducted were successful and all equipment performed satisfactorily during and after these tests as discussed in the referenced WCAP's.

These extensive tests clearly demonstrate that the hydrogen recombiner will survive the chemical spray environments required during accidents and post-accident conditions.

REFERENCES

(1) WCAP 7709-L and Supplements 1-4

(2) NRC letter Vassallo to Eichaldinger of May 1, 1981 provides NRC acceptance of the H_2 Recombiner to IEEE 344-1971 and 323-1971 standards.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X ; NUREG-0588, Cat. I ; NUREG-0568, Cat. II .

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION			
Equipment Type	Hydrogen Recombiner	Electrical Hydrogen Recombiner	
Manufacturer's Name (5.2.2/-/-)	Westinghouse	Westinghouse	
Model Number (5.2.2/-/-)	Type A	Model A	
Serial Number			
Features/Mounting (5.2.6/-/-)	Standard	standard	
Connections/Interfaces (5.2.6/-/-)		Junction boxes, cables, thermocouples, etc.	
Location/Elevation	Containment		
Equipment ID No.	See page 1a.		
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	See licensee references, page 1a.	WCAP-7709-L & Supplements 1 thru 7	
Report Date			
Issued by		Westinghouse	
Prepared for		AEC/DRL	
Referenced Reports			
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.6)	Test	Type Test	
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Series of tests demonstrating heater operability under DBE conditions.	
Operating Conditions (-/2.2.10/2.2.10)			
Load/Cycles/Voltage/ Current/Freq.			

0054532

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

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)		Must pass visual inspection & functional test	
Accuracy (5.2.5/-/-)	N/A	N/A	
Number of Specimens			
Test Instruments Calibrated			
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Active		
Test Duration (5.2.1/-/-)		5½ days to 12 months, depending on test	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)			
Required Function Time	30 days		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Inspection / Baseline / Thermal Aging / Radiation / Mechanical Stress / DBE / Post DBE / Inspection	
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) Thermal Aging/Basis		80 thermal cycles / 40 cycles normal in 40 yrs.	
Material Aging Evaluation (7.0/-/-)			See Note 1 page 5f
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type		Not stated	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)		2×10^8 Rad	
Radiation Aging, Dose Rate		3.3×10^5 Rad/hr	
Radiation Aging, Method		Irradiation chamber	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		Power cables	
Operational Aging (-/4.2/-)			
Other Age Conditioning (-/4.2/-)			
Qualified Life Claimed/ Established (5.2.4/4.10/-)		40 yrs./40 yrs.	See Note 1, page 5f
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)		Maintenance per vendor manual	
On-Going Analysis of Failures and Degradation (7.0/-/-)		Periodic checks per vendor manual	
Margin (General) (6.0/3.0/3.0)		Meets 4.0 & 5.2 of DOR guidelines.	
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)			

0054539

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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		Not stated	
Radiation Dose (rd) (4.1.2/1.4/1.4)		See Radiation Aging, page 5c.	
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/-/-)		N/A, with analysis	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	5×10^7		
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		N/A, with analysis (i.e. same as gamma dose)	

0054540

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/05[illegible]-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase		See profiles, pages 5i & 5j	
Peak: °F/psig/RH/Time	300/47.5/na		
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Decrease To: °F/psig/RH/Time			
Equipment Surface Temperature (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)		Operational Test	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH	2500 ppm boric acid w/ NaOH to ~10 pH	
Spray Quantity (gpm/ft^2)		Not stated	
Spray Duration		10 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A		
In-Leakage Considered (5.2.6, [illegible])	N/A		
Time to Submergence	N/A		
Dust Environment (-/2.2.1, 2.2.11)			

C5541

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

NOTES:

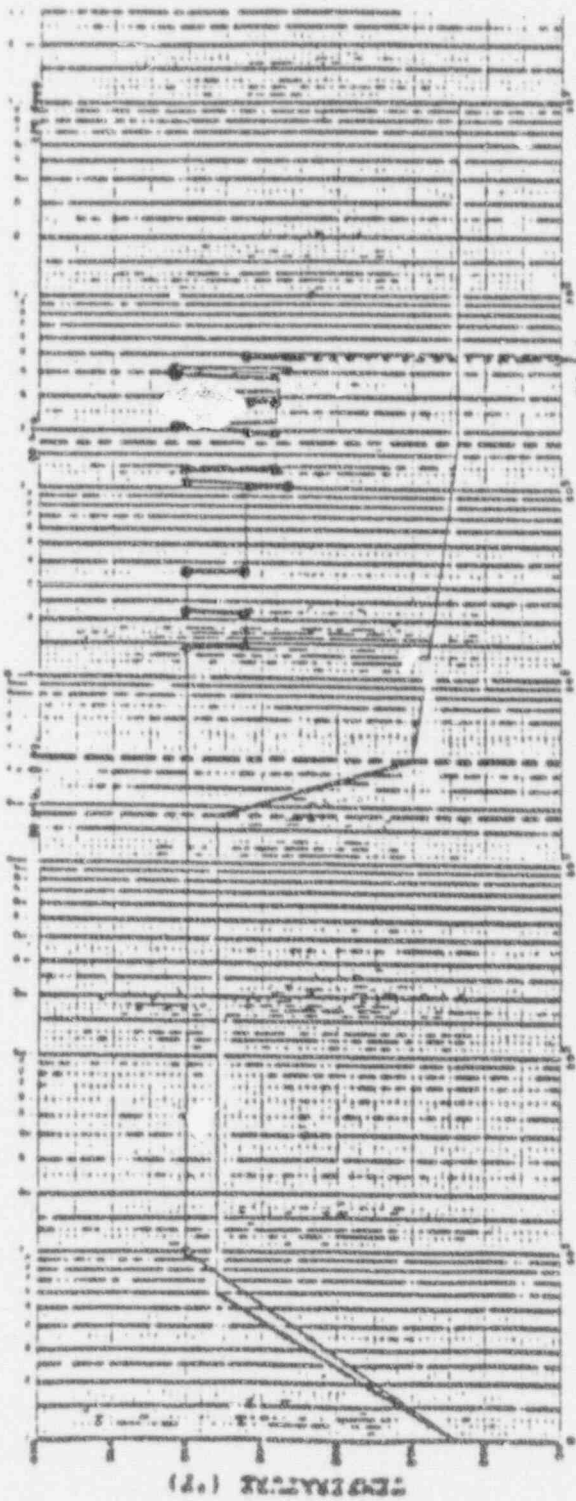
1 From reference [15772], the following statement is made regarding material aging:

The normal schedule of the recombiner calls for periodic testing to determine system availability plus periods of non-operating time in normal containment environment. Evaluation of these factors leads to the conclusion that the most significant aging factor was the fatigue life of the structure, due to thermal stresses induced by the periodic heat up and cool down tests. It was concluded that the metal structures and metal-enclosed thermal insulation would not be affected by time alone. The heater life for this type of heater element is far in excess of the duty cycles imposed by the periodic tests; however, the duty cycles were included in the aging program since they are a necessary part of the recombiner test. The power cables are subject to deterioration due to aging; they are covered by IEEE-383, "Standard for Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations" and have been qualified to Section 2.4 of this standard.

The reviewer finds this analysis to be acceptable. The documentation which supports the claim of a 40 year qualified life is consistent with the DOR guidelines and IEEE standards

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

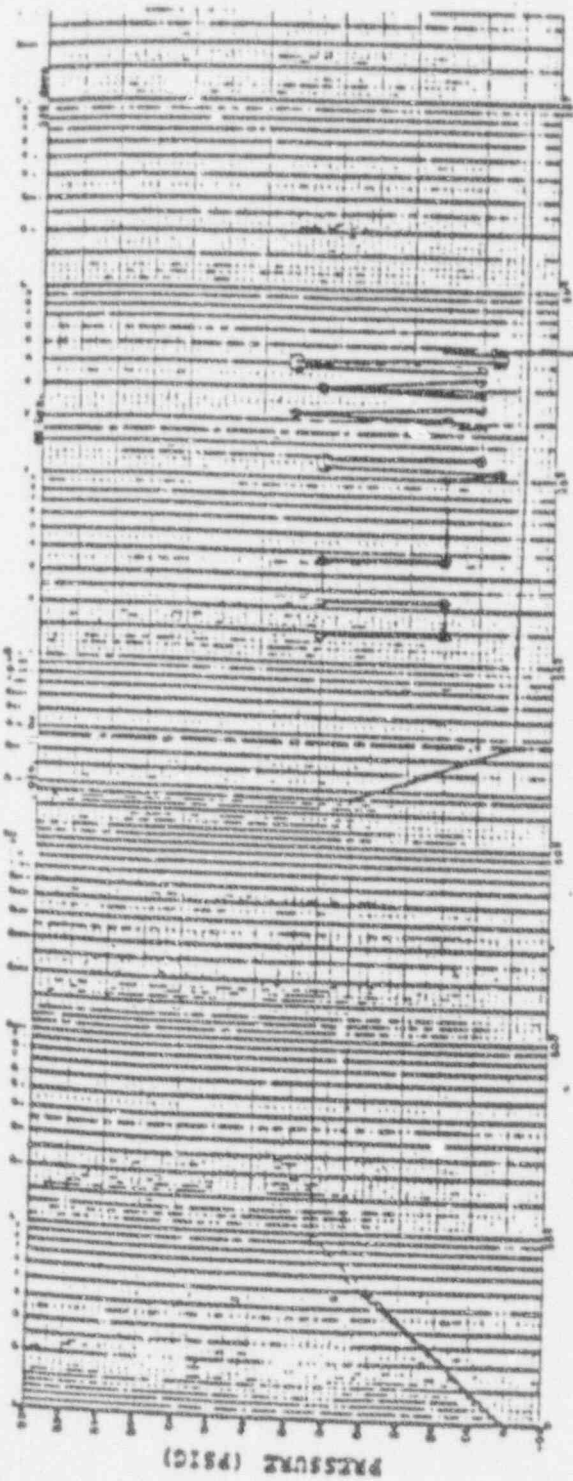
NOTES:



0054543

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 16

NOTES:



0054544

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

EQUIPMENT ITEM NO. 17
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
JOY MANUFACTURING MODEL TYPE P
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 17
LICENSEE REFERENCE(S): 1803
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (C001A, B (Q1E22M001A, B))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.2 [5]
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (C001A, B, C, D (Q1E19M001A, B, C, D))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.8.2 [5]
FUNCTION (PLANT ID): NOT STATED (H001A, B, C, D (Q1E12M001A, B, C, D))
SERVICE: CONTAINMENT HEAT REMOVAL
LICENSEE SUBMITTAL: SCEW(S): C.2.6.9 [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:

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~~

00541545

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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

0054546

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	X
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	

8005130217

LICENSEE RESPONSE TO NRC SER

COMPONENT: FAN-MOTORS

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age these motors to meet the requirements of IEEE 334-1974. Arrhenius models were used to establish a qualified life. The age susceptible materials of the motors were identified and an evaluation was made of their aging characteristics. Based on this methodology, a conservative qualified life of 40 years was established.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 10,000 ppm (Reference: Joy Report E-604 and F-14282). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

0054549

The Licensee has cited as evidence of qualification a Joy Report which envelopes all of the required parameters for the Farley 1 plant. However, from the documentation submitted, it is not possible to ascertain that the unit tested and the units installed are in the same family of motors. The SCEW sheet identifies the motor as a type P. The report contains the following description:

INTRODUCTION

JOY Manufacturing Company and Reliance Electric Company have jointly developed a line of motors designed for Class 1E in-containment service. Design parameters are identical for this entire line of motors, the most important of which are as follows:

1. Normal ambient of 122° F. (50° C.).
2. Temperature rise of 117° F. (65° C.).
3. Design life of forty (40) years.
4. Radiation maximum dosage of 1 x 10⁸ rads over the life of the motor.
5. Insulation is Class H, Type EN.
6. Short term (3 to 4 hours) ambient of 350° F., followed by a gradual reduction to 250° F.
7. One (1) year exposure to 100% relative humidity with vapor droplets and slightly caustic atmosphere.
8. Ambient pressure of 85 psig during the emergency mode.

In addition to all being designed to the above parameters, the materials and methods of construction are identical for the entire line of motors.

The objective of this report is to summarize the results of type testing undertaken at JOY on a representative motor driving a JOY AXIVANE fan for the purpose of qualifying it and thereby this line of motors and fans for Class 1E in-containment service for both SWR and PWR units as defined in ISEE-334-1974.

FAN/MOTOR DESCRIPTION

The fan selected for use in this test was of typical axial flow configuration consisting of an outer casing, vanes downstream of the fan rotor, and a beam for mounting and supporting the motor in the center of the outer casing, (see typical cross section, Figure 1). The casing used for the vibration testing portion of the program was a typical production casing for nuclear service, while the outer casing for the LOCA simulation was part of the pressure vessel. Power leads were connected in the normal manner for the vibration portion of the testing, i.e., the connection was made in a conduit box mounted on the outside of the fan casing.

For the LOCA simulation, the power leads were connected by means of terminals protruding through an insulating and sealing plate. This was necessary to maintain the pressure boundary of the test chamber.

In both cases the leads were encased in steel pipe from the motor frame to the connection point and additionally separated by having each lead inside a fiberglass tube.

The fan had a 60 inch diameter rotor of typical fan construction, which is made up of a hub and 16 adjustable pitch blades which are mounted directly on the motor shaft and secured with a ball bearing locknut.

The motor used to drive the fan was a 150/75 horsepower Reliance Electric motor. This was a 1200/600 RPM motor in a D-5.05 frame. The motor had Class H, Type EN insulation, which is designed for the following conditions:

1. Radiation - maximum dosage of 1 x 10⁸ rads of gamma radiation during the life of the motor (40 years typical).
2. Short time temperature during emergency mode of 350° F. and ambient (for 3 to 4 hours), then gradual reduction to 250° F.
3. Ambient pressure of 85 psig during the emergency mode.
4. One (1) year exposure to 100% relative humidity with vapor droplets and a slightly caustic atmosphere.
5. Design life of forty (40) years.

0054550

-4-

ATTACHMENT A
APPENDIX E
REPORT X-604

MOTOR IDENTIFICATION:

R-42787

ED19739-A1-LT

12DC3003

HP 150/75

RPM 1185/590

Volts 460

Hertz 60

Amps 167/144

Code H

Phase 3

Ambient Spcl.

Insulation Class H - Type RN

Duty Continuous

Drive End Bearing 93[illegible]

Opposite Drive End Bearing 95[illegible]

INSULATION SYSTEM:

Reliance Type RN Class H Insulation System was used in this motor and is designed to meet the requirements of the IEEE 323-1974 and IEEE 334-1974 for Class 1E Continuous Duty Motors Used in Containment Service Applications for Nuclear Power Generating Plants.

The report indicates that the test motor was the same unit as had been tested in 1970 except that the 1970 motor was rewound. The test report for that motor described the test unit as follows:

a.	Manufacturer	Reliance Electric Company
b.	Type	P/my
c.	Enclosure	TEAO
d.	Torque	Constant
e.	No. of Windings	One
f.	Frame Number	5005
g.	Horsepower Rating, bhp	150/75
h.	Operating Speed(s), rpm	1200/600
i.	Power Supply, v/ph/cy	575/3/60
j.	Insulation Class	Class H
k.	Temperature Rise	NEMA Class B
l.	Air-Over Capacity (Minimum) ft./min.	4000
m.	Mounting Configuration	C-face, Footless
n.	Bearings	Anti-friction
o.	Shaft Configuration	Straight, threaded
p.	Shaft Seals	Air Wall Labyrinth
q.	Reference Drawings:	

1. Outline Dimension SK-31081-2
2. Shaft Seals SK-690124WB

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

The Licensee should either provide a more complete description for the installed motors or obtain certification from the manufacturer that the test report is applicable to the Farley 1 motors.

0251551

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

EQUIPMENT ITEM NO. 18
RTD LOCATED IN THE CONTAINMENT, ELEV. 124'0"
ROSEMOUNT-MODEL 176KF
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 18
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID) REACTOR TRIP (N1B13TE412B, D; 422B, D; 432B, D)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.2 [5]

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

(R) T, UT, NT, P, H, (TS), (A) S, (R), (M) I, (VM) RPN, DON, 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~~
~~System Consideration Review~~	~~4a, 4b, 4c~~
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~~

0054552

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

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

X 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.

X 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.

X 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
X Other (evaluate and take appropriate action)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 1/1/83.)

___ 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

0051553

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	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	X
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	X
Criteria Regarding Instrument Accuracy Satisfied	X
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	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 Qualification Review	
IV	Documentation Not Made Available	

00545554

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

0054555

COMPONENT: RTD'S [illegible]

NRC DEFICIENCY	APCo RESPONSE
AGING	Aging was not a requirement in qualification program for these RTD's which was developed to meet the requirements of IEEE-323-1971. Unfortunately, in-service experience with the type of equipment supplied by Westinghouse shows that it is highly unlikely that a significant in-service mechanism exists which would prejudice the qualification tests, performed by Westinghouse on a new equipment. In addition, radiation aging has been adequately addressed by the Westinghouse test program. A marginal application of one material (ethylene propylene rubber) has been identified in Appendix C of IE Bulletin 79-01B. The RTD'S will be replaced within 10 years unless it can be shown that the EPR is a non-critical material. APCo will complete an evaluation by January [illegible] to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Reference: WCAP 8157). This boric acid concentration meets the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified. (a) Temperature - The 320°F qualification test condition exceeds the 300°F required temperature by 20°F thus adequate margin has been demonstrated. (b) Pressure - The 66 psig qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure. (c) Radiation - The RTD'S equipment qualification tests were based on a conservative calculation from the Westinghouse generic program which uses TID-14844 source terms and a 4100 MWt plant as a basis. This conservative calculation established 1 x 10^8 rad β as the qualification basis. The maximum calculated dose for Farley Unit 1 RTD'S would be less than this amount due to its lower power rating. Therefore adequate margin exists. (d) Operating Time - The Document RTD qualification test program utilized a 6 day test period simulating a 32 day post-[illegible] environment based on conservative aging procedures. This documented conservative basis ensures that adequate margin exists.
RADIATION	RTD'S qualification time is forty (40) years normal full power operation and 5 minutes post SLB dose based on a total radiation dose of 1 x 10^8 rads gamma. If the ethylene propylene rubber is a critical material as identified in Appendix C of IE Bulletin 79-01B, the RTD'S qualification time is ten (10) years normal full power operation.
QUALIFICATION METHOD	The referenced test demonstrates the performance of the RTD'S when subjected to radiation followed by a steam/chemical spray test.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

0054455

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.)
EQUIPMENT DESCRIPTION			
Equipment Type	Temperature Element	R T D	
Manufacturer's Name (5.2.2/-/-)	Rosemount	Rosemount	
Model Number (5.2.2/-/-)	176 KF [illegible] 176 KS	176KF	Notes 1,2
Serial Number	Not stated	Not stated	
Features/Mounting (5.2.6/-/-)	Not stated	Not stated	
Connections/Interfaces (5.2.6/-/-)	Not stated	RTD 4 conductor cable with terminal lugs	Note 3
Location/Elevation		N/A	
Equipment ID No.	See Page 1a	N/A	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	WCAP 9157	WCAP 9157 [C687]	
Report Date	00-Sep-77	00-Sep-77	
Issued by	—	Westinghouse	
Prepared for	—	Westinghouse	
Referenced Reports	—	None	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Test and Analysis	-
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)	—	Monitoring and calibration	Note 4 X
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	—	Not stated	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

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)		2 out-of-3 meet accuracy requirement	Note 5
Accuracy (5.2.5/-/-)	Spec: ±0.2% Demon: ±0.2%	± 5%	Note 6 X
Number of Specimens		3	
Test Instruments Calibrated		Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Reactor Trip	Active	
Test Duration (5.2.1/-/-)		6 days	Note 7
Accident Duration (Envir. Above Normal) (5.2.1/-/-)		Not stated	
Required Function Time	2 weeks Post SLB	Reactor trip 30 Sec. Post-accident RCS 14 day	Note 8
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Rad/Steam	
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)	See page 5a	Not performed	Note 15 X
Thermal Aging/Basis			-
Material Aging Evaluation (7.0/-/-)		Not performed	Note 15
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Not performed	Note 15
Radiation Aging, Type		Gamma	

0054557

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1B

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	Not stated	Combined with DBE exposure	
Radiation Aging, Dose Rate		"	
Radiation Aging, Method			
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	Not stated	Not stated	
Operational Aging (-/4.2/-)		N/A	
Other Age Conditioning (-/4.2/-)		N/A	
Qualified Life Claimed/ Established (5.2.4/4.10/-)		Reactor trip Post-accident	Note 9,10
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity		120°F 200 R/h Not Stated	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)		Not stated	
On-Going Analysis (7.0/-/-)	See page 5a	N/A	
Margin (General) (6.0/3.0/3.0)		Not stated	
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)			

0051558

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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)	SLB	S L B	
Radiation Type		Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	1×10^8 rad	Not Applicable	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)		1.6 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/-/-)		Not stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)		100 Mrd	Note 11
Plateout Dose Considered (-/1.48/1.48)		Not stated	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		100 Mrd	

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase		24°F/6.6 psig/5	*
Peak: °F/psig/RH/Time	300/47.5/100/-	24 /66/-/255	
		220/66/-/12000	Notes 10,12
Decrease To: °F/psig/RH/Time	275/40/-/10^3s	220/20/100/22.6/1	
Decrease To: °F/psig/RH/Time	280/5/-/10^4s	220/20/100/5 day	
Decrease To: °F/psig/RH/Time	140/5/-/10^5s	80/14.7/100/not stated	
Equipment Surface Temperature (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	Test	Note 14
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	H_3BO_3 + NaOH	1.14w/o boric acid 0.17 wt% NaOH	
Spray Density (gpm/ft^2)	Not stated	Not stated	Note 14 X
Spray Duration	Not stated	Not stated	Note 14 X
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	N/A	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		N/A	
Time to Submergence		N/A	
Dust Environment (-/2.2.11/1.1.[illegible])		N/A	

* Deviation during transient is considered insignificant

8154560

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

NOTES:

Note 1

Two applications for the 176KF(1) and 176KS(2) are considered in WCAP 9157:

1. Short term reactor trip (ΔTave); required duration is 30 s(1)
2. Post-accident reactor coolant temp. monitoring; required duration is 14 days(2)

WCAP 9157 stated on pg. 2-1 that "the narrow range RTD and wide range RTD are designed indentically; the only difference is their lengths." On pg. 2-2, Westinghouse states that the narrow range and wide range RCS temperature RTDs tested is the 176KF model. (The 176KF is shorter in length than the 176KS)

Westinghouse recommends the model 176KF for narrow range operation and the model 176KS for wide range. (WCAP 9157, Westinghouse response to Question III.9) [6 8 F]

Note 2

The sensing end only of the model 176KS RTD was exposed to the steam environment in the test chamber, and therefore the 176 KS was used only as a reference RTD.

Note 3

Electrical interfaces, e.g., connections to terminal lugs on RTD cable, were not included or addressed in the qualification documentation.

Note 4 Calibration points used throughout the test program were 32°F and 250 °F. The manufacturer provides calibration points at 32°F, 525°F and 625°F.

The temperatures monitored by the RTDs during the test were not in the 500 - 600°F temperature range of expected operation. No data has been provided on the ability of the RTDs to operate accurately over this temperature range of interest. The report indicates that the RTDs were exposed to the environmental conditions only, and therefore, the functional test is inconclusive with respect to the ability of the RTDs to monitor reactor coolant temperature during the Design Basis Accident within the required accuracy.

Note (1) Applies to Equipment Item #18 only.
(2) Applies to Equipment Item #19 only.

Note 13

Conditions stated are for test profile. Actual temperature data was provided for the first 25 S only. This data indicated an overshoot to approximately 340° F at 25 S.

Note 14

Spray density and duration are not stated. WCAP 9157 indicates on pg 5-1 that spray can be injected via spray nozzles or main inlet steam piping to test chamber. No information is provided on specific approach used in this test.

Note 15

Rosemount Dwgs. 176KF and 176KS state that the lead termination area should be limited to 200° F. Based on the construction of the RTD and reactor coolant piping temperatures this temperature specification appears to be easily exceeded. Thermal aging of component parts has not been addressed by test or analysis.

0054562

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

0051563

NOTES:

Note 7(2)

The test described in WCAP 9157 consists of an initial 24 H transient period with temperature/pressure decreasing to 220° F/20 psig. A 5 day exposure at 220° F conditions is taken as equivalent to a 13 day severe environment exposure at 164° F. (In-containment average temperature over a 2 week period following a SLB is 164° F according to WCAP 9157.)

The basis for accelerating test time is a simple chemical reaction rate law model given on pg 2-7 of WCAP 9157. (This model is more conservative than an Arrhenius model based on similar governing materials and temperatures)

Acceleration of the test interval through increased test temperatures is not usually acceptable for steam exposures (only humid conditions) for the temperatures (220° F -vs- 164° F) and the devices considered here however, a test duration of 5 days vice 13 days after the initial 24 H transient period should be acceptable by engineering judgment.

Note 8(3)

Westinghouse has stated narrow range RTD (reactor trip) operating requirement is 30 S, however, no discussion of SLB size was provided. RTDs tested were required to operate for a minimum of 30 minutes in steam environment.

Note 9

Radiation doses for RTDs are based on application. Gamma dose for wide range RCS post-accident monitoring is determined from centerline dose in primary loop (hot leg) piping; narrow range reactor trip RTD dose is taken as ~~the~~ a surface dose on this piping.

Note:
(1) Applies to Equipment Item # 18 only.
(2) Applies to Equipment Item # 19 only.

NOTES:

Note 10

Qualified life claim in WCAP-9157 of 12 and 40 years is based on dose rate and operating time calculations performed by Westinghouse. Thermal aging has not been included in the qualified life evaluation. See note 15 .

Rosemount Dwg. No. 176KF (Rev.J) states "The Model 176KF will withstand radiation of 25 Rad/Hr."

Westinghouse has stated in Table 2.2 that the normal radiation dose rates at the reactor coolant leg pipe O.D. and general coolant system area are 200 R/h and 50 R/h, respectively.

No justification or analysis has been provided by Westinghouse or the Licensee for exceeding Rosemount's specified dose rates for the 176KF. (Rosemount Dwg. No. 176KS (Rev.E) states 200R/Hr.)

Note 11

Normal operation radiation exposure from reactor coolant is dominant consideration. WCAP 9157 states 2 week dose of 0.5 Mrd for SLB; 100 day dose is less than 0.6 Mrd (Fig. 2-2 in WCAP 9157). RTDs used for long-term post-LOCA monitoring will be exposed to significantly higher doses.

Note 12

Peak test chamber controlled pressure is stated as 66 psig; however, no additional pressure data has been provided in WCAP 9157

Facility setup supplies steam at saturated conditions except for initial transient period where superheating is possible. 100% RH is assumed at saturation conditions.

0054564

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

EQUIPMENT ITEM NO. 19
RTD LOCATED IN THE CONTAINMENT, ELEV. 122'9"
ROSEMOUNT MODEL 176KS
REQUIRED OPERATING TIME: 14 DAYS
TER CHECKSHEET NO. 19
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID) REACTOR TRIP (N1B21TE410, 413, 420, 423, 430, 433)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.3 [5]

0051565

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, E, (CS) (A) S, (R), (M) I, (UM) RPN, EQN, 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~~
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~~

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. 569	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

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

X 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.

X 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.

X 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
X Other (evaluate and take appropriate action)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 1/1/82.)

___ 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

0054566

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	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	X
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	X
Criteria Regarding Instrument Accuracy Satisfied	X
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	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 Qualification Review	
IV	Documentation Not Made Available	

See evaluation for Equipment Item no. 18.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

COMPONENT: RTD's WIDE RANGE

NRC DEFICIENCY	APCo RESPONSE
AGING & QUALIF. TIME	Aging was not a requirement in qualification program for these RTD's which was developed to meet the requirements of IEEE-323-1971. Furthermore, in-service experience with the type of equipment supplied by Westinghouse shows that it is highly unlikely that a significant in-service mechanism exists which could prejudice the qualification tests performed by Westinghouse on a new equipment within a few years from start-up. The materials used in this component have been compared with the list of components in Appendix C of IE Bulletin 79-01B and based on this comparison, no significant degradation would occur during this time. Based on the new requirement to address source terms associated with contained accidents in the reactor coolant system specified in NUREG-0588, and the test program dose of 1×10^8 rads; radiation aging effects have been adequately addressed for a period of time exceeding 3 effective full power years (operation to 7/81). APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Reference: WCAP 9157). This boric acid concentration meets the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:
	(a) Temperature - The 310°F qualification test condition exceeds the 300°F required temperature by 10°F, thus adequate margin has been demonstrated.
	(b) Pressure - The 66 psig qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure.
	(c) Radiation - The RTD's equipment qualification tests were based on a conservative calculation from the Westinghouse generic program which uses TID-14844 source terms and a 4100 MWt plant as a basis. This conservative calculation established 1×10^8 rads as the qualification basis for the limited period of operation discussed above. The maximum calculated dose for Farley Unit 1 RTD's would be less than this amount due to its lower power rating. Therefore adequate margin exists.
	(d) Operating Time - The Document RTD qualification test program utilized a 6 day test period simulating a 32 day post-DBA environment based on conservative aging procedures. This documented conservative basis assures that adequate margin exist for the limited period of operation discussed above.
RADIATION	Based on the Westinghouse test program (Ref. WCAP-9157), the qualified operating time of these RTD's is 3 effective full power years of operation plus 9 days post-DBA. The operating time is based on the test program radiation dose of 1×10^8 rads and the NUREG-0588 requirement to address source terms associated with contained accidents in the reactor coolant system.
QUALIFICATION METHOD	The referenced test demonstrated the performance of the RTD's when subjected to radiation followed by a steam/chemical spray test.

005568

0054569

NOTES:

Note 5

Westinghouse has stated 2-out of-3 RTDs must meet accuracy requirements corresponding to reactor trip (narrow range temperature) and post-accident monitoring (wide-range temperature) applications. A failure is permitted if it is random, i.e., not indicative of common mode failure. No rationale was provided for the 2-out of-3 acceptance criteria or technical bases for determining when a failure is not common mode. See related Note 6.

Note 6

WCAP - 9157 reports accuracy requirements of ± 5%. Testing performed did not provide information on worse case error under design basis accident conditions. Also, the qualification program did not address the ability of the RTDs' time response with respect to primary loop temperature changes and trip points under SLB conditions. It appears this information is an important consideration for this device.

Rosemount specifications on DWG 176KF (Rev E) states:

Calibration — Each sensor shall be precision calibrated to the accuracy shown, at the following temperatures:

Temperature	Accuracy
32°F (0°C)	.05°F (.03°C)
525°F (273.9°C)	.13°F (.07°C)
625°F (329.4°C)	.16°F (.09°C)

The calibration shall be conducted in accordance with Rosemount Report 2715A, and a computed output versus temperature curve from 30°F to 700°F in 1°F increments or if specified 0°C to 400°C in 1°C increments will be supplied with each sensor.

WCAP - 9157 indicated that calculated temperatures based on manufacturer's resistance tables at the 32° calibration point were not within specified accuracy (i.e. exceeded 0.05°F criterion). Calculated temperatures were 1.3 to 2.3°F below the calibration temperature of 32°F. Calibration temperatures of 525°F and 625°F were not used in the test program.

The Rosemount specification drawings, Dwg. No. 176KF (Rev.J) and 176KS (Rev. E) state

Repeatability

The sensor will withstand 10 consecutive temperature shocks within the design range of 2.1 [Spec. on Rosemount Dwg] without shifting ice point resistance by more than an amount equivalent to .2° C (.11° C) or 1.0% of actual span encountered, whichever is greater.

One of three 176KF RTDs was not within the repeatability 1.0% (or 2.3° F) limits during the post environmental test calibration at 250° F.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

EQUIPMENT ITEM NO. 20
RADIATION DETECTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
VICTOREEN MODEL 8771
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 20
LICENSEE REFERENCE(S): 2883
FUNCTION (PLANT ID) : RADIATION MONITOR(Q1D21RE0027A-A, B-B)
SERVICE: POST ACCIDENT MONITOR
LICENSEE SUBMITTAL: SCEW(S): TMI-5.2 [5, 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, RVS, 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~~

0054530

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

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

X The Licensee (has/~~has not~~) provided a response to the NSER 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.

X 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.

X Corrective action specified by the Licensee:

___ Equipment replacement with qualified equipment
X 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 (_____)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X 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

0054571

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

00541572

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)	
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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

Chapter 4 - Summary of Outstanding Items

As discussed in Chapter 2, the following three types of equipment were installed without complete qualification documentation.

Manufacturer	Generic Name	Model	No of Items	Chapter 2 Reference
Target Rock	Solenoid valve	79ABOO1	4	Section 2
Victoreen	Radiation sensor	877-1	2	Section 4
GEMS-Delaval	Level sensor	XM-54854	2	Section 7

The Target Rock solenoid valves and GEMS-Delaval level transmitters are presently undergoing qualification testing, which is expected to be completed during the fourth and third quarter of 1982, respectively. The test report for the Victoreen radiation detectors was recently evaluated. As discussed in Chapter 2, the evaluation of the test report indicates a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. This modification will be completed during the next outage of sufficient duration to complete the planned modifications.

All of the above equipment were installed prior to the completion of the qualification test program and the evaluation of the associated test reports. Alabama Power Company installed this equipment in order to provide the state-of-the-art coincident with the implementation dates required by NUREG-0737. Alabama Power Company will continue to monitor the progress of these ongoing qualification test programs.

0051573

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

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 detectors 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.

00544574

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

EQUIPMENT ITEM NO. 21
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 109'0"
BARTON MODEL 763 (LOT 1)
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 21
LICENSEE REFERENCE(S): 3836
FUNCTION (PLANT ID) POST-ACCIDENT MONITOR (N1B21PT402, 403)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.2 [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:

Contents	Checksheet Page No.
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
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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~~

0054575

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

00541576

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X 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
X Other (relocated or qualified)

___ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X 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 OF LISTED 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

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	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	X
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	X
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	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 Qualification Review	
IV	Documentation Not Made Available	

0054572

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

COMPONENT: PRESSURE TRANSMITTER (BARTON)

NRC DEFICIENCY	APCo RESPONSE
AGING	Aging was not a requirement in the qualification program for the Barton (LOT 1) transmitters, which was developed to address IEEE-323-1971. Radiation aging, however, has been adequately addressed by the LOT L-Sensing program. With the large range of experience and with the amount of testing on this type of transmitter, it is known that the materials and components would do not have a known thermal aging mechanism (as compared to Appendix C of IE Bulletin 79-01B) that could affect the performance of these transmitters before June 30, 1982. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2300 ppm. This boric acid concentration meets the Farley FSAR value of 2300 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified:
	(a) Pressure - The 75-psia qualification test condition provides adequate margin above the maximum calculated Farley Unit 1 containment pressure.
	(b) Radiation - The Barton transmitter equipment qualification tests were based on a conservative calculation from the Westinghouse generic program which used 5.8×10^7 rads gamma (Total Integrated Dose) and a 3100 MWt plant as a basis. This conservative calculation established 5×10^7 rad as the qualification basis. The maximum calculated dose for Farley - Unit 1 Barton Transmitters would be substantially reduced from this amount by a ratio of the Farley power rating (2652 MWt) over the calculational basis, therefore, adequate margin exists.
	(c) Operating Time - The Barton transmitter qualification test program utilized a 14 day test period simulating 1 hour (4) month post-DBA environment based on conservative aging procedures referenced in NP-TR-1150. This documented conservative basis assures that adequate margin exists.
QUALIFICATION METHOD	As discussed in the referenced reports, these transmitters were qualified for a LOCA in the environmental parameters shown in the table and per the proper test sequence.
RADIATION	The radiation dose of 5×10^7 rads gamma is sufficient (as discussed under Margin) to envelope both gamma and obtained beta dose.
TEMPERATURE	The LOCA test temperature exceeds the FSAR Unit 1 envelope.
PRESSURE	As discussed under Margin, 75 psia is a conservative test condition.
SENSITIVITY	The steam test demonstrated operability at 100% RH.

8054578

LICENSEE RESPONSE TO NRC SER (Continued)

4. Reactor Coolant System Wide Range Pressure Transmitters

A total of two pressure transmitters inside the containment was identified which are located below the maximum postulated flood level for a LOCA and may become submerged for such an accident. The operation of these transmitters is only required for a catagory break size less than the design basis LOCA. Interim operation is justified on the basis that several methods of determining RCS pressure over a wide range of values are available. These include pressurizer pressure, saturation pressure obtained from temperature in the pressurizer steam space, high head safety injection discharge pressure and steam line pressure. Other pressure indications that may be available include RHR discharge pressure, and pressure determination via the sample line. These two transmitters will be relocated above the maximum flood level or qualified for submergence during the next scheduled outage of sufficient duration to complete the planned action. If problems arise beyond control of Alabama Power Company which may impact the schedule, the NRC will be notified. Design change requests have been issued to the architect engineer for design processing.

00515529

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

0054580

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.)
EQUIPMENT DESCRIPTION			
Equipment Type	Transmitter	Pressure & differential pressure Transmitter	
Manufacturer's Name (5.2.2/-/-)	Barton	ITT/Barton	
Model Number (5.2.2/-/-)	763 & 764	[763] a,c, [764] a,c	
Serial Number	NA		see note 2 see note 6
Features/Mounting (5.2.6/-/-)	not stated	Not stated	
Connections/Interfaces (5.2.6/-/-)	not stated	Not stated	
Location/Elevation	see page 1a	NA	
Equipment ID No.	see page 1a	NA	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	NS-TMA-1950	NS-TMA-1950	[3336] (note 1)
Report Date		SEPT. 24, 1978	
Issued by	NA	Westinghouse	
Prepared for	NA	Westinghouse	
Referenced Reports	NA	NS-CE-[illegible]	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Test	
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)	NA	Radiation: 3% @ 10^6 Rads, 10% @ 50 Rads	
Operating Conditions (-/2.2.10/2.2.10)	NA	Loca [763] -45% at 15 min	X see note 7
Load/Cycles/Voltage/Current/Freq.		Wall Case [764] -55% at 3 min	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

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)	NA	see note 4	note 4
Accuracy (5.2.5/-/-)	± 10%	see note 3	X note 3 and 7
Number of Specimens	NA		
Test Instruments Calibrated	NA	YES	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	ACTIVE		
Test Duration (5.2.1/-/-)	NA		
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	>24 hrs		
Required Function Time	30 days	14 day test to simulate 4 months	see note 5
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	NA	radiation/seismic/	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	NA	steam-temperature-pressure-chemical spray	
1. Representative Sample	NA		
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) Thermal Aging/Basis	None	None	X
Material Aging Evaluation (7.0/-/-)	None	None	X
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	None	None	X
Radiation Aging, Type	Gamma	Gamma	

0054581

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	—	see accident conditions	
Radiation Aging, Dose Rate	—	—	
Radiation Aging, Method	—	—	
Materials Susceptible (Radiation) (5.2?4, 7.0/-/-)	—	—	
Operational Aging (-/4.2/-)	—	—	
Other Age Conditioning (-/4.2/-)	—	—	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	Not stated	None	X
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity	—	4×10^4 rad over 40 [illegible]	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	—	NA	
On-Going Analysis of Failures and Degradation (7.0/-/-)	—	NA	
Margin (General) (6.0/3.0/3.0)	—	NA	
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)	NA	NA	

0054582

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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/MSLB	NA	
Radiation Type	GAMMA	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	—		
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	—	≈ 2.5 X10⁶ R/hr.	
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/-/-)	5 X10⁷ Rads	5 X10⁷ rads	*
Plateout Dose Considered (-/1.48/1.48)	—		
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	—		

* accuracy during test:

≈ 3% span @ 1 X10⁶ rad (the dose assumed to envelope the radiation received by the instruments under postulated LOCA conditions in the time period for automatic protection function)

<10% of span @ 50 X10⁶ rads.

0054583

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase			
Peak: °F/psig/RH/Time	340/78/100/-	370/75/100/seconds	
Decrease To: °F/psig/RH/Time	285/40/-/10^3s	320/75/100/2 min.	
Decrease To: °F/psig/RH/Time	180/19/-/10^4s	320-220/75-2.4/2min-24h.	Note 5
Decrease To: °F/psig/RH/Time	140/5/-/10^5s	220/2.4/100/24h-15hr Cooldown.	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	NA		
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)	H_3BO_3 + NaOH	1.14 WT % boric acid 0.17 WT % NAOH	
Spray Density (gpm/ft^2)			
Spray Duration		24 hours	
Submergence Duration (4.1.3/2.2.5/2.2.5)	See Page 3b	Not Performed	X
In-Leakage Considered (5.2.6, 5.3.2/-/-)			
Time to Submergence			
Dust Environment (-/2.2.11/2.2.11)			-

0051584

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

NOTES:

1. The report states that environmental qualification was performed in accordance with IEEE-323 (1971) Criteria [38367. Test report NS-TMA-2120 was also cited, but it was not available for review.

2. The report [38316] NS-TMA-1950 states that the list of valid numbers for transmitters manufactured in Lot #1 is listed NS-TMA-1950 is applicable is:

TABLE 1-5

BARTON LOT NO. 1 SERIAL NUMBERS

Differential Pressure Transmitters		Pressure Transmitters	
Model [764] 44	101 through 109	Model [763] 44	101 through 110
	113 through 166		113 through 119
	170 through 187		122 through 124
	192 through 204		126 through 144
	207		
	209		
	216 through 255		
	258 through 276		
	284 through 299		
	291 through 301		
	307 through 310		
	317 through 320		
	322 through 341		
	347		

0051585

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

NOTES:

(3.) Test report [3836] states: (accuracy)

" ..... For performance of reactor trip/safety injection functions used to mitigate the consequences of a high energy pipe break a deviation of ±10% of output span is permitted.

The ±10% requirement for environmental accuracy requirements is the algebraic sum of the effects on transmitter accuracy due to the containment ambient temperature and radiation at the time of protective function initiation. This requirement is predicated upon the assumption that, at the time of protective function initiation, the total integrated dose to the transmitter is [≤10^6]^{a,b,c} rads and the containment temperature effect to the electronics is [≤230°F]^{a,b,c}. For post accident monitoring functions (except wide range pressure), the goal is to limit the deviation in accuracy to about ±25% for the algebraic combination of the effects due to temperature and radiation from [5 minutes to 4 months]^{a,b,c} following the event. At [5 minutes]^{a,b,c} the assumed combination would be [320°F and 1 x 10^6]^{a,b,c} rads and at [4 months]^{a,b,c} the assumed combination is [160°F and 4 x 10^7]^{a,b,c} rads. For wide range pressure transmitter the goal is to limit the deviation in accuracy to ±10% following the postulated steam line break accident. Each transmitter is temperature compensated to ensure these requirements are met (e.g., if no error due to radiation is expected at [1 x 10^6]^{a,b,c} rads the transmitter would be temperature compensated so that its error does not exceed [±10%]^{a,b,c} of output span at [230°F]^{a,b,c} even if the ambient temperature remained at [230°F]^{a,b,c} for a long period of time)."

(4.) Test report [3836] states (acceptance criteria):

"The test program will be considered successful if the above criteria are met by all transmitters in the program. However, infrequent failures of a random nature can be expected during the testing of a sample. One failure or two different failures during the test of three similar units will be considered random and the test a success unless the failure(s) investigation reveals potential common mode problems. It should be noted that these are generic error allowances and individual plant evaluations may show that larger errors are acceptable."

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PROPRIETARY INFORMATION

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

NOTES:

(5.) The test report [3836] states:
"The test chamber conditions were held at 220°F for 14 days to simulate long term post accident conditions. Using a 10°C half life rule of thumb for thermal aging criteria this test simulates a 4 months post accident period."

It is concluded the applicability of the Arrhenius equation to this complex device has not been established. Therefore it can not be concluded that a 120 day test duration has been simulated. However, the DOR guidelines state "the time duration of the test should be at least as long as the period from the initiation of the accident until the temperature and pressure service conditions return to normal." Therefore it is concluded that the test duration is acceptable for the required function.

For the Farley 2 application the test envelopes the accident conditions

0051587

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

0054589

NOTES:
(6.) test specimen

TABLE 1-6
ORIGINAL QUALIFICATION UNITS

Type	Serial Number	Test Facility Designation	Range
Pressure	763 [4,6] - 142	AQ-2	1700-2500 psig [4,6]
Pressure	763 - 124	AQ-3	0-3000 psig
Pressure	763 - 119	AQ-4	0-3000 psig
Differential Pressure	764 - 229	AR-1	140-25 " W.C.
Differential Pressure	764 - 165	AR-2	475-210" W.C.
Differential	764 - 275	AR-3	540-145" W.C.

TROUBLE SHOOTING UNITS

Type	Serial Number	Test Facility Designation	Range
Pressure	763 [4,6] - 139	AQ-5	1700-2500 psig [4,6]
Differential Pressure	764 - 274	AS-1	540-145" W.C.
Differential Pressure	764 - 278	AS-2	540-145" W.C.
Differential Pressure	764 - 347	AS-3	475-210" W.C.

-3836

0054589

NOTES:

(7.) accuracy observed during LOCA test [3836]:

" When subjected to the test conditions the narrow range pressure transmitter (to be used to monitor pressurizer pressure for trip/safety injection function initiation) exhibited a maximum positive error of [+14%][3,4] span that was out of specification (+10% span) for the first [few minutes][3,4] of the test (see Figure 3-6). The wide range pressure transmitters, used to monitor reactor coolant system pressure, also exceeded their post accident monitoring specification of ±10% span. As can be seen in Figure 3-6, these instruments did not go beyond approximately [+25%][3,4,5] span at any point. The differential pressure transmitters, used for pressurizer level and steam generator level applications did not exceed the +10% span tolerance for automatic protective function initiation before going [negative].[3,4] The units exceeded [±25%][3,4,5] at approximately [15 minutes][3,4] into the test and remained outside of the specification for about [2 hours][3,4] (Figure 3-6). All test units (pressure and differential pressure) returned within specification, stabilized with an error of about [5%][3,4] span and successfully completed the accelerated long term monitoring portion of the test. "

It is concluded that the accuracy after short term function (seconds) is unacceptable.

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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

PROPRIETARY INFORMATION

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITE

NOTES:

(8) Reference 3836 Concludes:

"The sequential testing of the Barton [764] [8,6] differential pressure and Barton [763] [8,6] pressure transmitter described in Section 3 coupled with the threshold testing described in Section 5 has demonstrated the ability of the production lot 1 instruments to function properly in post accident containment conditions resulting from either a postulated loss of coolant accident or a postulated steam line break accident. The [large negative shifts] [8,6,8] seen during the sequential testing are a result of a combination of high circuit board temperature and high radiation effects on the instrument internals. This combination of high circuit board temperature [320°F] [8,6,8] and high radiation [> 10^6 rads] [8,6,8] would not be present during either a postulated loss of coolant accident or a postulated steam line break accident.

The threshold testing has shown that under conditions more applicable to the calculated containment conditions resulting from a postulated loss of coolant accident (circuit board temperature ≤ 280°F and radiation levels up to 40 x 10^6 rads) or postulated steam line break accident (circuit board temperatures < 320°F and radiation doses < 6 x 10^6 rads), the instruments will function properly and [large negative errors] [8,6,8] will not be observed. Westinghouse and Barton are continuing to evaluate the instrument to attempt to eliminate the source of the [large negative errors] [8,6,8] from future production lots in order to retain the capability for qualification testing to a single envelope.

The sequence testing has demonstrated the ability of the instruments, following high radiation and seismic testing, to maintain seal integrity and survive for extended duty times in the post accident environment. The sequential testing also demonstrated the ability of the Barton [764] [8,6] differential pressure transmitter to meet the ±10% span accuracy requirement for short term automatic protective function initiation. The narrow range pressure transmitter Model [763] [8,6] exceeded the 10% span accuracy requirement for automatic protective function initiation and the acceptability of the observed error must be evaluated on a case by case basis for any plant using a narrow range pressure transmitter from lot 1. One of the two wide range pressure transmitters, Model [763], [8,6] also slightly exceeded the ±10% span long term monitoring accuracy requirement for wide range pressure transmitters. This has been corrected by improving the temperature compensation on each of the units in production lot 1 to maintain errors less than ±10% during long term monitoring."

The licensee has not presented any accuracy evaluation as required by the item in question regarding these transmitters.

0051590

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

EQUIPMENT ITEM NO. 22
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 166'6"
FOXBORO MODEL E11GM (MCA)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 22
LICENSEE REFERENCE(S): 710
FUNCTION (PLANT ID) REACTOR TRIP (Q1B31PT455, 456, 457)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.7 [5]

0054594

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

(R) (T) QV, RT, (F) H, (SS) (A) S, (R), (M) I, (VM) RPN, EQN, 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~~
Equipment Environmental Qualification Review	~~5a, 5b, 5c, 5d~~ 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. 22

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

X 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.

X 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.

X 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
X Other (evaluate and take appropriate actions)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 1/1/82.)

___ 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

00545592

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	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	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 Qualification Review	
IV	Documentation Not Made Available	

0054593

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

COMPONENT: PRESS TRANSMITTERS (FOXBORO E11GH)

NRC DEFICIENCY	APCo RESPONSE
AGING	Aging was not a requirement in the qualification program for the Foxboro transmitters, which was developed to address IEEE-323-1971. Radiation aging, however, has been adequately addressed by the testing program. With the large range of experience and with the amount of testing on this type of transmitter, it is known that the materials and components used do not have chemical thermal aging mechanism (as compared to Appendix C of IE Bulletin 79-01B) that could affect the performance of these transmitters before June 30, 1982. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 1.5 wt % boric acid. This boric acid concentration exceeds the Farley FSAR value of 1000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified: (a) Temperature - The 318°F qualification test condition exceeds the 300°F required temperature by 18°F thus adequate margin has been demonstrated. (b) Pressure - The 75 psia qualification test condition provides adequate margin above the maximum calculated Farley Unit 1 containment pressure. (c) Radiation - The radiation test far exceeds the five minute requirement.
RADIATION	Total test far exceeds requirements for five minutes.
TEMPERATURE	318°F temperature excursion during steam test envelops FSAR #1 requirement.
PRESSURE	75 psia pressure excursion during steam test envelopes FSAR #1 requirement.
HUMIDITY	100% relative humidity demonstrated during steam test.
QUALIFICATION METHOD	As documented in WCAP-8341 Forboro and Westinghouse have performed a series of simultaneous and sequential qualification tests that demonstrate the capability of these units to perform their function for five minutes into an event.

00545594

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

NOTES:

WCAP 8541 states:

- ENVIRONMENTAL AND RADIATION TESTS

- Style A

  - Test Report No. CD-6005 (Appendix A): A steam/temperature test was completed on three of the four model transmitters which have 10-50 mA amplifiers and aluminum covers. (The E13DH is similar to the E13DM and would show similar results.) These transmitters are also supplied with cast iron covers which provide a greater heat sink which should improve the test results. The amplifiers were the standard model N0143SY.

- Style B

  - Test Report No. T3-1013 (Appendix B): A steam/temperature/chemical spray test was conducted on all four model transmitters which have 4-20 mA amplifiers. The amplifiers were models N0148ND and N0148NL; the NL model had the same design as the ND, although components were substituted for radiation resistance. [illegible]

  - Test Report No. T3-1068 (Appendix C): A radiation test was conducted on the E13 model transmitters which have both 4-20 mA and 10-50 mA amplifiers. The 4-20 mA amplifiers tested were models N0148ND and N0148NL. The difference in these amplifiers was noted. The 10-50 mA amplifier tested was the model N0148PD which is the same design as the standard N0143SY but has a radiation resistant wiring harness. Failures of these transmitters at higher radiation levels were noted and traced to a diode common to all amplifiers. E11 model transmitters were not included in the radiation test because the [illegible]

  - Test Report No. T3-1097 (Appendix D): Due to problems encountered during the previous radiation test, another radiation test was conducted on improved amplifiers. The 10-50 mA amplifier (N0148PD) had components substituted to improve its radiation resistance, but the design was not altered. The new model number is N0148PW. The 4-20 mA amplifier (N0148NL) had a diode changed for radiation resistance. This is the only version of this model that has been produced, hence, the model number remains the same.

  - Test Report No. T4-6040 (Appendix E): A radiation test was conducted to ensure that the O-rings used on the E11 model bottomworks (capsule assemblies) are satisfactory. Since the E13 model was previously tested, this difference in design was subjected to a radiation test and then was hydrostatically tested.

0054595

0051596

Bechtel Power Corporation

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Electrical Correspondence

E-91

SCS Letter dated 2-16-84 ISE-NS-1772

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0051597

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

NOTES:

The report indicates that the transmitters are susceptible to radiation damage. The DOR Guidelines require that LOCA test be [illegible] on a [illegible] radiated specimen if the part is susceptible to radiation. The LOCA tested units were not pre-irradiated

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 [illegible] with exposure to [illegible] temperature and pressure steam/air environment. The same test [illegible] should be used [illegible] the equipment is to be qualified for [illegible] should only be considered valid for [illegible] conditions applied to the same test specimen in the [illegible] sequence.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

NOTES:

In addition the licensee has not yet evaluated age-related degradation

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FRC Assignment No. 13
FRC Task No. 509

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

EQUIPMENT ITEM NO. 23
LEVEL SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 127'6"
DE LAVAL MODEL LS36497
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 23
LICENSEE REFERENCE(S): 2587
FUNCTION (PLANT ID) MAIN FEED PUMP TRIP (Q1N21LSH2828A, B, C; 2829A, B, C)
SERVICE. FLOOD LEVEL SENSOR
LICENSEE SUBMITTAL: SCEW(S): C.2.15.3 [5]

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

R, T, QV, RT, P, H, CS, (A) S, (R), (M) I, QM, RPN, EQN, 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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Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (~~has~~/has not) been provided by the Licensee for this equipment item.

X 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
X Other (evaluate and take appropriate actions)

___ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 1/1/82.)

___ 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

0054600

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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	X
Aging Degradation Evaluated Adequately	X
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	X
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	X
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	___

0054601

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

LEVEL SWITCHES (DELAVAL - GEMS)

NRC DEFICIENCY

None

APCo RESPONSE

This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and prior operating experience. APCo will complete an evaluation by January 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

REMARKS

IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

a) Temperature - The 308°F qualification test condition does not meet the 308° required temperature. However, because of the short duration of the excursion and the thermal lag of the component, adequate margin is demonstrated.

b) Pressure - The 75 psig qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 Main Steam Room pressure of 20.3 psia.

c) Operating Time - Although the specified time is 4 hours, the safety function of the switch occurs within 10 minutes after the event starts (flooding due to feed line break). The 4 hours qualification time is therefore conservative.

Adequate margin is thus demonstrated.

0054602

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

LICENSEE RESPONSE TO NRC SER

ITEM 2:

Tie in information between the environmental qualification documentation for the Gems level transmitters and the applicability of this documentation to the Gems level switches will be provided.

RESPONSE:

The environmental qualification documentation for the Gems-DeLaval level transmitters (FIRL Test Report F-C3834, March 1974) is also applicable to the Gems-DeLaval level switches. Applicability of the report to the level switches is documented on Gems-DeLaval drawing LS-36497, June 8, 1975, which has been made a part of the central qualification documentation file.

8005160603

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

NOTES:

[1888] [1887]

1. FIRL report S-C3834 supplement to F-C3834 consisted of extended steam exposure in accordance with the first 24 hours of the temperature/pressure profile of IEEE 323-74. During successful execution of the 24 hour steam exposure the sensor functioned properly for less than 90 minutes, which is considered to be a failure.

2. The test program did not include thermal aging.

3. No qualified life has been established for this equipment.

0051604

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

EQUIPMENT ITEM NO. 24
LEVEL SENSOR LOCATED IN THE CONTAINMENT
DE LAVAL MODEL XM54854323
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 24
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): LEVEL INDICATION (7782A-A, 7782B-B)
SERVICE: CONTAINMENT SUMP
LICENSEE SUBMITTAL: SCEW(S): TMI-7.2 [5, 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)

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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~~

0054605

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. 529	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

0054606

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

X 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.

X 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.

X 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
X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 9/31/82.)

___ 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. 24

0054607

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	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 Qualification Review	
IV	Documentation Not Made Available	

Chapter 4 - Summary of Outstanding Items

As discussed in Chapter 2, the following three types of equipment were installed without complete qualification documentation.

Manufacturer	Generic Name	Model	No of Items	Chapter 2 Reference
Target Rock	Solenoid valve	79A8001	4	Section 2
Victoreen	Radiation sensor	877-1	2	Section 4
GEMS-Delaval	Level sensor	XM-54854	2	Section 7

The Target Rock solenoid valves and GEMS-Delaval level transmitters are presently undergoing qualification testing, which is expected to be completed during the fourth and third quarter of 1982, respectively. The test report for the Victoreen radiation detectors was recently evaluated. As discussed in Chapter 2, the evaluation of the test report indicates a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. This modification will be completed during the next outage of sufficient duration to complete the planned modifications.

All of the above equipment were installed prior to the completion of the qualification test program and the evaluation of the associated test reports. Alabama Power Company installed this equipment in order to provide the state-of-the-art coincident with the implementation dates required by NUREG-0737. Alabama Power Company will continue to monitor the progress of these ongoing qualification test programs.

8054608

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

EQUIPMENT ITEM NO. 25
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
DE LAVAL MODEL XM36495
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 25
LICENSEE REFERENCE(S): 1887, 2587
FUNCTION (PLANT ID) POST-ACCIDENT LEVEL MONITOR (Q1E11L73594A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.2 [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:

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~~

0054609

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

0054610

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

X 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.

X 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.

X 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
X Other (evaluate and take appropriate actions)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action? 1/1/82.)

___ 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

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	X
Aging Degradation Evaluated Adequately	X
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	X
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	X
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	

0054611

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

0054612

LEVEL - TRANSMITTERS (DELAVAL-GEMS) (Q1E11LT3594A & B)

NRC DEFICIENCY	APCo RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 15000 ppm (Ref. Franklin Report F-C3834). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: a) Temperature - The 300°F qualification test condition equals the 300°F required temperature. Margin is demonstrated, however, in the conservation employed in calculating the required temperature. b) Pressure - The 74.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 61.3 psia. c) Radiation - The 1 X 10^8 Rads. qualification test condition exceeds the Farley Unit 1 containment level of 3 X 10^7 Rads. d) Operating Time - The specified time is 4 hours and 4 hours qualification has been demonstrated. Therefore, adequate margin exists.

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

0054613

NOTES:

1. FIRL report S-C3834 [1888], supplement to F-C3834 [1887], consisted of extended steam exposure in accordance with the first 24 hours of the temperature/pressure profile of IEEE 323-74. During successful execution of the 24 hour steam exposure the sensor functioned properly for less than 90 minutes, which is considered to be a failure.

2. The test program did not include thermal aging.

3. No qualified life has been established for this equipment.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

EQUIPMENT ITEM NO. 26
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 159'0"
BARTON MODEL 764 (LOT 1)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 26
LICENSEE REFERENCE(S): 3836
FUNCTION (PLANT ID) PRESSURIZER LEVEL (Q1B31LT459, 460, 461)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.6 [5]
FUNCTION (PLANT ID): FEEDWATER CONTROL (Q1C22LT474 TO 476, 484 TO 486, 494 TO 496)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.9 [5]

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

(R) (T) QV, RT, (P) (H) (CS) (A) S, (R), (M) I, (JM) RPN, EQN, 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~~

0054614

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

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

X 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.

X 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.

X 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
X Other (evaluate and take appropriate actions)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 1/1/82.)

___ 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

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	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	X
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	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 Qualification Review	
IV	Documentation Not Made Available	

See page 5f and evaluation of Equipment Item no. 21.

0054616

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

COMPONENT: LEVEL TRANSMITTERS (BARTON)

NRC DEFICIENCY	APCo RESPONSE
AGING	Aging was not a requirement in the qualification program for the Barton (LOT 1) transmitters, which was developed to address IEEE-323-1971. Radiation aging, however, has been adequately addressed by the LOT 1 testing program. With the large range of experience and with the amount of testing on this type of transmitter, it is known that the materials and components used do not have a known thermal aging mechanism (as compared to Appendix C of IE Bulletin 79-01B) that could affect the performance of these transmitters before June 30, 1982. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm. This boric acid concentration meets the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified: (a) Pressure - The 75 psia qualification test condition provides adequate margin above the maximum calculated Farley Unit 1 containment pressure of 47.5 psig. (b) Radiation - The Barton transmitter equipment qualification tests were based on a conservative calculation from the Westinghouse generic program which uses TLD-14844 source terms and a 4100 MWt plant as a basis. This conservative calculation established 5×10^7 rad as the qualification basis. The maximum calculated dose for Farley - Unit 1 Barton Transmitters would be substantially reduced from this amount by a ration of the Farley power rating (2652 MWt) over the calculational basis. Therefore, adequate margin exists. (c) Operating Time - The Barton transmitter qualification test program utilized a 14 day test period simulating a four (4) month post-DBE environment based on conservative aging procedures referenced in NS-TMA-1930. This documented conservative basis ensures that adequate margin exists.
QUALIFICATION METHOD	As discussed in the referenced reports, these transmitters were qualified for a LOCA to the environmental parameters shown in the table and per the proper test sequence.
RADIATION	The radiation dose of 5×10^7 rads gamma is sufficient (as discussed under Margin) to envelope both gamma and shielded beta dose.
TEMPERATURE	The LOCA test temperature meets the FNP Unit 1 envelope.
PRESSURE	As discussed under Margin, 75 psia is a conservative test condition.
HUMIDITY	The steam test demonstrated operability at 100% RH.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

NOTES:

1. The licensee has presented information which indicates that these devices are located above the flood level. Therefore, submergence testing is not required.

8005140618

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

EQUIPMENT ITEM NO. 27
FLOW TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 180'0"
FOXBORO MODEL E13DM
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 27
LICENSEE REFERENCE(S) 687
FUNCTION (PLANT ID) FEEDWATER CONTROL (Q1C22FT474, 475, 484, 485, 494, 495)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.10 [5]

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

(R) (T) QV, RT, (P) (H) (CS) (A) S, (R), (M) I, (UM) RPN, EQN, 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~~

0054619

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

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

0054620

X 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.

X 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.

X 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
X Other (evaluate and take appropriate actions)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action: 1/1/82.)

___ 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. 27

0054621

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	X
Test Duration Margin (1 hour + Function Time) Satisfied	X
Criteria Regarding Margins Satisfied (NUREG-0588, Cat. I)	

NRC QUALIFICATION CATEGORY		DESIGNATION: X = CATEGORY
I.a	Equipment Qualified	
I.b	Equipment Qualification Pending Modification	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

0054622

COMPONENT: FLOW TRANSMITTERS, [illegible]

NRC DEFICIENCY	AFCo RESPONSE
AGING	Aging was not a requirement in the qualification program for the Foxboro transmitters, which was developed to address IEEE-323-1971. Radiation aging, however, has been adequately addressed by the testing program. With the large range of experience and with the amount of testing on this type of transmitter, it is known that the materials and components used do not have a known thermal aging mechanism (as compared to Appendix C of IE Bulletin 79-01B) that could affect the performance of these transmitters before June 30, 1982. AFCo will complete an evaluation by January 1, 1987 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2500 ppm. This boric acid concentration meets the Farley FSAR value of 2600 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified: (a) Temperature - The 360°F qualification test condition exceeds the 300°F required temperature by 60°F thus adequate margin has been demonstrated. (b) Pressure - The 90 psia qualification test condition provides adequate margin above the maximum calculated Farley Unit 1 containment pressure.
RADIATION	The radiation dose meets the FNP #1 requirement of 4×10^4 normal dose plus 30 seconds post-accident.
TEMPERATURE	360°F temperature excursion during steam test envelopes FNP #1 requirement.
PRESSURE	90 psia pressure excursion during steam test envelopes FNP #1 requirement.
HUMIDITY	100% relative humidity demonstrated during steam test.
QUALIFICATION METHOD	As documented in WCAP-9157 Westinghouse performed a sequential radiation and steam/chemical spray test that demonstrates the short term performance capability of these units.

LICENSEE RESPONSE TO NRC SER (Continued)

APPENDIX 1

UNIT 1

III.F-FLOW TRANSMITTER

ZENS NO.	79-01B RESPONSE SECTION	NRC DEFICIENCY
Q1C32FT474	C.2.A	R,T,P,E,A,QM,M,CS
Q1C32FT475	C.2.A	R,T,P,E,A,QM,M,CS
Q1C32FT484	C.2.A	R,T,P,E,A,QM,M,CS
Q1C32FT485	C.2.A	R,T,P,E,A,QM,M,CS
Q1C32FT494	C.2.A	R,T,P,E,A,QM,M,CS
Q1C32FT495	C.2.A	R,T,P,E,A,QM,M,CS

0054623

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

NOTES:

1. Test report reference [687] was cited as evidence of qualification for the Foxboro E13DM transmitter. This report makes the following statement of the test results:

Appendix A contains a summary of the transmitter errors during the trip portion through to the time that the transmitter's operational characteristics became erratic and the error excessive enough to cancel the testing. Each transmitter of both manufacturers [(Foxboro and Fischer & Porter)] exhibited high errors at various times during the environmental tests, as shown in appendix A, but remained within the accuracy required for trip functions within the first [30] 60 seconds.

Failure of all the test units was attributed to high temperature steam leaking into the transmitter electronics housing and causing the electronic amplifier to fail. It should be noted that neither of the models tested was designed for the environment in which it was tested.

One of the Foxboro test units had a 65.4% error at 4.3 minutes into the test. This is considered unacceptable. The DOR guidelines require a minimum of one hour margin for equipment with short operating times.

2. Aging degradation has not been evaluated by the licensee.

3. The test report [687] documents a total dose of 4×10^4 R/s in the transmitter irradiation test. This falls far short of the licensee TID specified on the SCEW sheet viz. 5×10^7 Rads.

0054624

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

0054625

EQUIPMENT ITEM NO. 28
LIMIT SWITCH LOCATED IN THE CONTAINMENT
NAMCO MODEL EA180
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 28
LICENSEE REFERENCE(S): 3293, 5909
FUNCTION (PLANT ID) VALVE POSITION INDICATION (Q1B13ZS1034, 2035, 2036)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [5, 22]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1B31ZS0444B, 445A)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [5, 22]

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

R, T, QT, ET, P, E, CS, A, S, (R), M, I, UM, EPN, EQN, SEW, 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. 78

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

X 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.

X The Licensee has presented information which shows there are no outstanding qualification deficiencies.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X 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
X Other (PMP To Be ESTABLISHED)

___ 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. 28

0054927

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 Adequ	
Qualified Life or Replacement Sche Established (If Required)	X
Program Established to Identify Ag. , 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	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

LICENSEE RESPONSE TO NRC SER

COMPONENT: LIMIT SWITCHES - [illegible]

NRC POSITION	APCo RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1981 based on type testing, material analysis using Arrhenius methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1981 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modifications, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment, was 3000 ppm boron (Reference: Qualification Test Report for NAMCO EA-180 Limit Switches). This boron acid concentration exceeds the Tertiary Phase value of 2000 ppm.
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix I, Section II.B.
QUALIFICATION METHOD	This equipment has been qualified to the requirements of IEEE-323-1974 using the methodology of IEEE 0344.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

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)	LICENSE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION Equipment Type	LIMIT SWITCH	LIMIT SWITCH	
Manufacturer's Name (5.2.2/-/-)	NAMCO CONTROLS	NAMCO CONTROLS	
Model Number (5.2.2/-/-)	EA180	EA180-11302, REV. H	
Serial Number	NOT STATED	3979 H 13658	
Features/Mounting (5.2.6/-/-)	ON VALVE	HORIZONTAL IN AUTOCLAVE	
Connections/Interfaces (5.2.6/-/-)	NOT STATED	TEFLON TAPE USED TO SEAL CONDUIT THREADS	
Location/Elevation	CONTAINMENT EL 115'	N/A	
Equipment ID No.		N/A	
QUALIFICATION REPORT (8.0/5.0/5.0) Report ID Number	QTR-105	QTR-105	
Report Date	N/A	AUGUST 28, 1980	
Issued by	N/A	ACME CLEVELAND DEVELOPMENT COMPANY	
Prepared for	N/A	NAMCO CONTROLS	
Referenced Reports	N/A	NOT STATED	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	N/A	SEQUENTIAL TEST	
QUALIFICATION TEST PROGRAM Functional Test Description (5.2.5/2.2.9/2.2.9)	N/A	MAKE/BREAK CONTACT	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	0.5 AMPS @ 100 VDC	

0054629

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	N C ?	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	NOT STATED		
Number of Specimens	N/A	1		
Test Instruments Calibrated	N/A	YES		
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	NOT STATED	ACTIVE		
Test Duration (5.2.1/-/-)	N/A	30 days		
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	> 1 day	N/A		
Required Function Time	NOT STATED	N/A		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	INSPECTION/BASE LINE DATA THERMAL AGING/MECHANICAL WEAR AGING/ IRRADIATION/ SEISMIC TESTING/ LOCA SIMULATION		
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	N/A			
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) Thermal Aging/Basis	NOT STATED	400 hrs @ 120°C		X NOTE 1
Material Aging Evaluation (7.0/-/-)	NOT STATED	ANALYSIS TO DETERMINE SUSCEPTIBILITY		
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	NOT STATED	THERMAL		
Radiation Aging, Type	GAMMA	GAMMA		

0054630

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

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	204 MEGA RADS *	
Radiation Aging, Dose Rate	N/A	0.1×10^6 RADS/HR	
Radiation Aging, Method	N/A	TEST	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	NOT STATED	NOT STATED	
Operational Aging (-/4.2/-)	N/A	100,300 ACTUATION CYCLES WHILE UNDER 0.5 AMP @ 100 Vdc LOAD	
Other Age Conditioning (-/4.2/-)	N/A	NOT STATED	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	NOT STATED	5 YEARS @ 55°C	X NOTE 1
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity	NOT STATED	N/A	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	NOT STATED	EAIBS-90051	
On-Going Analysis of Failures and Degradation (7.0/-/-)	NOT STATED	N/A	
Margin (General) (6.0/3.0/3.0)	N/A	NOT STATED	
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)	N/A	NOT STATED	

* NORMAL AND ACCIDENT DOSE COMBINED IN SINGLE EXPOSURE PRIOR TO LOCA SIMULATION

0054631

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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/MSLB	
Radiation Type	GAMMA	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	50 MEGARADS	204 MEGARADS*	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	NOT STATED N/A	9.1×10^6 RADS/HR TEST	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	NOT STATED	N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	NOT STATED	NOT STATED	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	NOT STATED	204 MEGARADS*	
Plateout Dose Considered (-/1.48/1.48)	NOT STATED	N/A	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	NOT STATED	N/A	

* NORMAL AND ACCIDENT DOSES COMBINED IN A SINGLE EXPOSURE PRIOR TO LOCA SIMULATION

0054632

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2P.

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	D & QUALIFICATION T DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	65/2.6/SEC	11F°/SEC	
Peak: °F/psig/RH/Time	316/48/100/45SEC *	340/70/100/3 hrs	
Decrease To: °F/psig/RH/Time	270/38/100/16MIN *	140/-/-/10SEC 340/70/100/3hrs	
Decrease To: °F/psig/RH/Time	180/10/100/1day *	320/40/100/3 hrs	
Decrease To: °F/psig/RH/Time	140/5/100/- *	260/25/100/6 days 200/10/100/25 days	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	N/A	N/A	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	N/A	TEST	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3/NaOH	$Na_2S_2O_3$/H_3BO_3/NaOH/H_2O	
Spray Density (gpm/ft^2)	NOT STATED	0.15	
Spray Duration	NOT STATED	30 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	N/A	
In-Leakage Considered (5.2.6, 5.3.2/-/-)	N/A	N/A	
Time to Submergence	N/A	N/A	
Dust Environment (-/2.2.11/2.2.11)	N/A	N/A	

* LICENSEE PROFILE ENVELOPED FOR COMPARISON

0054633

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

NOTES:

1. ALTHOUGH THE REPORT PROVIDES A MEANS OF ESTABLISHING A QUALIFIED LIFE BASED ON THE AGING SIMULATION, THE LICENSEE HAS NOT STATED THE QUALIFIED LIFE. THIS IS A DEFICIENCY. The Qualified life should be based on plant specific parameters such as temperature.

0054634

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

EQUIPMENT ITEM NO. 29
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
NAMCO MODEL D2400X
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 29
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N25ZS3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.3 [5]

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

R, (T) (W) RT, (P) (E) CS, (A) S, (R), (M) I, (SM) (RPN) EQN, 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~~

0051635

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REFUELING OUTAGE VERIF. TO 6/30/82.)

___ 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

0054036

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

COMPONENT: LIMIT SWITCHES - OUTSIDE CONTAINMENT (UNQUALIFIED)

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD MARGIN RPM	Adequate Qualification documentation for these limit switches in the specified environments is not available. The switches will be replaced by ones having full Environmental Qualification documentation during the next refueling outage currently scheduled for on or before June 30, 1982. Justification for interim operation until these limit switches can be replaced is provided in Section 0, Page 0.3.

0054638

LICENSEE RESPONSE TO NRC SER (Continued)

7. Limit Switches - Outside Containment

A total of 32 limit switches outside the containment were determined not to have qualification documentation. Interim operation is justified on the basis that the accident temperature excursion to which these switches are exposed is less than two seconds in duration, and the thermal lag of the switch enclosure precluces damage to the internals. Should failure occur subsequently, other safety related components would not be affected. Based on the facts of short duration of the harsh environment and that potential subsequent failure will not adversely affect other safety-related equipment, interim use of these switches is acceptable until they can be replaced. Replacement with qualified switches having adequate documentation will be completed during the next scheduled refueling outage. If any problems arise beyond the control of Alabama Power Company which may impact this schedule, the NRC will be notified. A replacement program to fully support this schedule has been implemented.

8005460339

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

EQUIPMENT ITEM NO. 30
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
MICRO SWITCH MODEL OPDAR
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 30
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N12ZS3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3368B, 3976B)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]

8005160440

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

R, (T) (TI) RT, (P) (H) CS, (A) S, (R), (M) I, (JM) (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~~

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. C3257 FRC Assignment No. 13 FRC Task No. 509	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

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

X 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 presentnd information which shows there are no outstanding qualification deficiencies.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X Equipment replacement with qualified equipment
- ___ Equipment modification
- ___ Equipment relocation above submergance 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REPLACE ENTIRE FLOW TO 6/30/82.)

___ 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

8051641

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: Y = CATEGORY
I.a	Equipment Qualified	
I.b	Equipment Qualification Pending Modification	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 Qualification Review	
IV	Documentation Not Made Available	

0054642

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

COMPONENT: LIMIT SWITCHES - OUTSIDE CONTAINMENT (UNQUALIFIED)

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD MARGIN RPB	Adequate Qualification documentation for these limit switches in the specified environments is not available. The switches will be replaced by ones having full Environmental Qualification documentation during the next refueling outage currently scheduled prior to June 30, 1982. Justification for interim operation until these limit switches can be replaced is provided in Section B, Page B.2.

0054643

LICENSEE RESPONSE TO NRC SER (Continued)

3. Limit Switches - Outside Containment

A total of 32 limit switches outside the containment were determined not to have qualification documentation. Interim operation is justified on the basis that the accident temperature excursion to which these switches are exposed is less than two seconds in duration, and the thermal lag of the switch enclosure precludes damage to the internals. Should failure occur subsequently, other safety related components would not be affected. Based on the facts of short duration of the harsh environment and that potential subsequent failure will not adversely affect other safety-related equipment, interim use of these switches is acceptable until they can be replaced. Replacement with qualified switches having adequate documentation will be completed during the next scheduled refueling outage. If any problems arise beyond the control of Alabama Power Company which may impact this schedule, the NRC will be notified. A replacement program to fully support this schedule has been implemented.

0054644

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

EQUIPMENT ITEM NO. 31
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
NAMCO MODEL EA170
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 31
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1C22ZS0478, 488, 498, 489, 499)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3368A, C; 3976A, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.6 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICAT..N (Q1N23ZS3228A, B, C; 3227A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N12ZS3234A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.3 [5]

0054645

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

R, (T) (WT) RT, (P) (H) CS, (A) S, (R), (M) I, (UM) (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. 31

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action PENDING OTHER REPLACE TO 6/30/82.)

___ 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

0054646

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

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	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 Qualification Review	
IV	Documentation Not Available	

0054042

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

COMPONENT: LIMIT SWITCHES - OUTSIDE CONTAINMENT (UNQUALIFIED)

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD MARGIN RPM	Adequate Qualification documentation for these limit switches in the specified environments is not available. The switches will be replaced by ones having full Environmental Qualification documentation during the next refueling outage currently scheduled prior to June 30, 1982. Justification for interim operation until these limit switches can be replaced is provided in Section D, Page D.3.

0054644

LICENSEE RESPONSE TO NRC SER (Continued)

3. Limit Switches - Outside Containment

A total of 32 limit switches outside the containment were determined not to have qualification documentation. Interim operation is justified on the basis that the accident temperature excursion to which these switches are exposed is less than two seconds in duration, and the thermal lag of the switch enclosure precludes damage to the internals. Should failure occur subsequently, other safety related components would not be affected. Based on the facts of short duration of the harsh environment and that potential subsequent failure will not adversely affect other safety-related equipment, interim use of these switches is acceptable until they can be replaced. Replacement with qualified switches having adequate documentation will be completed during the next scheduled refueling outage. If any problems arise beyond the control of Alabama Power Company which may impact this schedule, the NRC will be notified. A replacement program to fully support this schedule has been implemented.

8005160

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

EQUIPMENT ITEM NO. 32
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 117'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 32
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID) VALVE POSITION INDICATION (Q1P17ZS3184, 3443)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1P17ZS3103, 3765, 3766, 3179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1P17ZS3180A, B, C; 3181A, B, C; 3104)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1P13ZS3196, 2867B, 3197, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1E21ZS8871)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.7 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1G21ZS7126)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.10 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1B31ZS8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3 [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:

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~~

0054650

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

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

X 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.

X 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

0051651

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

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)	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	
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	

FOR EVALUATION REFER TO FRC ITEM # 28

0054657

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

COMPONENT: LIMIT SWITCHES - INSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm boron (Reference: Qualification Test Report for NAMCO EA-180 Limit Switches). This boron acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix 1, Section II.B.
QUALIFICATION METHOD	This equipment has been qualified to the requirements of IEEE-323-1974 using the Methodology of NUREG 0588.

0054653

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

EQUIPMENT ITEM NO. 33
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 109'0"&110'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 33
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID) VALVE POSITION INDICATION (Q1P12ZS3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1E21ZS8149A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.8 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1E21ZS8808AB, BB, CB)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.8 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1G21ZS3376; N1G21ZS1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.3 [5]

0054654

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, WM, 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, 3e
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~~

Franklin Research Center A Division of The Franklin Institute 20th and Race Streets, Phila., Pa. 19103 (215) 448-1000	NRC Contract No. NRC-03-78-118 FRC Project No. C5257 FRC Assignment No. 13 FRC Task No. 509	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 53

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

X 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.

X 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

0054655

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

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)	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	X
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	X
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	

0054656

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

COMPONENT: LIMIT SWITCHES - INSIDE CONTAINMENT

NRC PERIODICITY	APCo RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e. justification, alternate equipment, qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm boron (Reference: Qualification Test Report for NAMCO EA-180 Limit Switches). This boron acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix I, Section II.B.
QUALIFICATION METHOD	This equipment has been qualified to the requirements of IEEE-323-1974 using the Methodology of NUREG 0588.

0054657

LICENSEE RESPONSE TO NRC SER (Continued)

[illegible]
[illegible]

[illegible]

[illegible]

LICENSEE RESPONSE TO NRC SER (Continued)

FAILURE MODE ANALYSIS (CONT.)

conditions are (1) loss of power, (2) control switch failed open or held continuously in CLOSE position, and (3) containment isolation signal. For the first two conditions, limit switch failure has no effect on the solenoid. For the third condition (containment isolation signal present), should the limit switch fail open, there would be an immediate effect. Subsequent to the failure, it would not be possible to re-open the air-operated valve unless the control switch was held continuously in the OPEN position. However, this condition has no effect on the ability of the valve to perform its safety function, i.e., to close.

In the event that containment isolation is called for and the limit switch fails closed, the isolation function will be performed as required. However, when the isolation signal is subsequently reset, the failed limit switch would cause its associated solenoid to be re-energized resulting in a re-opening of the air-operated isolation valve (Refer to Figure TI.D-1).

JUSTIFICATION FOR OPERATION

Protection against a loss of containment isolation is provided by redundant air-operated valves located outside of containment. Because these valves and their control elements are located outside containment they are not subject to the adverse environment resulting from the postulated initiating event.

0054659

LICENSEE RESPONSE TO NRC SER (Continued)

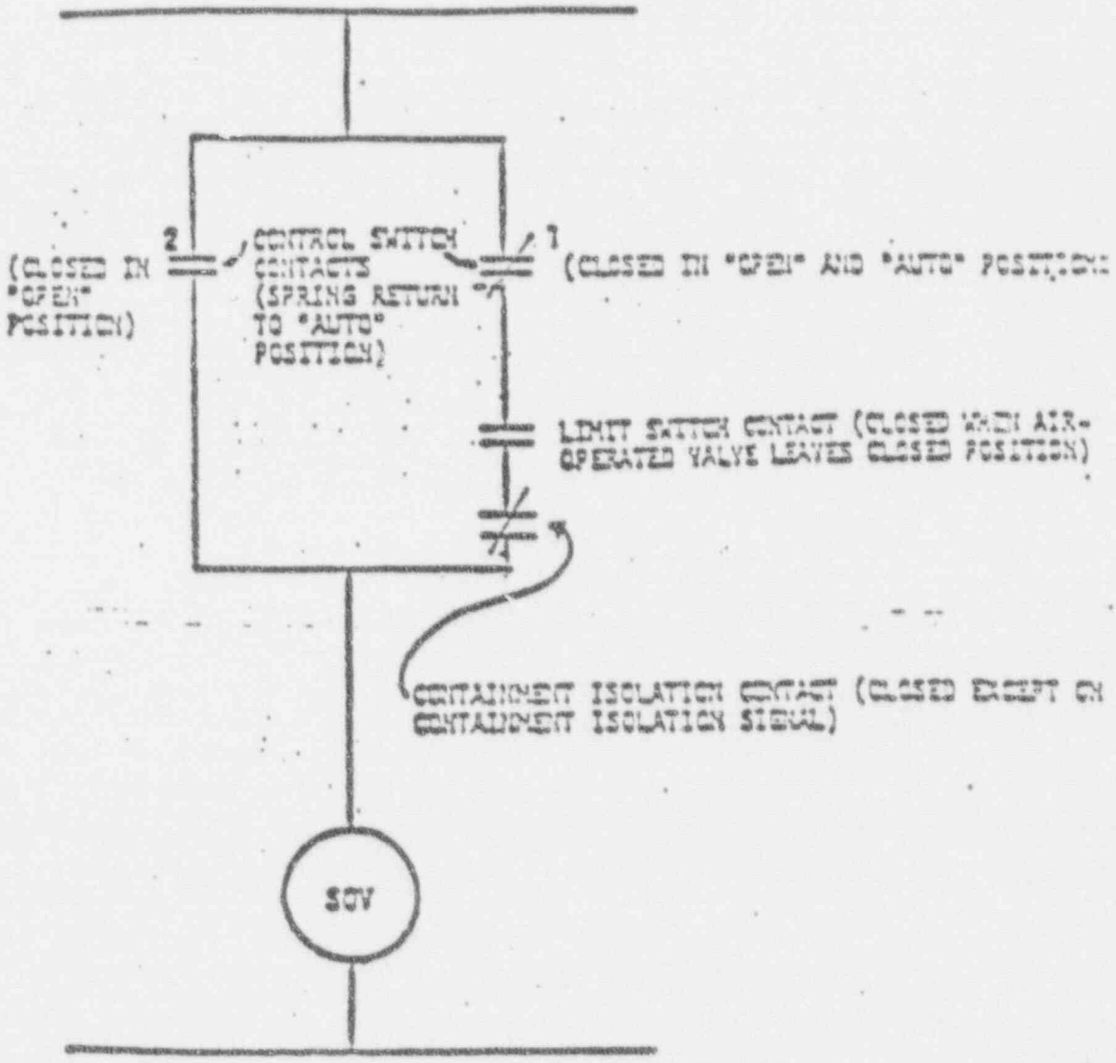


Figure III.D-1
TYPICAL LIMIT SWITCH "SEAL-IN" CIRCUIT
FOR CONTAINMENT ISOLATION VALVE

0054660

LICENSEE RESPONSE TO NRC SER (Continued)

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

TABLE II.D-1

Component	El.	Time to Function	Time to Submergence
Q1E21ZS8149A	111'	30 sec.	1260 sec.
Q1E21ZS8149B	111'	30 sec.	1260 sec.
Q1E21ZS8149C	111'	30 sec.	1260 sec.
Q1E21V038A (MOV8808A)	111'-6"	30 sec.	1390 sec.
Q1E21V038B (MOV8808B)	112'-6"	30 sec.	1660 sec.
Q1E21V038C (MOV8808C)	113'-6"	30 sec.	1950 sec.
N1G21SV1003B	110'	30 sec.	983 sec.
N1G21ZS1003B	110'	30 sec.	983 sec.
N1G21ZS3376	109'	30 sec.	714 sec.
N1G21SV3376	109'	30 sec.	714 sec.
Q1E21SV8149AB	111'	30 sec.	1260 sec.
Q1E21SV8149BB	111'	30 sec.	1260 sec.
Q1E21SV8149CB	111'	30 sec.	1260 sec.
Q1E21ZS8808AB	111'-6"	30 sec.	1390 sec.
Q1E21ZS8808BB	112'-6"	30 sec.	1660 sec.
Q1E21ZS8808CB	113'-6"	30 sec.	1950 sec.

0054661

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

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.)
EQUIPMENT DESCRIPTION			
Equipment Type	LIMIT SWITCH	LIMIT SWITCH	
Manufacturer's Name (5.2.2/-/-)	NAMCO CONTROLS	NAMCO CONTROLS	
Model Number (5.2.2/-/-)	EA180	EA180-11202, REV. H	
Serial Number	NOT STATED	3979 N 13658	
Features/Mounting (5.2.6/-/-)	ON VALVE	HORIZONTAL IN AUTOCLAVE	
Connections/Interfaces (5.2.6/-/-)	NOT STATED	TEFLON TAPE USED TO SEAL CONDUIT THREADS	
Location/Elevation	CONTAINMENT EL 115'	N/A	
Equipment ID No.		N/A	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	QTR-105	QTR-105	
Report Date	N/A	AUGUST 28, 1980	
Issued by	N/A	ACME CLEVELAND DEVELOPMENT COMPANY	
Prepared for	N/A	NAMCO CONTROLS	
Referenced Reports	N/A	NOT STATED	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	N/A	SEQUENTIAL TEST	
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)	N/A	MAKE/BREAK CONTACT	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	0.5 AMPS @ 100 VDC	

0054662

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

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	NOT STATED	
Number of Specimens	N/A	1	
Test Instruments Calibrated	N/A	YES	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	NOT STATED	ACTIVE	
Test Duration (5.2.1/-/-)	N/A	30 days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	> 1 day	N/A	
Required Function Time	NOT STATED	N/A	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	INSPECTION/BASE LINE DATA THERMAL AGING/MECHANICAL WEAR AGING/IRRADIATION/ SEISMIC TESTING/LOCA SIMULATION	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	N/A		
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) Thermal Aging/Basis	NOT STATED	400 hrs @ 120°C	X NOTE 1
Material Aging Evaluation (7.0/-/-)	NOT STATED	ANALYSIS TO DETERMINE SUSCEPTIBILITY	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	NOT STATED	THERMAL	
Radiation Aging, Type	GAMMA	GAMMA	

0054660

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

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	204 MEGA RADS*	
Radiation Aging, Dose Rate	N/A	9 x 10^6 RADS/HR	
Radiation Aging, Method	N/A	TEST	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	NOT STATED	NOT STATED	
Operational Aging (-/4.2/-)	N/A	100,300 ACTUATION CYCLES WHILE UNDER 0.5 AMP @ 100 VDC LOAD	
Other Age Conditioning (-/4.2/-)	N/A	NOT STATED	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	NOT STATED	5 YEARS @ 55°C	X NOTE 1
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity	NOT STATED	N/A	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	NOT STATED	EA189-90051	
On-Going Analysis of Failures and Degradation (7.0/-/-)	NOT STATED	N/A	
Margin (General) (6.0/3.0/3.0)	N/A	NOT STATED	
Margin (NUREG-0588, Cat. I) (-/3.2/-) 1. Temperature (+25°F) 2. Pressure (+5 psig, 10 psig max) 3. Radiation (not required) 4. Time (+10%, +1 hour + function time minimum)	N/A	NOT STATED	

* NORMAL AND ACCIDENT DOSE COMBINED IN SINGLE EXPOSURE PRIOR TO LOCA SIMULATION

0054664

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

NRC REQUIREMENTS WITH SECTION REFERENCE (NUREG/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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/MSLB	
Radiation Type	GAMMA	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	50 MEGARADS	204 MEGARADS*	
Radiation Dose Rate (rd/hr)	NOT STATED	9.1×10^6 RADS/HR	
Radiation Qual. Method (5.3.1/-/-)	N/A	TEST	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	NOT STATED	N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	NOT STATED	NOT STATED	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	NOT STATED	204 MEGARADS*	
Plateout Dose Considered (-/1.48/1.48)	NOT STATED	N/A	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	NOT STATED	N/A	

* NORMAL AND ACCIDENT DOSES COMBINED IN A SINGLE EXPOSURE PRIOR TO LOCA SIMULATION

0054695

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	6.5/2.6/SEC	11/8/SEC	
Peak: °F/psig/RH/Time	316/48/100/63SEC *	340/70/100/3 hrs	
Decrease To: °F/psig/RH/Time	270/38/100/14MIN *	160/-/-/10SEC 340/70/100/3hrs	
Decrease To: °F/psig/RH/Time	180/10/100/1day *	320/40/100/3 hrs	
Decrease To: °F/psig/RH/Time	140/5/100/- *	260/25/100/4 days 200/10/100/25 days	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	N/A	N/A	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	N/A	TEST	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3/NaOH	$Na_2S_2O_3$/H_3BO_3/NaOH/H_2O	
Spray Density (gpm/ft^2)	NOT STATED	0.15	
Spray Duration	NOT STATED	30 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)	NOT STATED	N/A	X NOTE 2
In-Leakage Considered (5.2.6, 5.3.2/-/-)	YES	N/A	
Time to Submergence	714 SEC	N/A	
Dust Environment (-/2.2.11/2.2.11)	N/A	N/A	-

* LICENSEE PROFILE ENVELOPED FOR COMPARISON

Franklin Research Center 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. 509	Page 51

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

NOTES:

1. ALTHOUGH THE REPORT PROVIDES A MEANS OF ESTABLISHING A QUALIFIED LIFE BASED ON THE AGING SIMULATION, THE LICENSEE HAS NOT STATED THE QUALIFIED LIFE. THIS IS A DEFICIENCY

2. THE LICENSEE HAS NOT ESTABLISHED QUALIFICATION OF THE LIMIT SWITCHES FOR SUBMERGENCE

0054667

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

EQUIPMENT ITEM NO. 34 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.8.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.7.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.11 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.3 [5]

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

B, T, (T), RT, P, H, CS, A, S, (R), M, I, UM, 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

0954668

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

EQUIPMENT ITEM NO. 34
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT, ELEV. 143'0"
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 34
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID) CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.19.5 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.7 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.16 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.11.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.10.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.10 [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:

Contents	Checksheet Page No.
Equipment Item	~~1a~~, 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~~

0054669

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. 509	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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

0051670

193/1 1002

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	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	

0054627

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

COMPONENT: PENETRATIONS

SRP DEFICIENCY

AGING

CHEMICAL SPRAY

MARGIN

AFW's RESPONSE

Type test accelerated aging techniques were used to thermally age the most age susceptible material which analyses determined to be epoxy resin. Using Arrhenius techniques, a temperature dependent life time was established based on 50% reduction in ultimate tensile strength. Thermogravimetric analyses also were run on a DuPont Model 950 thermal analyzer to confirm the elevated temperature tests. These data can be extrapolated to indicate a service life in excess of 130,000 hours (40 years) at the average service temperature of 140°F.

The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 8750 ppm (Reference: G. E. Test Report for L. V. Penetration). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.

IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

a) Temperature - The 340°F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated.

b) Pressure - The 110 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 62.2 psia.

c) Operating Time - The 10 day qualification test time exceeds 4 hours specified time and demonstrates adequate margin.

d) Radiation - The 1×10^8 rads, qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 5×10^7 rads. Therefore adequate margin exists.

005467

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

LICENSEE RESPONSE TO NRC SER (Continued)

APPENDIX 1

UNIT 1

III.D PENETRATIONS

ITEM NO.	79-018 RESPONSE SECTION	NRC DETERMINATION
Q1EEE3012	C.2.1,C.2.2,C.2.3,C.2.4	CS,A,M
Q1EEE3025	C.2.1,C.2.3,C.2.4	CS,A,M
Q1EEE3030	C.2.1,C.2.2,C.2.3,C.2.4	CS,A,M
Q1EEE3040	C.2.2,C.2.3,C.2.4	CS,A,M
Q1EEE3002	C.2.3,C.2.9,C.2.6,C.2.8	CS,A,M
Q1EEE3018	C.2.3,C.2.9,C.2.11,C.2.12,C.2.20	CS,A,M
Q1EEE3010	C.2.4	CS,A,M
Q1EEE3006	C.2.5,C.2.6	CS,A,M
Q1EEE3020	C.2.5,C.2.6,C.2.10,C.2.11,C.2.18, C.2.19,C.2.20	CS,A,M
Q1EEE3005	C.2.6,C.2.11,C.2.19	CS,A,M
Q1EEE3006	C.2.6,C.2.9	CS,A,M
Q1EEE3041	C.2.6,C.2.12,C.2.13,C.2.20	CS,A,M
Q1EEE3012	C.2.6	CS,A,M
Q1EEE3001	C.2.6,C.2.7,C.2.10	CS,A,M
Q1EEE3023	C.2.6,C.2.7,C.2.10	CS,A,M
Q1EEE3024	C.2.7	CS,A,M
Q1EEE3042	C.2.7	CS,A,M
Q1EEE3014	C.2.8,C.2.9,C.2.19	CS,A,M
Q1EEE3015	C.2.8,C.2.11,C.2.19	CS,A,M
Q1EEE3016	C.2.9,C.2.11,C.2.20	CS,A,M
Q1EEE3019	C.2.8,C.2.9,C.2.10,C.2.11, C.2.12,C.2.18,C.2.19,C.2.20	CS,A,M
Q1EEE3017	C.2.11,C.2.8	CS,A,M
Q1EEE3007	C.2.6,C.2.11,C.2.18,C.2.19	CS,A,M

0054623

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

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.)
EQUIPMENT DESCRIPTION			
Equipment Type	Electrical Penetration	Electrical Penetration	
Manufacturer's Name (5.2.2/-/-)	GE	General Electric	
Model Number (5.2.2/-/-)	100 Series	Series 100	
Serial Number	Various	various	
Features/Mounting (5.2.6/-/-)	in Containment Shell	Horizontal in Autoclave	
Connections/Interfaces (5.2.6/-/-)	Pigtailed	Crimp with splice sleeve	
Location/Elevation	See p-1a	Not Applicable	
Equipment ID No.	"	Npt Applicable	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	N. I D	100 Series Containment Penetration Jan. 1974 &	
Report Date	1/1974 & 3/74	March 1974	
Issued by	GE	General Electric	
Prepared for	GE	General Electric	
Referenced Reports	NA	NO74-502-3 San Jose	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	↓	Sequential Test	
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Leakage and Insulation Resistance/ Carry Current	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	Various	NO4-95A@460Vac NO10-3A @ 460Vac NO16-1A@125Vac	

0054674

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3Y

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	$< 10^{-7}$ ccHe/sec @15psig	
Accuracy (5.2.5/-/-)		Not Applicable	
Number of Specimens		6	
Test Instruments Calibrated		Before and After each part of test	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	ambient	Not Stated	
Test Duration (5.2.2/-/-)	N/A	7 days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	> 24 hrs	Not Applicable	
Required Function Time	4 hrs	Not Applicable	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	Thermal Cycle Irradiation LOCA Simulation Post LOCA Inspection	
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) Thermal Aging/Basis	see p-30	Analysis and tests of Subcomponents	
Material Aging Evaluation (7.0/-/-)	"	Each Material evaluated	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		"O" ring seal Limiting	
Radiation Aging, Type	[illegible]	Gamma	

0053678

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	Not Stated	See Accident Dose	
Radiation Aging, Dose Rate	↓	See Accident Dose	
Radiation Aging, Method		Test	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		Not Stated	
Operational Aging (-/4.2/-)		Not Applicable	
Other Age Conditioning (-/4.2/-)		Thermal Cycle	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 yrs @ 160	40 Years	
Normal Ambient Temperature	N/A	Not Applicable	
Normal Ambient Radiation	↓	Not Applicable	
Normal Ambient Humidity		Not Applicable	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	Equip. Program	Not Applicable	
On-Going Analysis of Failures and Degradation (7.0/-/-)	"	Not Applicable	
Margin (General) (6.0/3.0/3.0)	N/A	Not Applicable	
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)	↓	Not Applicable	

0055426

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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	[illegible]	Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	5X10 7	5×10^7	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	Not Stated	3Mrd/hr 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 Applicable	
Radiation Dose (Normal + Accident) (4.1.2/-/-)		Not Applicable	
Plateout Dose Considered (-/1.48/1.48)		Not Applicable	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		Not Applicable	

00546277

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	See page 5-9	Not Stated	
Peak: °F/psig/RH/Time		340/103/100/3hrs	
Decrease To: °F/psig/RH/Time		320/81/100/3hrs	
Decrease To: °F/psig/RH/Time		260/25/100/18hrs	
Decrease To: °F/psig/RH/Time		250/16/100/168hrs	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, [illegible]/1.2.5.C, 2.2.6)		Not Applicable	
Spray qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH	None	Note
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)		None	
Spray Density (gpm/ft^2)	Not Stated	None	
Spray Duration		None	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	None	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		Not Applicable	
Time to Submergence		Not Applicable	
Dust Environment (-/2.2.11/2.2.11)		Not Applicable	-

0054678

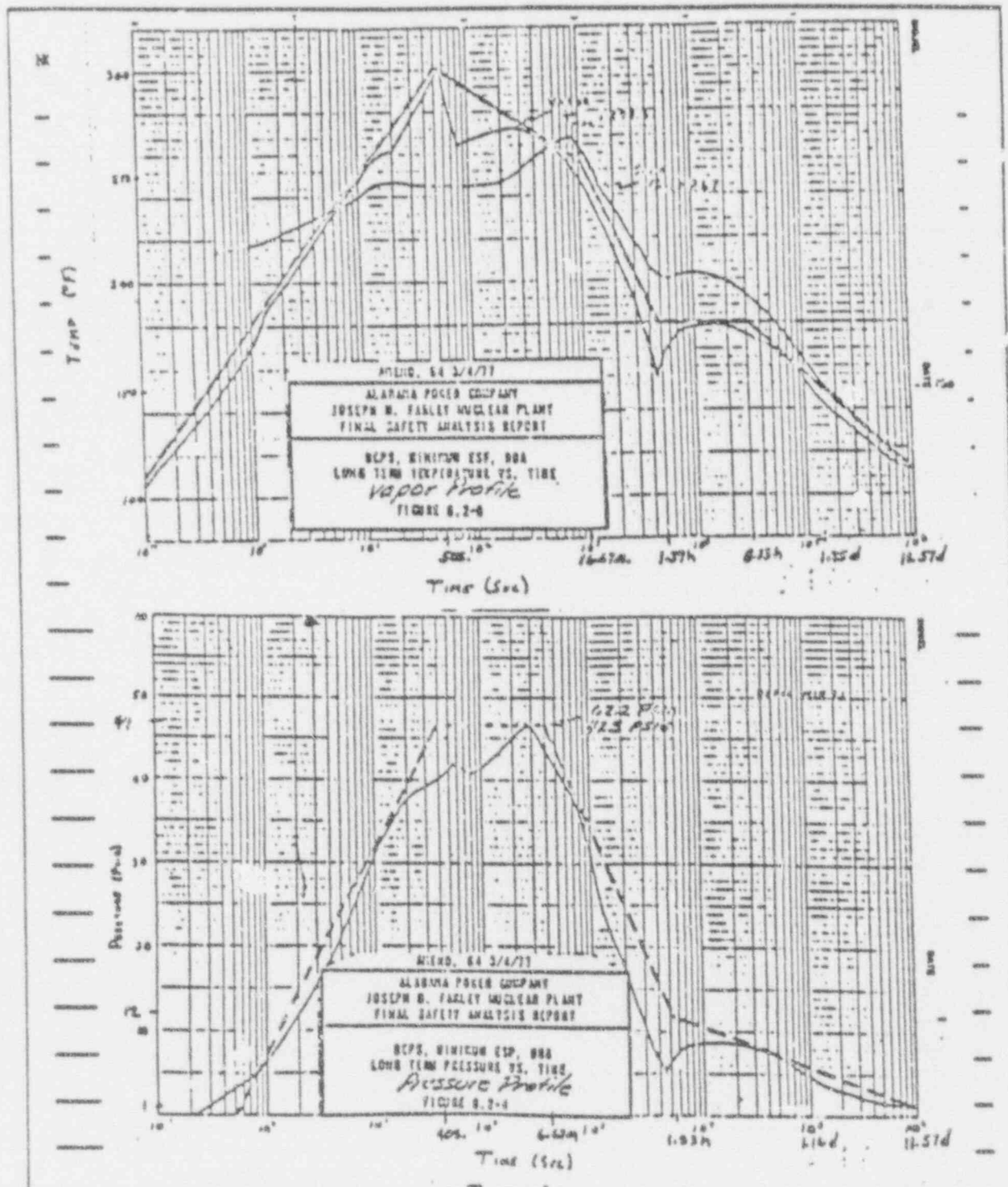
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2.V

NOTES:

Note 1. The test report does not include chemical spray per se but does include immersion tests and steam tests where the steam is generated from a boric Acid/ sodium hydroxide solution. It is concluded that the testing is at least as severe as from a fine spray.

00546679

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34



0054680

0054681

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

EQUIPMENT ITEM NO. 35
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 35
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-7.4 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-5.3 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-4.4 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-3.4 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-2.3 [5, 22]

00546871

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, EQN, 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~~
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~~

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. 509	Page 1b

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.

X 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.

X 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

0054683

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	
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 see item 34

00546684

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

EQUIPMENT ITEM NO. 36
TERMINAL BLOCK LOCATED IN THE CONTAINMENT, ELEV. 116'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 36
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID) CONDUCTOR TERMINATION (11TB001, 003, 004; 21TB001, 002, 005)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (11TB001, 002; 21TB003, 004; 31TB001, 002)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1B21SV8047-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1G21SV3376-B/JB; N1G21SV1003A-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (SV7126-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.7 [5]

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

R, T, QV, RT, P, M, (CS) (A) (S) (R), M, I, (VK) RPN, EQN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a, 1a2, 1a3
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~~

0054683

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

EQUIPMENT ITEM NO. 36 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1E21SV8149AA-A/JB; BA-A/JB; CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1E21SV8871-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P13SV3196-B/JB, 28678-B/JB, 3197-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P13SV2866B-B/JB;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1E12SV3999A-A/JB, B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P17SV3184-B/JB; 3443-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.20.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3765-A/JB, 3766-A/JB, 3103-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

0054686

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, UM, EPN, 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. 36

EQUIPMENT ITEM NO. 36 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3179A-A/JB, 3179B-A/JB, 3179C-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3180A-A/JB, 3180B-A/JB, 3180C-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3181A-A/JB, 3181B-A/JB, 3180C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P14SV3104-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

DESIGNATION FOR DEFICIENCY IDENTIFIED BY THE NRC SER - CIRCLED ITEM(S) ONLY:
(See Section 2 of this TER for Legend)

R, T, QT, RT, P, EQ, CS, A, S, (R), M, I, QM, RPN, EQN, 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. 26

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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

00546688

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. 509

Page 2

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	
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	

0054689

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2½

COMPONENT: TERMINAL BLOCKS/JUNCTION BOXES - INSIDE CONTAINMENT

IEEE DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to [illegible] the terminal blocks. Arrhenius methodology was used to establish a qualified life. The age-susceptible materials were identified and activation energies determined. From the analysis, a qualified life of 40 years was established for both inside and outside containment for Plant Farley.
CHEMICAL SPRAY	The chemical spray concentration utilized during equipment qualification testing program for this equipment was 10,000 ppm (Reference: Wyle Report 44154-1). This boric acid concentration exceeds the Farley FSAR value of 2800 ppm.
SUBMERGENCE	The original IEB 79-01B submittal listed the floor level only for elevation, since a verification walkdown could not be performed due to plant operation. It has since been verified that all terminal blocks/junction boxes are above the postulated flood level, and are not subject to submergence.
QUALIFICATION METHOD	This equipment has been qualified to the requirements of IEEE 323-1971 using [illegible] methodology.

0054690

Bechtel Power Corporation

HARD COPY RECORD

CHECK THE TYPE OF RECORD:

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- PHOTOGRAPH (PHOTO DOCUMENT) ☐
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- COMPUTER PRINTOUT ☐
- FLIMSY SOURCE DOCUMENT ☐

Job No. 7597-03/20

Elec trical Correspondence

E-91

SCS LETTER OF 2-16-83 LSF-NS-1772

Item No. 36, pages 5a thru 5h

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The Licensee Stated:

0054692

ENVIRONMENTAL QUALIFICATION OF
STATES COMPANY TERMINAL BLOCKS FOR
ALABAMA POWER COMPANY
JOSEPH M. FARLEY NUCLEAR PLANT

1. INTRODUCTION

As a result of a review performed pursuant to NRC Circular 79-08, it was determined that the terminal blocks used in conjunction with certain safety related electrical circuits inside the containment did not have documentation certifying their qualification status.

There is a total of 43 terminal blocks inside the containment which are used to connect electrical solenoid valves to field wiring. These valves are used for the purpose of containment isolation. In addition, there are six wide range Tesla/Test reactor coolant system temperature sensors, two in each loop, which are interconnected to field wiring through terminal blocks. These are provided to enable the required manual functions to be performed, as proposed to an orderly shutdown following a Condition II or Condition III event as noted in FSAR Sections 13.2 and 13.3. The terminal blocks are Type ZVM, Catalog M-15012, manufactured by States Company, a division of Multi-Amp Corporation. They are twelve pole, front connected terminal blocks with white marker strips and are mounted on the inside of NEMA 1 enclosures, where dimensions are 12" x 14" x 5". The molded base of the terminal block is fabricated from general purpose Durez #791, which is a brand name of Isomer Chemical and Plastics Corporation and is basically a two stage, asbestos free phenolic. The barrier strips are fabricated from Allied Chemical Grade FP-1085 polypropylene. Both materials are highly resistant to heat and moisture as well as ionizing radiation.

The enclosures which house the terminal blocks are Hoffman Engineering Company, NEMA Type 4, continuous hinge, sloop cover boxes, Catalog A-1412CRFF. They are fabricated from 14 gauge steel and finished with gray hammertone enamel inside and out over phosphatized surfaces. To preclude the collapse of the enclosures due to positive pressure, wood holes have been drilled in the boxes, and rupture disks installed over the holes.

Although it was demonstrated that the terminal blocks were environmentally qualified for in-containment applications at Farley, based on an engineering evaluation of published data, and previous test information on constituent parts of the terminal block, it was decided that the blocks should be environmentally qualified by a series of formal, sequential tests at a testing laboratory.

The testing laboratory selected was Wyle Laboratories located in Huntsville, Alabama, and the testing was performed during the period of December 7, 1978 and February 11, 1979.

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. 3
REPORT NO. 44354-1

3.0 REFERENCES

3.1 Alabama Power Company Purchase Order No. FEP-3-1194.

3.2 Wyle Laboratories Qualification Plan 5[illegible]/LOCS/EE, Revision 8, dated October 10, 1978.

4.0 TEST ITEM AND TEST EQUIPMENT DESCRIPTION

4.1 Test Item Description

4.1.1 Test Item No. 1

A 12-pole Terminal Block, Type [illegible], manufactured by States Company, a Division of Multi-Amp Corporation, and a 6-Pole Terminal Block, Type [illegible], manufactured by States Company, are mounted in a steel [illegible] 4 Enclosure. The 6-pole terminal block is sealed in RTV. The [illegible] 4 Enclosure contains a blowout plug to prevent differential pressure buildup. The [illegible] 4 Enclosure is 13" x 12" x 6". The terminal blocks are wired for AC circuits in accordance with Bechtel Schematic for Test Item No. 1 (Box No. 1) and Drawing B-181604, Sheet 62. The wire leads are approximately 10' long for test connections and exit the [illegible] 4 Enclosure through conduit.

4.1.2 Test Item No. 2

A 12-Pole Terminal Block, Type [illegible], manufactured by States Company, a Division of Multi-Amp Corporation, and a 6-Pole Terminal Block, Type [illegible], manufactured by States Company, are mounted in a steel [illegible] 4 Enclosure. The 6-pole terminal block is sealed in RTV. The [illegible] 4 Enclosure contains a blowout plug to prevent differential pressure buildup. The [illegible] 4 Enclosure is 13" x [illegible]". The terminal blocks are wired for DC circuits in accordance with Bechtel Schematic for Test Item No. 2 (Box No. 2) and Drawing B-181607, Sheet 13. The wire leads are approximately 10' long for test connections and exit the [illegible] 4 Enclosure through conduit.

4.1.3 Test Item No. 3

Eighteen (18) base-shrink splices, manufactured by Raychem Corporation, are mounted in a steel [illegible] 4 Enclosure. The [illegible] 4 Enclosure is 13" x 12" x 6" and contains a blowout plug to prevent differential pressure buildup. The splices connect AC and DC circuits in accordance with the schematics for Test Item No. 3 (Box No. 3) and Drawings B-181607 and B-181606, Sheet 62. The wire leads are approximately 10' long for test connections and exit the [illegible] 4 Enclosure through conduit.

4.1.4 Test Item No. 4

A 12-Pole Terminal Block, Type [illegible], manufactured by States Company, a Division of Multi-Amp Corporation, is mounted in a steel [illegible] 4 Enclosure. The [illegible] 4 Enclosure contains no blowout plug and all conduit outlets are sealed with RTV. The [illegible] 4 Enclosure is 13" x 12" x 6". The terminal block is wired for DC circuits in accordance with Bechtel Schematic for Test Item No. 4 (Box No. 4). The wire leads are approximately 10' long for test connections and exit the [illegible] 4 Enclosure through the conduit.

0054693

Regarding Aging the Licensee stated:

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. IV-1
REPORT NO. 44754-1

SECTION IV

TEMPERATURE AGING TEST

1.0 [illegible]

The four (4) [illegible] 4 Enclosures shall be subjected to an accelerated aging test that will put them into a condition which would be equivalent to a 40-year aged condition.

Each component of the subject equipment was reviewed for function and age-related failure mechanisms which could affect its function. This review is contained in the Qualification Plan 543/1023/EA, Revision 2, Section III (Qualification Program), Paragraph 3.0 (Aging). (This Qualification Plan is included as Section III of this report.)

As described in Paragraph 3.1, "Aging Evaluation", of the Qualification Plan contained in Section III, the "wear-list" material is the phenolic in the terminal blocks in Test Items #1, #2, and #4, the the heat-shrink splices in Test Item #3.

The aging time and conditions are shown below.

Test Item	Aging Temp.	Aging Time	Aging Atmosphere
Terminal Blocks	82°C[1]	163 hours	Air, 80% R.H. ± 10%
Heat-Shrink Splices	82°C[2]	163 hours	Air, 80% R.H. ± 10%
	126°C[3]	53 hours	Air, Uncontrolled R.H.

1 - Equivalent to a 40-year life.

2 - Aged with the terminal blocks to produce an equivalent 1.27 year life.

3 - Additional aging to produce aging equivalent to 38.73 years for a total equivalent 40-year life.

2.0 [illegible]

The four (4) [illegible] 4 Enclosures were placed in a temperature chamber. The test items were aged in air at 82 ± 1°C with controlled humidity of 80% ± 10% for 163 hours.

All four test items were removed from the chamber. Test item #3 was placed in another chamber and aged in air at 126°C and uncontrolled ambient humidity for an additional 53 hours and then removed from the chamber.

3.0 [illegible]

The test items were subjected to the temperature aging test as specified above. At the completion of testing, they were visually inspected and no degradation was noted.

Photographs pertaining to this test are contained in Appendix I of this section.

Equipment used for this test is listed in Appendix II of this section.

005469

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

Regarding radiation the Licensee provided the Following:

Page 22-1
Report 44354-1

005469

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF NUCLEAR ENGINEERING
ATLANTA, GEORGIA 30332

[illegible]

December 21, 1978

Mr. Benny Smith
Wyle Laboratories
7800 Governors Drive West
Huntsville, Alabama 35807

Dear Mr. Smith:

Pursuant to your instructions for [illegible] enclosures (Job [illegible], PO [illegible]-6064, were irradiated in our hot cell facility using cobalt 60 to a total dose of 1.0 X 10[illegible] rads (dose to attached cabling was not determined).

We certify the specific parameters of this irradiation to be:

Irradiation Period:	December 8 thru December 21, 1978 (303.0 kg)
Dose Rate:	3.3 X 10[illegible] rad/hr
Total Dose:	1.0 X 10[illegible] rads
Dosimetry:	Thermoluminescent dosimeters of lithium borate (Eurasia TL-600) calibrated with a Farmer Dosimeter model 2502/3.

If you require any further information please contact me.

GEORGIA INSTITUTE OF TECHNOLOGY

Marge Bruce
Assistant Research Scientist

MCB/lrm

Regarding LOCA simulation, the Licensee's results are presented on the following pages:

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. [illegible]
REPORT NO. [illegible]

SECTION VIII

ACCIDENT TEST (LOCA)
ENVIRONMENTAL CONDITION - CASE I

1.0 [illegible]

The four (4) NEMA 4 Enclosures shall be subjected to the environmental condition (Case I) shown in Figure 8, page 27 of Wyle Laboratories Qualification Plan 545/7/25/DS, Section XIII of this report. The following chemical spray solutions will apply:

- Sodium hydroxide to a pH of 10.5 at room temperature
- Boric acid, 10,000 ppm
- Chemical spray rate approximately 0.7 gpm/ft^2 of test item projected horizontal (cross-sectional area

Chemical spray starts 55 seconds after initiation of environmental condition, Case I.

The circuits will be energized with 1.1 x 125 VDC, 1 ampere, for the DC requirements, or 1.1 x 115 VAC, 1 ampere, for the AC requirements.

2.0 [illegible]

The four (4) NEMA 4 Enclosures were installed in the Wyle 30" Environmental Simulation Chamber, as shown in Photographs No. 1 and No. 2 (located in Appendix II of this section). After running the cables through the chamber, the cables were ported with Scotchcast Resin at the chamber interface. The circuits were energized for the Accident Test as follows:

1.1 x 125 VDC, 1 ampere, for circuits No. 2 (Test Item #2), 2B (Test Item #3), and 4 (Test Item #4); and 1.1 x 125 VAC, 1 ampere, for circuits No. 1 (Test Item #1) and 1A (Test Item #3). The circuit currents and voltages were recorded during the test.

After the chamber was sealed, the circuits were energized and the test items were subjected to the environmental condition, Case I.

3.0 [illegible]

The test items were subjected to the Accident Test as specified above. A typical chart of the test profile is shown in Figure 1, Appendix I, of this section. No significant fluctuations of currents or voltages were observed.

Photographs pertaining to this test are located in Appendix II of this section.

Equipment used during this test is listed in Appendix [illegible]

0054696

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0054697

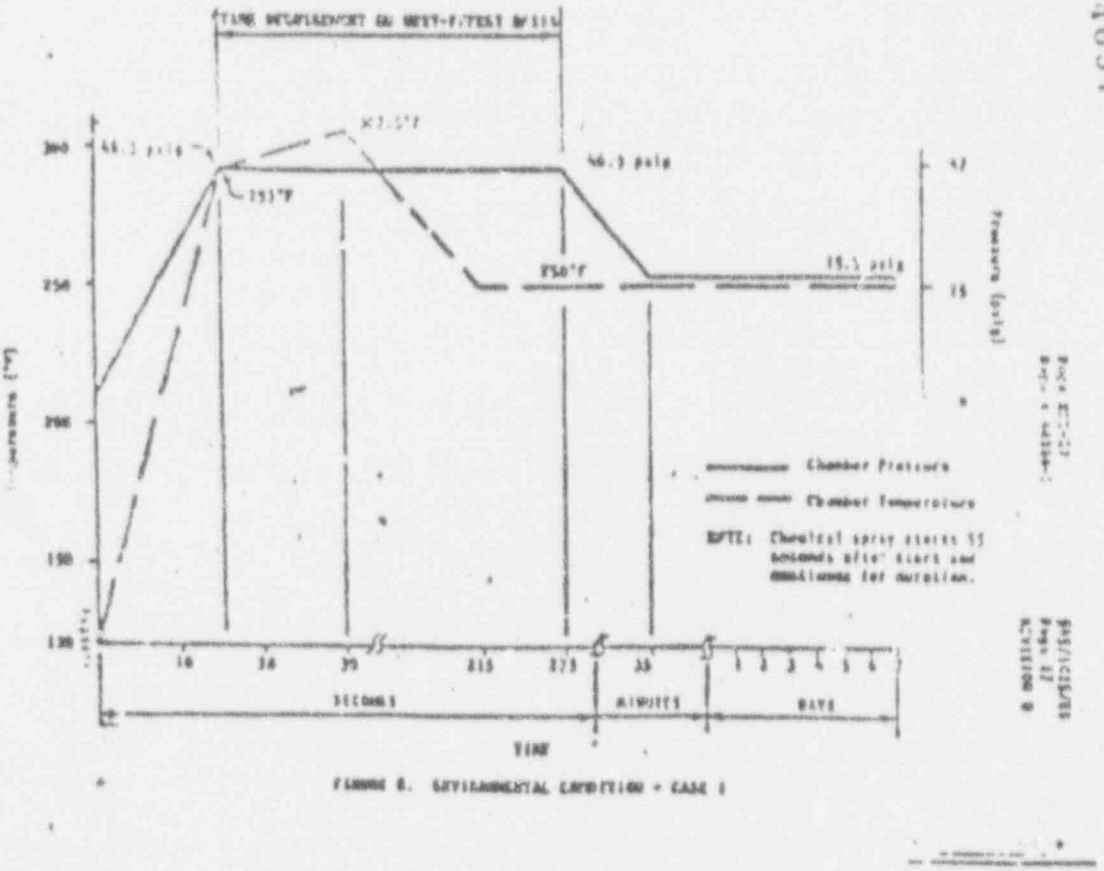


FIGURE 8. ENVIRONMENTAL CONDITIONS - CASE 1

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. [illegible]
REPORT NO. [illegible]

SECTION [illegible]

ACCIDENT TEST (LOCA)
ENVIRONMENTAL CONDITION - CASE [illegible]

1.1 [illegible]

The four (4) [illegible] 4 Enclosures shall be subjected to the Environmental Condition shown in Figure 9, page [illegible], Wyle Laboratories Qualification Plan [illegible] Section [illegible] of this report. The following chemical spray solutions shall apply:

- Sodium hydroxide to a pH of 12.5 at room temperature
- Boric acid, 10,000 ppm
- Chemical spray rate approximately 0.7 gpm/ft^2 of test item projected horizontal cross-sectional area

Chemical spray will be required during the entire Environmental Condition Case [illegible].

The circuits will be energized with 1.1 x 125 VDC, 1 ampere, for the DC requirements, or 1.1 x 115 VAC, 1 ampere, for the AC requirements.

1.1 [illegible]

The four (4) [illegible] 4 Enclosures were installed in the Wyle [illegible] Simulator Chamber. After running the cables through the chamber, the cables were potted with Scotchcast Resin at the chamber interface.

The circuits were energized for the Accident Test as follows:

1.1 x 125 VDC, 1 ampere, for circuits No. 1 (Test Item #2), No. 2B (Test Item #3), and No. 4 (Test Item #4); and 1.1 x 115 VAC, 1 ampere, for circuits No. 1 (Test Item #1) and No. 3A (Test Item #3). The circuit currents and voltages were recorded during the test.

After the chamber was sealed, the circuits were energized and the test items were subjected to the environmental condition (Case [illegible]) as shown in Figure [illegible]. An exception to this is contained in Notice of Anomaly No. 1 (located in Appendix I of this section) which allowed a change to the initial ramp rate for pressure and temperature.

0054698

1 9 5 7 1 1 0 2 9

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0054699

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. X-2
REPORT NO. 44354-1

RESULTS

The test items were subjected to the Accident Test as specified above. A chart of the test profile is shown in Appendix II of this section.

During the test, the following voltage and current fluctuations were observed:

Test Item 1 - Voltage and current readings fluctuated as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	129.3 to	1.20 to
100 min	126.5 to	1.18 to
185 min	100.6 to	.006
287 min	108.8	Remained at .006

Test Item 2 - Voltage readings indicated an open circuit by test end and current readings changed as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	137.6 to	1.19 to
20 min	134.3 to	1.19 to
1[illegible] min	.00	.63 to
287 min	Remained at .00	.38

Test Item 3, Circuit 8 - Voltage and current readings fluctuated as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	137.8 to	1.24 to
30 min	137.3 to	1.24 to
140 min	21.4 to	.39 to
185 min	143.8	1.990

Test Item 4 - Voltage readings indicated an open circuit by test end and current readings changed as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	140.3 to	1.22 to
287 min, 20 sec	140.3 to	1.22 to
287 min, 29 sec	.13 to	.13 to
287 min	.00	.099

(* to nearest minute)

Subsequent to the test it was determined that the anomalies were caused by the testing equipment rather than by the test specimens.

Bechtel Power Corporation

HARD COPY
RECORD, END

0054700

3 9 5 7 1 I U S I

GPD-27540-A 8/79

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

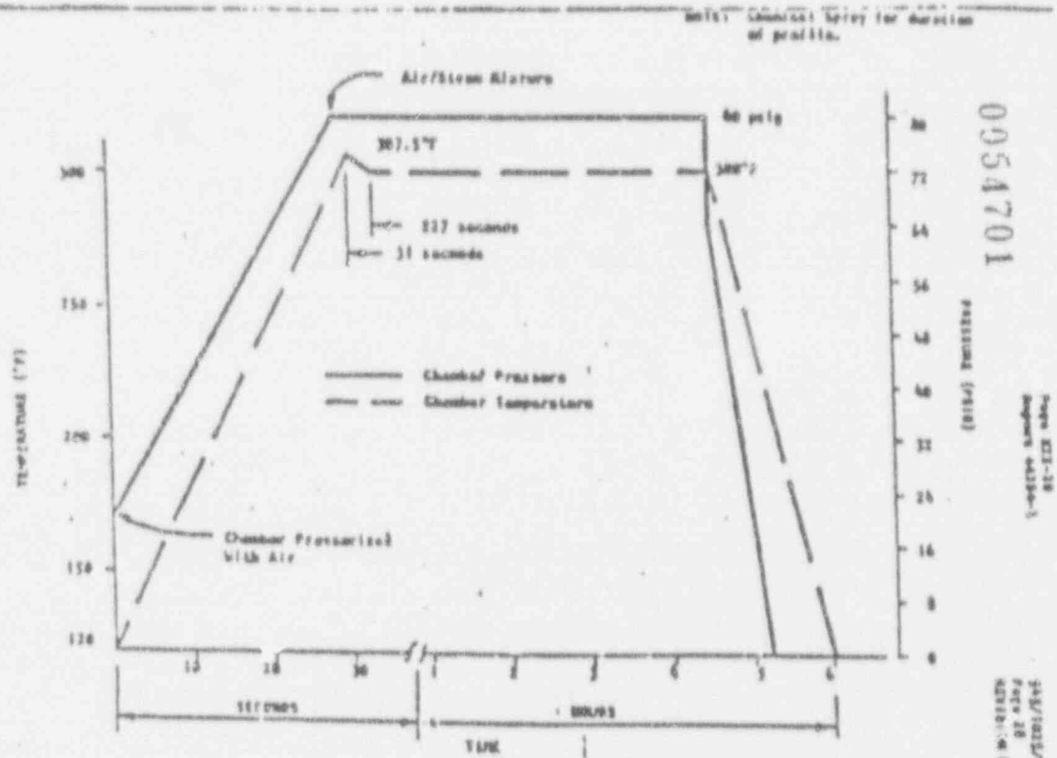
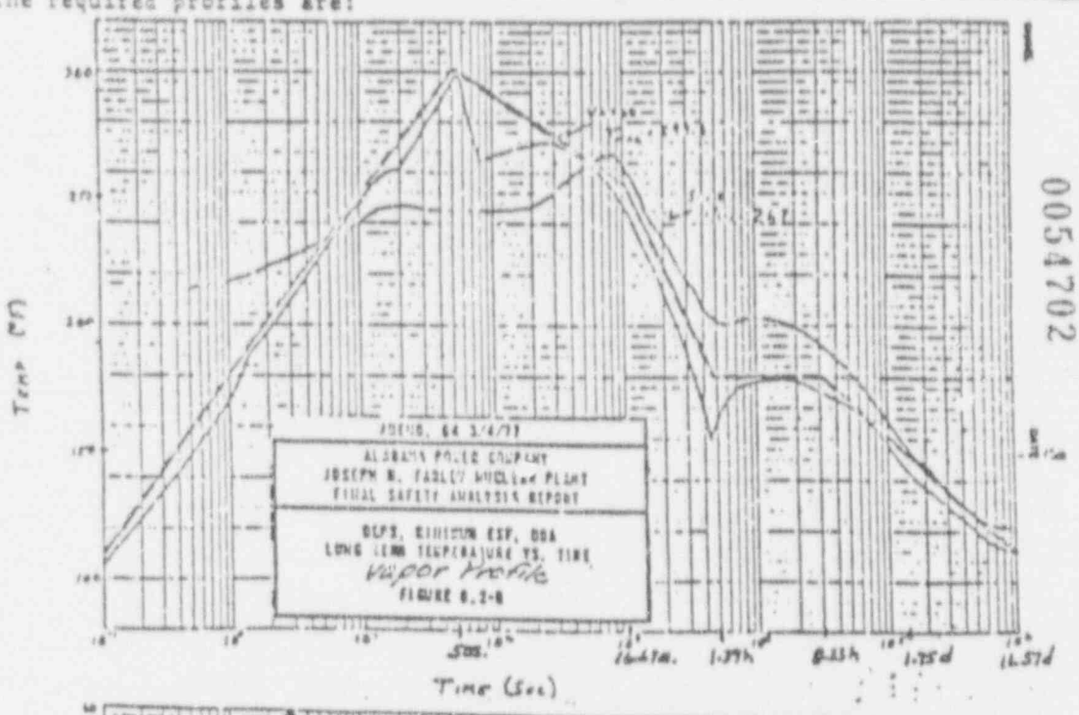


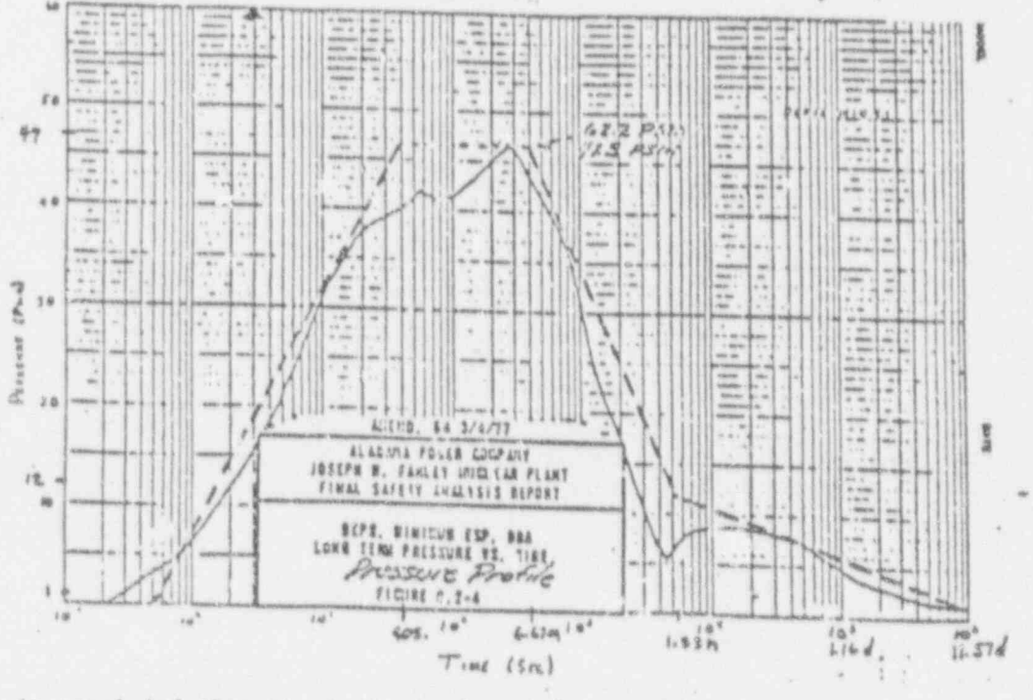
FIGURE 5. ENVIRONMENTAL CONDITIONS - CASE II

0054701

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

The required profiles are:





It is concluded that the test envelopes the required profiles.

00554702

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

EQUIPMENT ITEM NO. 37
TERMINAL BLOCK LOCATED IN THE CONTAINMENT
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 37
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID) CONDUCTOR TERMINATION (Q1T52B018-B; B1TB025; Q1B13SV2113B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [5, 22]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1B13SV2113B-B/JB; 2213A-A/JB; A1TB007)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [5, 22]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1B31SV0444BA-B/JB; SV0445AA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.3 [5, 22]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1B31SV0444BA-B/JB; SV0445AA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.3 [5, 22]

0054703

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

R, T, QV, RT, P, M, 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	~~4, 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~~

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. 509	Page 1b

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.

X 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.

X 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

0054704

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

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	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 Qualification Review	
IV	Documentation Not Made Available	

See Evaluation report item 3c

0054170

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

COMPONENT: TERMINAL BLOCKS/JUNCTION BOXES - [illegible]

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the terminal blocks. Arrhenius Methodology was used to establish a qualified life. The age-susceptible materials were identified and activation energies determined. From the analysis, a qualified life of 40 years was established for both inside and outside containment for Plant Farley.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 10,000 ppm (Reference: Byis Report 66134-1). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	The original IE 79-01B submittal listed the floor level only for elevation, since a verification walkdown could not be performed due to plant operation. It has since been verified that all terminal blocks/junction boxes are above the postulated flood level, and are not subject to submergence.
QUALIFICATION METHOD	This equipment has been qualified to the requirements of IEEE 323-1971 using IEEE 323-74 methodology.

0051706

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

EQUIPMENT ITEM NO. 38
TERMINAL BLOCK LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 38
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID) CONDUCTOR TERMINATION (N1C22SV0478A-A/JB, 488A-A/JB, 49A-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N25SV3772A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.17.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N23SV3227AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N23SV3228AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (A1TD034)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.4 [5]

0054707

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, QA, RPN, EQN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a, 1b,
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. 38

EQUIPMENT ITEM NO. 38 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N12SV3234A-A/JB, B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (3235A-A/JB, BB-JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3368AA-A/JB, BA-A/JB, CA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3369AA-A/JB, BA-A/JB, CA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3370AA-B/JB, BA-B/JB, CA-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3376A-B/JB, B-B/JB, C-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]

0054708

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, E, CS, A, S, (R), M, I, VM, 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. 38

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

0054709

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

___ 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 flood level
___ Relocate or shield from radiation source
___ Verify qualification by additional (testing/analysis)
___ Equipment relocation to 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. 38

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	
I.c	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 exhaustion refer to item 36

00547210

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

COMPONENT: TERMINAL BLOCKS/JUNCTION BOXES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APSd RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the terminal blocks. Arrhenius Methodology was used to establish a qualified life. The age-susceptible materials were identified and activation energies determined. From the analysis, a qualified life of 40 years was established for both inside and outside containment for Plant Farley.
TEMPERATURE	The qualification temperature of the terminal blocks is 307°F. As can be seen from Figure C.4.8 the calculated peak temperature of 304°F is reached in 0.27 seconds, where it remains for approximately 1.1 seconds, at which time the temperature drops to atmospheric saturation temperature at 212°F. Because of the thermal lag, the terminal blocks are [illegible] exposed to a temperature greater than 212°F. The terminal blocks [illegible] are therefore qualified to the accident environment with adequate margin.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

a) Temperature - Refer to discussion on temperature above.

b) Pressure - The 80 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 Main Steam Room pressure of 70.3 psia.

c) Radiation - Although the terminal blocks are qualified for 1×10^8 rads, radiation qualification is not a requirement for the Main Steam Room.

Therefore adequate margin exists.

0054711

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

EQUIPMENT ITEM NO. 39
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
BOSTON INSULATED WIRE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 39
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.8 [5]

00547112

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

R, T, QV, 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. 39

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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 progre s
___ 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 accouplishing the corrective action _____.)

___ The Licensee states that the equipment item does not require qualification and/or should be exempted from environmental qualification.

DESIGNATION OF EQUIVALENT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CITED 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

0054713

0054714

COMPONENT: INSTRUMENT CABLE

AS DEFICIENCY	APCs RESPONSE
AGING	Type test accelerated aging methods were used to thermally age instrumentation cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology, a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Ref. BTW Report 73[illegible]). This boric acid concentration meets the Farley FSAR value of 2000 ppm.
SUBMERGENCE	Deficiency shown for six cases 1VTR5001D, 1V1T5002D, 1V1T5002T & E, 1V3T5002T & E appears to be NRC clerical error.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

a) Temperature - The 340°F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated.

b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 61.2 psia.

c) Radiation - The 1 X 10^8 Rads, qualification test condition provides adequate margin above the specific Farley, Unit 1 containment level of 3 X 10^7 Rads.

Therefore, adequate margin exists.

Note - Deficiencies E, E, & G shown for cable 1VTR5006G have not been identified by NRC

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

0054715

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	X

The licensee has referenced a BTN Report No 73E062 as evidence of qualification. The report was not made available for review.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

EQUIPMENT ITEM NO. 40
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, ELEV. 115'0"
BOSTON INSULATED WIRE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 40
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]

00554716

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. 40

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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

0054717

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

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	X

The licensee has referenced a BIW report No 72E062 as evidence of qualification. The report, however, was not made available for review.

0054718

0054719

COMPONENT: INSTRUMENT CABLE

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging methods were used to thermally age instrumentation cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology, a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Ref. BTW Report 73E042). This boric acid concentration meets the Farley FSAR value of 2000 ppm.
SUBMERGENCE	Deficiency shown for six cases 1VTV5031D, 1V1V5002U, 1VTV5002T & U, 1V3V5002T & U appears to be NRC clerical error.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: a) Temperature - The 340°F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated. b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit I containment pressure of 62.2 psia. c) Radiation - The 1 X 10^8 Rads. qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 3 X 10^7 Rads. Therefore, adequate margin exists.

Note - Deficiencies U, K, & G shown for cable 1VTR5066G have not been identified by NRC

0054729

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

EQUIPMENT ITEM NO. 41
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, 115'0"
BOSTON INSULATED WIRE, MODEL NOT STATED
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 41
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.7.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.9 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.13.15 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.13 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.6 [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, U, (S), (A), S, (R), (M), I, QM, RFN, EQN, SEN, QI, RFS, None.

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a1, 1a2
Summary of Licensee Response to the NRC SER	1b
Equipment Environmental Qualification Summary Forms	2
Licensee Response to NRC SER	3a, ~~3b, 3c, 3d~~
System Consideration Review	~~4, 4a, 4b, 4c~~
Equipment Environmental Qualification Review	~~5, 5a, 5b, 5c~~
Installed TMI Lessons Learned Implementation Equipment Summary	~~6, 6a~~
Maintenance and Replacement Schedule Summary	~~7, 7a, 7b~~

0054721

EQUIPMENT ENVIRONMENTAL QUALIFICATION-REVIEW OF EQUIPMENT ITEM NO. 41

EQUIPMENT ITEM NO. 41 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.9 [5]

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

R, T, QV, NC, 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 Summa	6a, 6b

0054722

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. 509	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7.

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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)

8005140723

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	
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	X

The licensee has referenced a BTN report. No 73E062 as evidence of qualification. The report, however, was not made available for review.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

0054725

COMPONENT: INSTRUMENT CABLE

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging methods were used to thermally age instrumentation cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology, a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Ref. NTW Report 238042). This boric acid concentration meets the Farley FSAR value of 2000 ppm.
SUBMERGENCE	Deficiency shown for six cases 1VTV50310, 1V1V50029, 1V2V50027 & U, 1V[illegible]002T & U appears to be NRC clerical error.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: a) Temperature - The 340°F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated. b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 62.2 psia. c) Radiation - The 1 X 10^8 Rads, qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 5 X 10^7 Rads. Therefore, adequate margin exists.

Note - Deficiencies W, X, & O shown for cable 1VTR30460 have not been identified by NRC

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

EQUIPMENT ITEM NO. 42
ELECTRICAL CABLE, CONTROL LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 42
LICENSEE REFERENCE(S): 2103, 457
FUNCTION (PLANT ID) ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.17.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.16.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.13.14 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.15.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.4.8 [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, (S), M, I, QM, RPH, EXN, SEN, QI, RPS, None,

Not stated, Not applic

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~~

0054726

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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

0054227

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	X
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	

0054728

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 443

LICENSEE RESPONSE TO NRC SER

COMPONENT: POWER and CONTROL CABLES

NRC DEFICIENCY	APCo REVIEW
ACTED	Type test accelerated aging methods were used to thermally age cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 18,000 ppm (Ref: Ghemite Report 141). This boric acid concentration exceeds the Farley FSAR value of 2800 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 180 days post DBA. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

a) Temperature - The 340°F qualification test condition exceeds the 320°F required temperature by 20°F thus adequate margin has been demonstrated.

b) Pressure - The 96.7 psig qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 61.3 psig.

c) Radiation - The 2×10^8 Rads, qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 3×10^7 Rads.

Therefore, adequate margin exists.

Note: Deficiencies 2, 3 & 6 have not been identified by NRC.

0054729

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

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.)
EQUIPMENT DESCRIPTION Equipment Type	Electric Cable	Electrical Cable	
Manufacturer's Name (5.2.2/-/-)	Okonite	Okonite Company	
Model Number (5.2.2/-/-)	Not stated	See page 5f (Note A)	X Note 1
Serial Number	Not stated	Not Applicable	
Features/Mounting (5.2.6/-/-)	↓	Not Applicable	
Connections/Interfaces (5.2.6/-/-)		Cable Splice (Note A)	
Location/Elevation	Containment	Not Applicable	
Equipment ID No.	N/A	Not Applicable	
QUALIFICATION REPORT (8.0/5.0/5.0) Report ID Number	ER-141 N-1	E.R.141	
Report Date		February 29,1972	
Issued by	Okonite	Okonite	
Prepared for	Okonite	Okonite	
Referenced Reports	N/A	F-C3094/F-C3171	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		Test	
QUALIFICATION TEST PROGRAM Functional Test Description (5.2.5/2.2.9/2.2.9)		Maintain electrical Loading @ rated Voltage, Insulation Resistance & Hypot	
Operating Conditions (-/2.2.10/2.1.10) Load/Cycles/Voltage/ Current/Freq.	↓	Not Applicable	

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

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 Applicable	
Number of Specimens		6	
Test Instruments Calibrated		Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	N, Tabulated	Not Applicable	
Test Duration (5.2.1/-/-)	N/A	100+ days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	~24 hrs	Not Applicable	
Required Function Time	10 yr. to Long Term	Not Applicable	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	Thermal Aging Irradiation LOCA (PWR Conditions) LOCA (BWR Conditions)	
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		Not Applicable	
Aging (5.2.4, 7.0/4.0/4.0) Thermal Aging/Basis	Arrenius	168 hrs @ 121°C Basis Not Stated	
Material Aging Evaluation (7.0/-/-)		Not Stated	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Not Stated	
Radiation Aging, Type	Gamma	Gamma	

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

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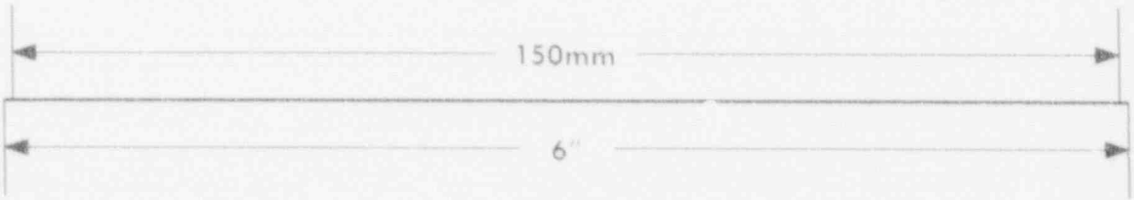
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	Not Stated	See Accident Dose	
Radiation Aging, Dose Rate		See Accident Dose	
Radiation Aging, Method		Test	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		Not Stated	
Operational Aging (-/4.2/-)		Not Applicable	
Other Age Conditioning (-/4.2/-)		Not Stated	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 years	Not Stated	
Normal Ambient Temperature	Not Stated	Not Applicable	
Normal Ambient Radiation		Not Applicable	
Normal Ambient Humidity		Not Applicable	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	Early Program	Not Applicable	
On-Going Analysis of Failures and Degradation (7.0/-/-)		Not Applicable	
Margin (General) (6.0/3.0/3.0)	24°F 32.5 psi 1.5x10⁸ rd.	Not Applicable	
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)	N/A	Not Applicable	

0054732

2

IMAGE EVALUATION TEST TARGET (MT-3)



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770 BASKET ROAD
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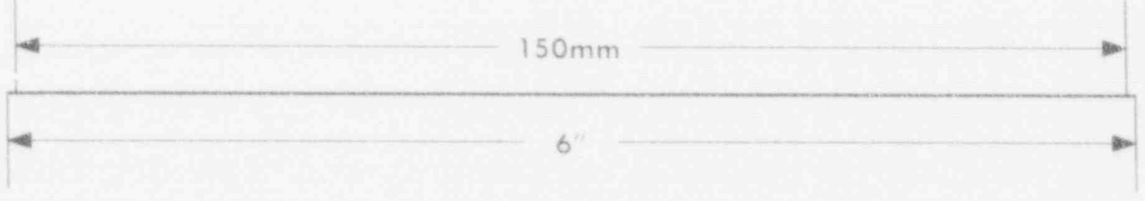
2

IMAGE EVALUATION TEST TARGET (MT-3)



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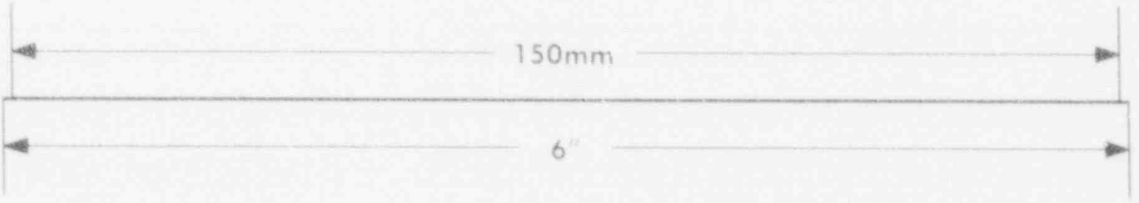
2

IMAGE EVALUATION TEST TARGET (MT-3)



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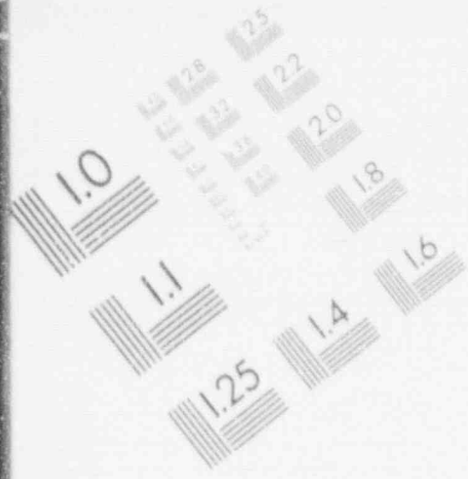
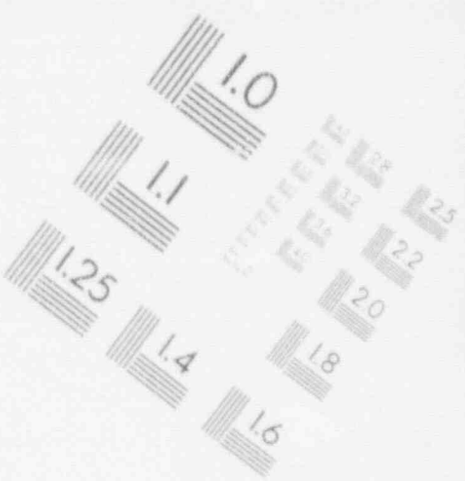
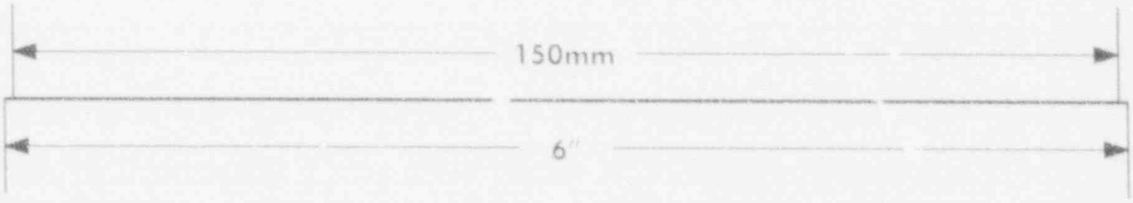
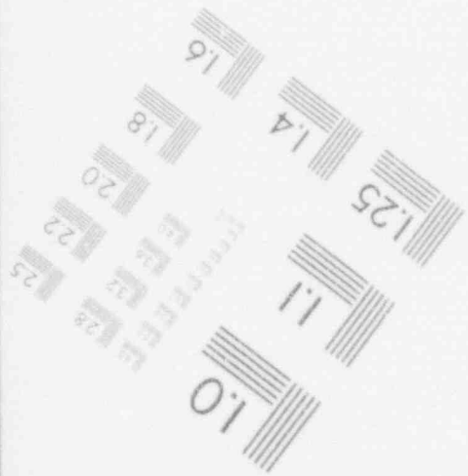
2

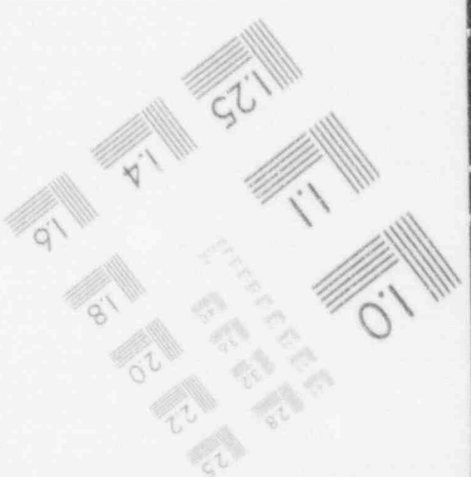
IMAGE EVALUATION TEST TARGET (MT-3)











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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (Z OR NOTE NO.)
ACCIDENT CONDITIONS			
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)	2×10^7	2×10^8	
Radiation Dose Rate (rd/hr)	Not Stated	300,000 rd/hr	
Radiation Qual. Method (5.3.1/-/-)		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 Applicable	
Plateout Dose Considered (-/1.48/1.48)		Not Applicable	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		Not Applicable	

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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase		25°F, 8Psi/ second	
Peak: °F/psig/RH/Time	See Profile	324/80/100/3.3 hrs 252/16/100/7 days	
Decrease To: °F/psig/RH/Time	P 5	345/104/100/4 hrs 320/75/100/4.5 hrs	
Decrease To: °F/psig/RH/Time		256/15/100/20 hrs 272/25/100/3.5 hrs	
Decrease To: °F/psig/RH/Time		212/0/100/100 days	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	N/A	Not Stated	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	N/A	Test	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH	10000 ppm Boric Acid buffered with NaOH to a pH of 10.5	
Spray Density (gpm/ft^2)	Not Stated	0.15	
Spray Duration		7 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)		Not Stated	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		Not Applicable	
Time to Submergence		Not Applicable	
Dust Environment (-/2.2.11/2.2.11)		Not Applicable	-

0054734

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

NOTES: 4.

CABLE SAMPLES TESTED:

One sample of each of the following types of cable and splice was tested. The samples were designated as shown in Table I.

Table I

Sample No.	Cable Designation
A-4	1/C #14 0.030" Okonite, 0.015" Okoprene
D-4	4/C #14 0.030" Okonite, 0.015" Okoprene, 0.045" Okoprene
E-4	7/C #14 0.030" Okonite, 0.015" Okoprene, 0.045" Okoprene
B-4	1/C 4/0 0.055" Okonite, 0.045" Okoprene
F-4	4/C #12 0.047" Okonite, 0.015" Okolon, 0.045" Okolon
C-4	1/C 4/0 0.140" Okoguard, 0.065" Okolon with T-95 splice and T-35 jacketing tape

Note 1 The cables tested in ER 141 are described above, the cables tested in N-1 are

Test Specimens

1/C #12 7x coated copper, .030" Okonite insulation
1/C #6 7x coated copper, .045" Okonite insulation, .030" Okolon jacket

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.

0054735

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

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).

[0012]

IEEE-383

1.3.1 Cable Description. The 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 practice.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42

NOTES:

ELECTRIC CABLES, FIELD SPLICES, AND CONNECTIONS

IEEE Std 383-1974

Table 1
Representative Cables for Type Tests

Type	Test	Section	Size
Up to 2000 V multiconductor control cable or Shielded multiconductor signal cable (see tail below for individual component) or Single conductor power cable	temperature and moisture resistance	2.3.1	1/C — 14 or 12 AWG
	thermal and radiation exposure	2.3.3	1/C or M/C — 14 or 12 AWG
	design basis event simulation	2.4	1/C or M/C — 14 or 12 AWG 1/C — 6, 4 or 2 AWG
	vertical flame test singles from cable assembly	2.5.6	1/C — 14 or 12 AWG
	vertical tray flame test	2.5.4	7/C — 16, 14 or 12 AWG
Shielded pairs, triple or quad from multiconductor signal cable	temperature and moisture resistance	2.3.1	1 pair shielded 16 AWG or actual cable
	thermal and radiation exposure	2.3.3	
	design basis event simulation	2.4	
	vertical flame test	2.5.6	
Coaxial, triaxial or special instrument cable	temperature and moisture resistance	2.3.1	actual size
	thermal and radiation exposure	2.3.3	
	design basis event simulation	2.4	
	vertical flame test singles from cable assembly	2.5.6	
Single pair thermocouple extension cable	temperature and moisture resistance	2.3.1	2/C — 20 AWG or actual size if smaller
	thermal and radiation exposure	2.3.3	
	design basis event simulation	2.4	
	vertical tray flame test	2.5.4	
	vertical flame test singles from cable assembly	2.5.6	
2001—16,000 V power cable 1/C triplexed and multiconductor	vertical tray flame test	2.5.4	8 AWG (2.5kV) 2/O or 4/O or 4/O (2-15kV)

In Lieu of the detailed description discussed above it would be acceptable for the licensee to obtain certification from the manufacturer identifying what test report(s) apply to the cables furnished for installation.

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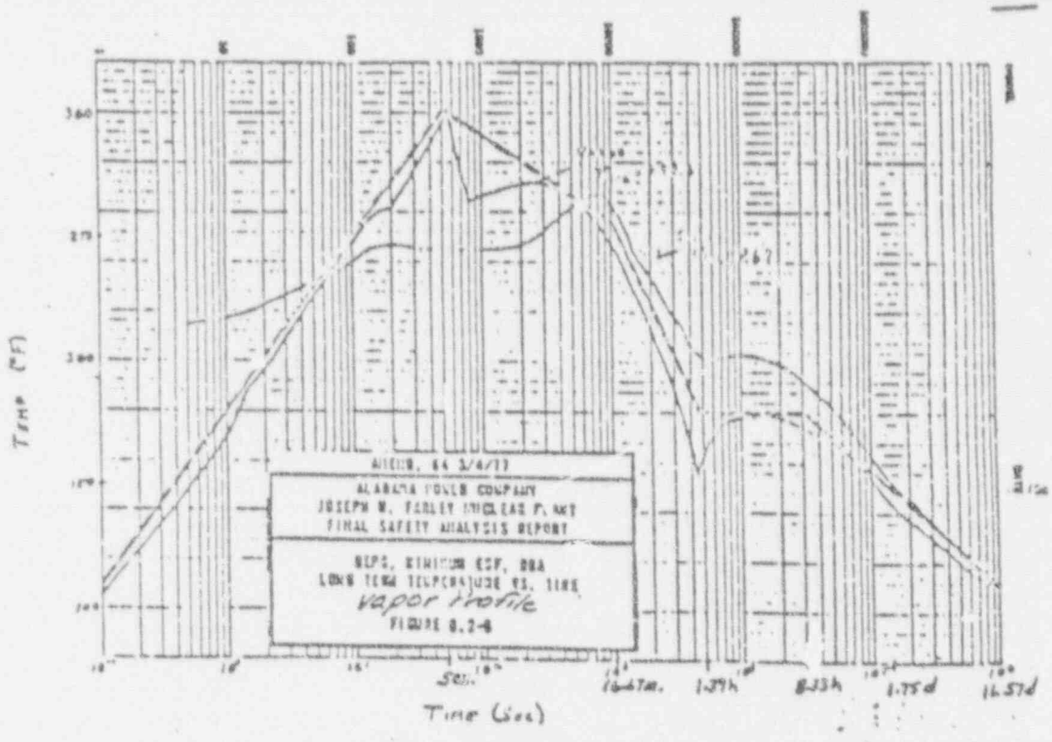
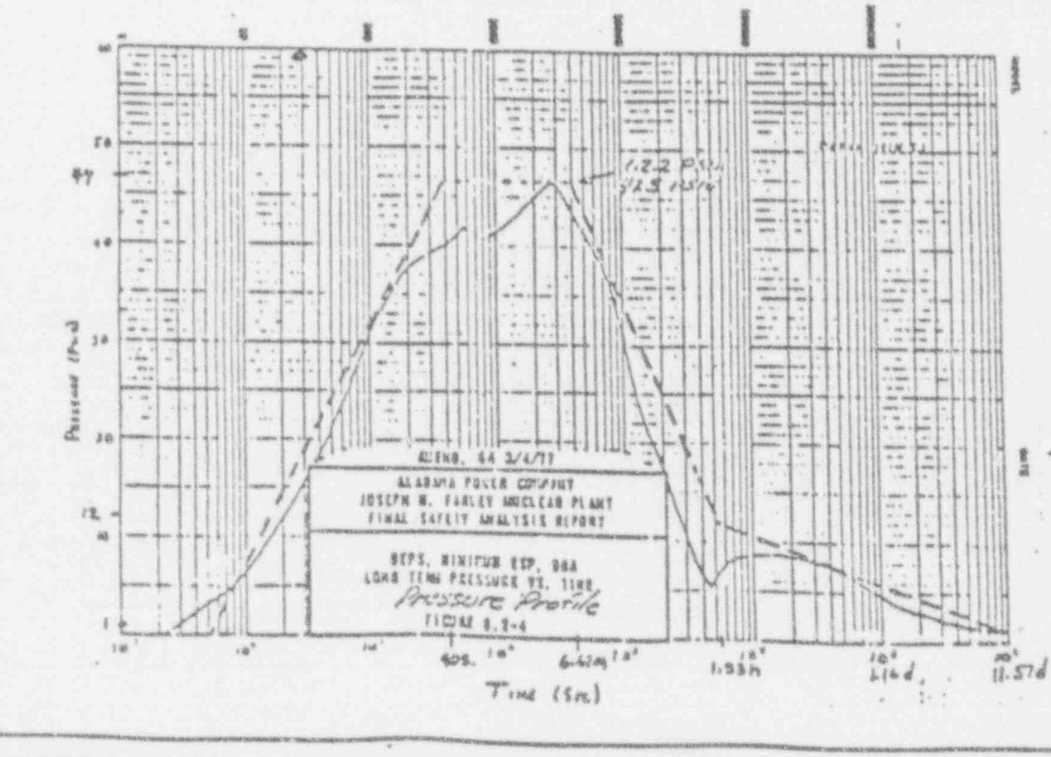
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 42





0054738

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

EQUIPMENT ITEM NO. 43
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT, ELEV. 115'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 43
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID) ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.20.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.19.6 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.18.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.5.4 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.6.12 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.7.4 [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, EQN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a1, 1a2
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~~

0054739

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 43

EQUIPMENT ITEM NO. 43 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.8.4 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.12 [5]
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SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.10.5 [5]
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SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.11.7 [5]
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SERVICE: ELECTRICAL SYSTEMS
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SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.3.8 [5]

0054740

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

R, T, [illegible], RT, P, H, CS, A, S, (R), M, I, QM, EPM, EQN, SEN, QI, EPS, 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. 43

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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

0054741

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 63

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)	
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	

For evaluation refer to Item 42

0054742

COMPONENT: POWER and CONTROL CABLES

NRC DEFICIENCY	APCs RESPONSE
AGING	Type test accelerated aging methods were used to thermally age cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 14,000 ppm (Ref: Ohmite Report 141). This boric acid concentration exceeds the Farley FAR value of 1000 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 100 days post DBA. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

a) Temperature - The 324°F qualification test condition exceeds the 300°F required temperature by 24°F thus adequate margin has been demonstrated.

b) Pressure - The 94.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 62.2 psia.

c) Radiation - The 2 X 10^{7} Rads. qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 3 X 10^{7} Rads.

Therefore, adequate margin exists.

Note: Deficiencies B, E & G have not been identified by NRC.

0054743

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

EQUIPMENT ITEM NO. 44
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 44
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID) ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-7.3 [5, 22]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.2 [5, 22]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.2 [5, 22]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.4 [5, 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~~

0054744

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. 509	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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 _____.)

X 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

00547745

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 44

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS	IE	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)		
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		I	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 42

00547746

COMPONENT: POWER and CONTROL CABLES

NRC DEFICIENCY	APCs RESPONSE
AGING	Type test accelerated aging methods were used to thermally age cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 10,000 ppm (Ref: Chemite Report 141). This basic acid concentration exceeds the Farley FSAR value of 2000 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 100 days post DBE. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: a) Temperature - The 334°F qualification test condition exceeds the 300°F required temperature by 24°F thus adequate margin has been demonstrated. b) Pressure - The 94.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 62.2 psia. c) Radiation - The 2 X 10^8 Rads. qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 5 X 10^7 Rads. Therefore, adequate margin exists.

Note: Deficiencies B, E & G have not been identified by NRC.

4. This equipment is not essential to achieve a safe shutdown condition for any licensed DBE and, therefore, no operating time is specified.

0054747

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 49

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.

0054748

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. 49

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.

X 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

The licensee has not identified which equipment is serviced by the cable ∴ an evaluation of the statement on page 3a can not be made

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 45

EQUIPMENT ITEM NO. 45
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 109'0"
BARTON MODEL 764 (LOT 1)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 45
LICENSEE REFERENCE(S): 3836
FUNCTION (PLANT ID) LEVEL INDICATION (Q1N11LT477, 487, 497)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.7 [5]

00547S0

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

(R) (T) QV, RT, (P) (H) (S) (A) S, (R), (M) I, (UM) 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. 45

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X 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
X Other (relocate or qualify)

___ The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X 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

0054751

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	
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	X
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	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 Qualification Review	
IV	Documentation Not Made Available	

See evaluation of Equipment Item no. 21

1951 108 2

8. Level Transmitters (0LN11LT477, 487, and 497)

Three Wide Range Level Transmitters used on the steam generators inside containment were identified as being located below the maximum postulated flood level for a LOCA.

Interim justification for continued operation is justified on the basis that several methods of determining steam generator level are available. These include steam generator narrow range pressure transmitters and feedwater flow transmitters.

These transmitters will be qualified for submergence or relocated above the maximum flood level during the next scheduled outage of sufficient duration to complete the planned action. If problems arise beyond the control of Alabama Power Company which may impact the schedule, the NRC will be notified. Design change requests have been issued to architect engineer for design processing.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 46

EQUIPMENT ITEM NO. 46
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 128'0"
NAMCO MODEL EA170
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 46
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3369A, B, C; 3370A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3369AJ, BJ, CJ; 3370AJ, BJ, CJ)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1CIIZS0479)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.4A [5]

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

R, (T) (A) RT, (P) (H) CS, (A) S, (R), (M) I, (AM) (RPN) EQN, 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~~

0054754

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 46

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

___ The Licensee (has/has not) specifically stated that the equipment is/is not 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REFUELING OUTAGE PRIOR TO 6/30/82.)

___ 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

0054755

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 Performance 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	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 Qualification Review	
IV	Documentation Not Made Available	

0051756

3. Limit Switches - Outside Containment

A total of 32 limit switches outside the containment were determined not to have qualification documentation. Interim operation is justified on the basis that the accident temperature excursion to which these switches are exposed is less than two seconds in duration, and the thermal lag of the switch enclosure precludes damage to the internals. Should failure occur subsequently, other safety related components would not be affected. Based on the facts of short duration of the harsh environment and that potential subsequent failure will not adversely affect other safety-related equipment, interim use of these switches is acceptable until they can be replaced. Replacement with qualified switches having adequate documentation will be completed during the next scheduled refueling outage. If any problems arise beyond the control of Alabama Power Company which may impact this schedule, the NRC will be notified. A replacement program to fully support this schedule has been implemented.

00547757

0054758

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).

Although 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, it is appropriate to highlight for the Licensee and the NRC certain conclusions and concerns reached as a result of the review which require special attention. These concerns are summarized below.

Equipment Item Nos. 23 and 25 have been assigned to NRC Category II.b. These Conax flood level detectors exhibited severe anomalies during testing, and failure occurred approximately 90 minutes into the test.

On June 23, 1982, the Licensee provided the following response concerning TMI Action Plan equipment [23]:

> "Alabama Power Company has performed a review of the location of all TMI Action Plan equipment and has identified the equipment requiring environmental qualification. The accompanying Master Lists and System Component Evaluation Work Sheets to this chapter identify this equipment and verify its qualified status. Below is a discussion of each of the sections provided in this chapter.
>
> Inadequate Core Cooling; NUREG-0737, II.F.2
>
> Instrumentation and equipment associated with inadequate core cooling is addressed by R.G. 1.97. In accordance with letter dated November 16, 1981, Alabama Power Company committed to respond to the Regulatory Guide

Franklin Research Center

upon the promulation of the associated draft licensing documents that would affect the design (e.g., NUREG-0801, -0799, -0814, -0835). Following the preparation and implementation of a design for an integrated system to ratisfy the various licensing requirements in this regard, Master Lists and SCEWS will be prepared.

Reactor Coolant System (Head Vent); NUREG-0737, II.B.1

Four (4) solenoid valves, Target Rock model 79AB001, are undergoing qualification testing and, upon completion of the test and subsequent evaluation, the associated SCEWS will be updated. All other equipment located in a possible harsh environment have adequate documentation to demonstrate their capability to function in the most limiting post-accident environment postulated for Farley Nuclear Plant - Unit 1.

Pressurizer Safety and Relief Valve; NUREG-0737, II.D.1

Master lists and SCEWS are provided, herein, to verify the full qualification of all equipment located in a possible harsh environment.

Pressurizer Safety Valve Position Indication; NUREG-0737, II.D.3

Master lists and SCEWS are provided, herein, to verify the full qualification of all equipment located in a possible harsh environment.

High Range Containment Radiation; NUREG-0737, II.F.1.3

A test report regarding the Victoreen Radiation Detectors was recently completed and evaluated by Alabama Power Company subsequent to their installation. The review of the test report indicates the installation of a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. The design of the water-tight fitting has been initiated and will be implemented at the next outage of sufficient duration to complete the modifications. All other equipment located in a possible harsh environment have adequate documentation to demonstrate their capability to function in the most limiting post-accident environment postulated for Farley Nuclear Plant - Unit 1.

Hydrogen Recombiner System; NUREG-0737, II.E.4.1

As stated in Alabama Power Company letter dated January 14, 1981, Farley Nuclear Plant does not utilize external hydrogen recombiners. Dedicated hydrogen penetrations are therefore not applicable to Farley Nuclear Plant. The qualified status of equipment associated with the hydrogen recombiner system located in the containment or Farley Nuclear Plant is verified in a previous IEB 79-01B response, Section C.2.7, dated August 25, 1981.

0054759

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Containment Water Level; NUREG-0737, II.F.1.5

Master Lists and SCEWS are provided, herein, to verify the status of qualification of all equipment located in a possible harsh environment. Two (2) level transmitters, GEMS Delaval model XM54854-323, are undergoing qualification testing and, upon completion of the test and subsequent evaluation, the associated SCEW will be revised. All other equipment located in a possible harsh environment have documentation to demonstrate their capability to function in the most limiting post-accident environment postulated for Farley Nuclear Plant - Unit 1.

Auxiliary Feedwater System; NUREG-0737, II.E.1.2

The status of qualification for equipment associated with the auxiliary feedwater system is verified in a previous IEB 79-01B response, Section C.2.16, dated August 25, 1981. In letter dated December 28, 1981, Appendix 2, Alabama Power Company notified the NRC that all limit switches lacking adequate qualification documents were replaced with fully qualified models during the third refueling outage ending March 1982. Chapter 3 of the December 28, 1981 letter also identified six (6) solenoid valves that lack adequate qualification documents and are scheduled for replacement during the fourth refueling outage. These limit switches and six (6) solenoids are not necessary to satisfy the requirements of NUREG-0737 as discussed in Alabama Power Company letter dated June 4, 1982 and are not considered an outstanding item in this regard. The modifications necessary to satisfy NUREG-0737 were completed during the second refueling outage ending March 1981.

Containment Isolation Dependability; NUREG-0737, II.E.4.2

The qualified status of equipment associated with containment isolation is verified in previous IEB 79-01B responses, dated August 25 and December 28, 1981, Sections C.2.3, C.2.4, C.2.6, C.2.9, and C.2.11 through C.2.20. Chapter 3 of the December 28, 1981 response identified two (2) solenoids located in the containment that lack adequate qualification documents and are scheduled for replacement during the fourth refueling outage. The solenoids are utilized to provide isolation of a cooling duct that is wholly enclosed within the containment and does not penetrate the containment boundary. The solenoids are not necessary to provide containment isolation or to satisfy the requirements of NUREG-0737, and are not considered an outstanding item in this regard.

Automatic PORV Isolation System; NUREG-0737, II.K.3.1

As stated in Alabama Power Company letter dated May 26, 1981, Alabama Power Company has reviewed the Westinghouse Owners Group report regarding this issue and has determined that an automatic PORV isolation system would not appreciably enhance protection against a PORV LOCA and no modifications are

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necessary. Consequently, no environmental qualification documentation is necessary.

Automatic Trip of RCP's; NUREG-0737, II.K.3.5

As stated in letter dated January 14, 1981, it is the opinion of Alabama Power Company that resolution of this issue will be achieved without any design modifications. The Westinghouse Owners Group has provided the NRC Staff the results of model analyses regarding this issue. In the event that an automatic system to trip the reactor coolant pumps is required after the NRC determination of model acceptability, environmental qualification of associated electrical equipment will be prepared upon system installation, as necessary.

The SCEWS provided for TMI Action Plan equipment reflect the most recent peak containment temperature and pressure postulated to result for a LOCA or MSLB. The analyses of the pressure/temperature response were performed in association with Amendment 26 to Technical Specification 3.6.2.3, Containment Cooling System. The Safety Evaluation Report in Alabama Power Company's letter dated August 17, 1982 provides the basis that environmental qualification of Unit 1 containment equipment is not invalidated as a result of this analysis, and this matter is not an unreviewed safety question. The most recent containment temperature and pressure responses are attached as Figures 1 and 2. SCEWS of containment equipment addressed in previous IES 79-01B submittals will not be revised."

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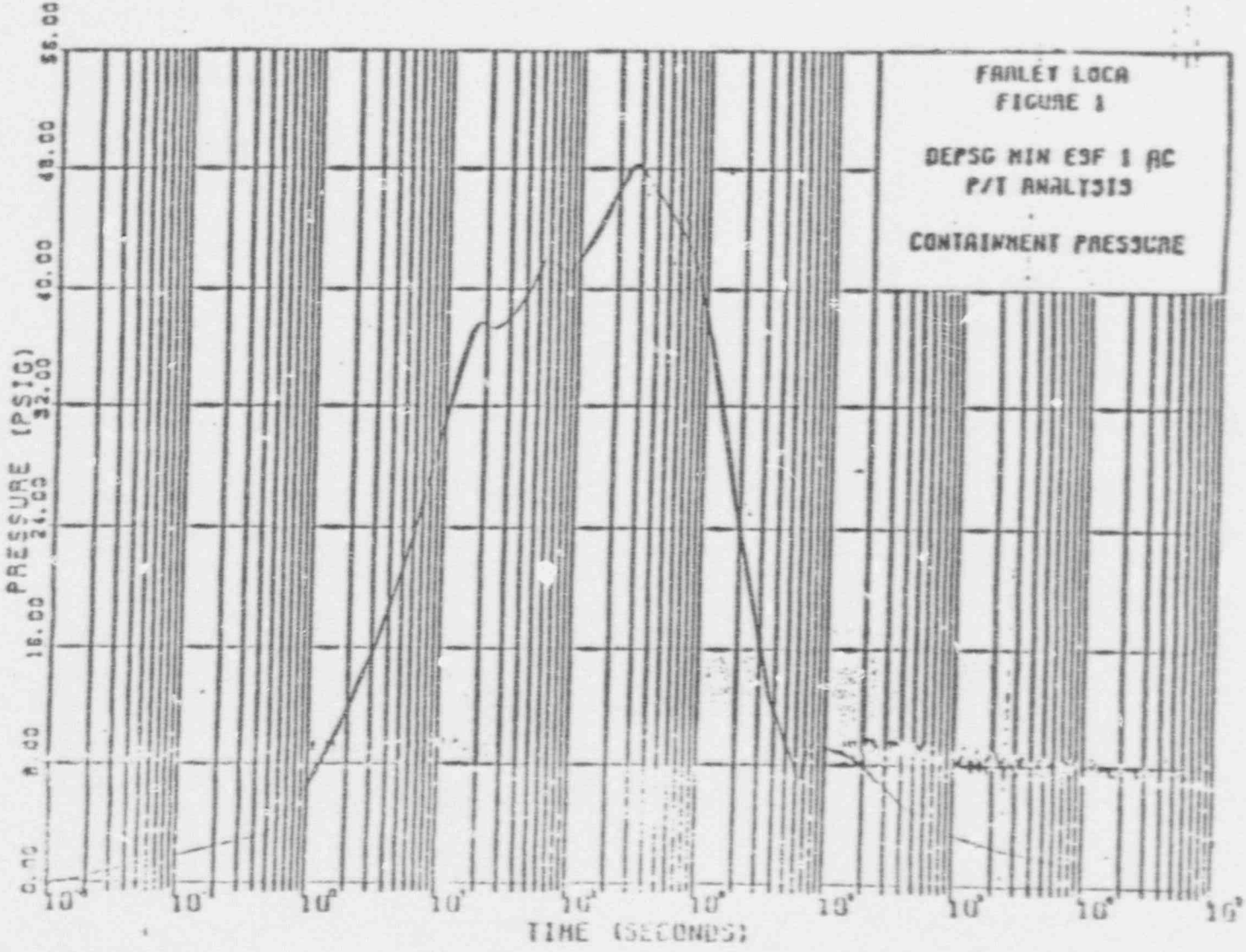

FIGURE SUPPLIED
BY THE LICENSEE

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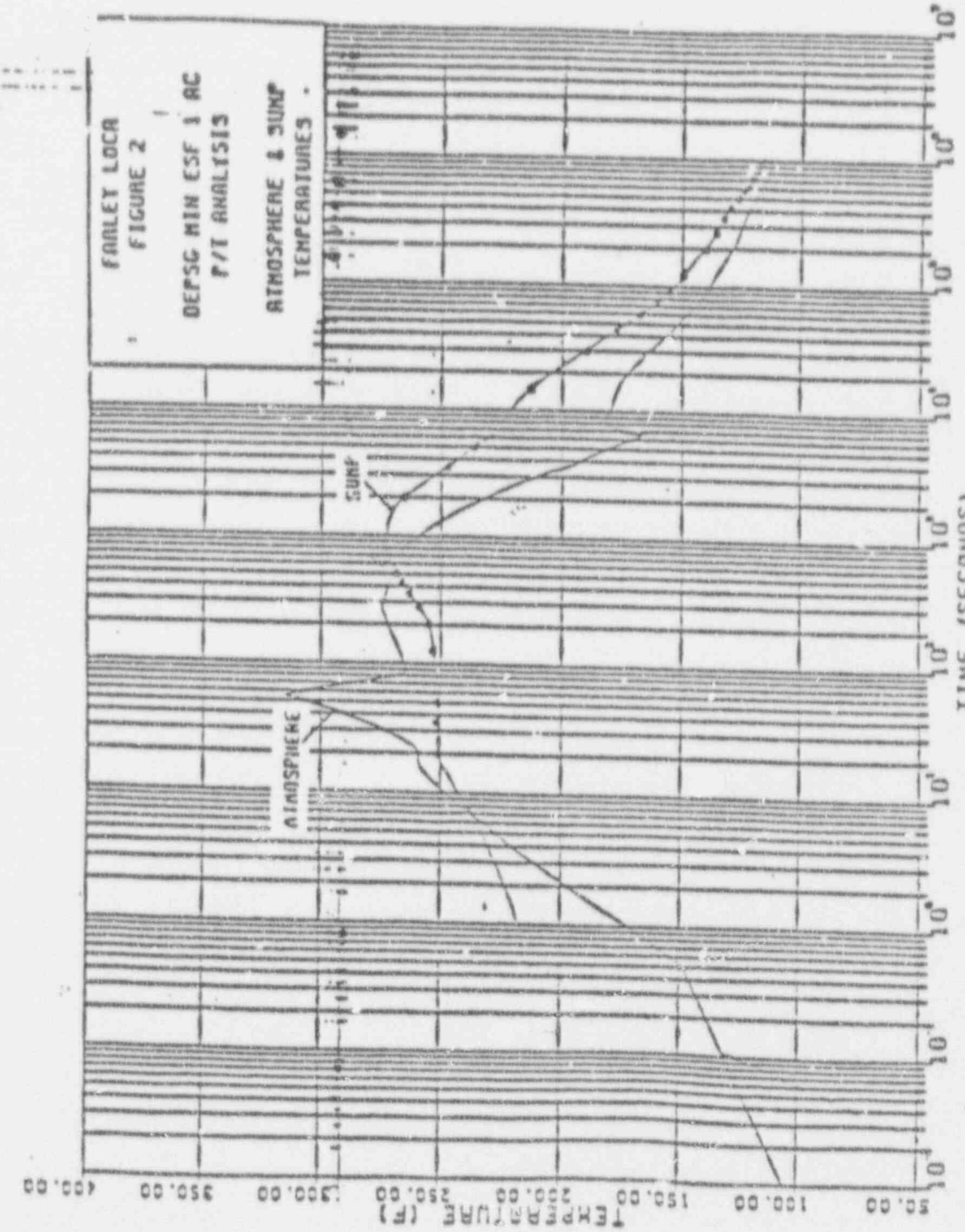

FIGURE SUPPLIED
BY THE LICENSEE

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6. REFERENCES

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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.

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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 [8].

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 from the final safety analysis report update for Joseph M. Farley Nuclear Plant Units 1 and 2:

Figure A-1. DESPG MIN ESF 1AC, Pressure vs. Time (Licensee Figure 6.2-1)

Figure A-2. Pressure Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-6)

Figure A-3. Temeprature Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-7)

Figure A-4. Pressure Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-8)

Figure A-5. Temperature Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-9)

Figure A-6. Pressure Versus Time, Steam Line 0.6 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-10)

Figure A-7. Temperature Versus Time, Steam Line 0.6 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-11)

Figure A-8. Pressure Versus Time, Steam Line 0.645 ft^2 Split, 102% Power (Licensee Figure 6.2-12)

Figure A-9. Temperature Versus Time, Steam Line 0.645 ft^2 Split, 102% Power (Licensee Figure 6.2-13)

Figure A-10. DESPG MIN ESF 1 AC P/T Analysis, Long Term Containment Pressure vs. Time (Licensee Figure 6.2-39)

Figure A-11. DEPS MIN ESF DBA, Pressure vs. Time (Licensee Figure 6.2-40)

Figure A-12. DEPSG MIN DBA Short Term Containment Temperature (Licensee Figure 6.2-41).

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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 design of this plant satisfies these criteria. The Licensee has stated that equipment qualified for a LOCA environment can be considered qualified for a MSLB accident environment.

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 Reference 8 as follows.

With respect to primary containment service conditions, the Licensee stated:

> "The Farley Unit 1 containment spray system is composed of two redundant and independent spray trains, including required auxiliary systems, which are designed so that a single active failure during the injection phase, or a single active or passive failure during the recirculation phase following a design basis event does not result in a loss of the protective function. Therefore, the containment spray system is not subject to a disabling single-component failure, and thus satisfies the requirements of Section 4.2.1 of the DOR guidelines."

The Licensee also provided the following response with respect to temperature margins applied to the primary containment accident profile:

"The containment pressure/temperature analysis and calculations of the equipment surface temperature in the harsh environment were performed using the Bechtel COPATTA computer program. COPATTA was derived from the CONTEMPT program written for the Loss-of-Fluid Test (LOFT) program. A detailed description of COPATTA is contained in Bechtel Topical Report BN-TOP-3, Revision 4, 'Performance and Sizing of Dry Pressure Containment.' This report has been reviewed and approved by the NRC.

The following discussion outlines the procedures used to model the temperature response of safety-related electrical equipment following a postulated main steam line break (MSLB). The methodology which is used to calculate the heat transfer rates to the surface of a component is taken from the NRC Interim Evaluation Model for Equipment Qualification, IE Bulletin 79-01B. An outline of this methodology, which is programmed into the containment analysis code COPATTA, is given in Section II.C.1. In Section II.C.2 the modeling of a solenoid valve typical of those used in the Farley containment is shown to demonstrate the specific modeling techniques used.

II.C.1 METHODOLOGY FOR SAFETY RELATED COMPONENT THERMAL ANALYSIS IN SUPERHEATED CONTAINMENTS

Component thermal analyses may be performed to justify environmental qualification test conditions less than those calculated during the containment environmental response calculation. The thermal analysis should be performed for the potential points of component failure such as thin cross-sections and temperature-sensitive parts where thermal stressing, temperature-related degradation, steam or chemical interaction at elevated temperatures, or other thermal effects could result in failure of the component electrically or mechanically. The heat transfer rate to components is calculated as follows:

a. Condensing heat transfer rate

$$q/A = h_{cd} \cdot (T_s - T_w)$$

where q/A = component surface heat flux

h_{cd} = the larger of 4x Tagami Correlation or 4x Uchida Correlation

T_s = saturation temperature (dew point)

T_w = component surface temperature

Both the Uchida and Tagami Correlations are empirical condensing heat transfer relationships. The Uchida Correlation is based on the ratio of steam to air masses. The Tagami Correlation is based on the free containment volume and the ratio of instantaneous to maximum energy release rates.

b. Convective heat transfer

A convective heat transfer coefficient should be used when the condensing heat flux is calculated to be less than the convective heat flux. During the blowdown period, a forced convection heat transfer correlation is used. For example:

$$Nu = C\,(Re)^n$$

where Nu = Nusselt No.
Re = Reynolds No.
c,n = epoirical constants dependent on geometry and Reynolds No.

The velocity used in the evaluation of Reynolds Number is determined as follows:

$$V = .25\,\frac{M_{BD}}{V_{CONT}}$$

where V = velocity in ft/sec

M_{BD} = the blowdown rate in lbm/hr

V_{CONT} = containment volume in ft^3

After the blowdown has ceased or reduced to a negligibly low value, a natural convection heat transfer correlation is acceptable. However, use of a natural convection heat transfer coefficient must be fully justified whenever used ($h_{convection} = 2.0$).

II.C.2 COMPONENT MODELING

As an example of the modeling techniques used, the model of a three-way direct-acting solenoid valve manufactured by the Automatic Switch Company is presented in this section. This solenoid valve is typical of those used in the Farley containment. Figure 1 [Figure 4-1 in this TER] shows several scaled views of the component including its internal construction. The critical region to be analyzed here is the upper housing, a four inch diameter circular cylinder, which contains the core assembly and coil used to energize the valve.

An implicit finite difference solution of the one-dimensional multi-region transient heat conduction equation is employed to determine the component's thermal response.

Mesh points, which define the length of nodes, are placed so that they lie on the external boundaries of the component, at the interface between materials, and at equal intervals between the interfaces and boundaries.

The COPATTA computer code used for this analysis allows up to 20 material regions and 101 mesh points per component. A component is modeled, as appropriate, in a rectangular, a cylindrical, or a spherical geometry.

Figure 2 [Figure 4-2 in this TER] is a diagram of the valve, modeled as a cylinder with the center line on the left and the cylinder surface on the right. The material regions from left to right correspond to the steel core assembly with 15 nodes, the copper coil with 10 nodes, the steel coil housing with 10 nodes, the air gap separating the coil and housing with 40 nodes, and the painted steel upper housing with 15 nodes in the steel and 5 nodes in the paint.

Typical thermal conductivities and volumetric heat capacities for each material are also given in Figure 2. The valves characteristic length of 2.75 inches, the height of the solenoid valve, is used in the calculation of the time dependent convective heat transfer coefficient described in section IIb. As the component is symmetrical, left side centerline boundary condition is insulated (no heat transfer). The right side surface is exposed to the containment MSLB atmosphere.

The component's temperature distribution is hence calculated by the COPATTA computer code for limiting MSLB transients. From this, the maximum surface temperature of the component can be identified and used to determine if a component is qualified for the MSLB environment.

Temperatures reported as qualification temperatures were in all cases the measured ambient temperature. However, analysis shows that for the qualification test steam environment, the equipment surface temperature and ambient temperature are essentially identical. Using the calculation methodology previously described the surface temperature was calculated as a function of autoclave temperature and time. For this analysis only 1x Uchida is used to conservatively calculate the basic heat transport to the modelled components.

The component's surface temperature approaches within 3°F of the ambient temperature in no more than about 200 seconds in a saturated steam environment. This is true of all the component types modelled. Since the qualification test procedure for all components maintained the temperature above the qualification temperature for a period of at least 20 to 240 minutes, we judge the components to be qualified.

Component Evaluation Worksheets will not be updated to reflect the higher equipment surface temperature expected due to the MSLB event. These higher temperatures have been reported in Table B.1-1."

With regard to submergence inside containment, the Licensee stated:

"Of the 56 safety related electrical components identified by the NRC as being potentially deficient for submergence, all but 16 have been relocated or verified to be above the flood level. These sixteen components are located in the containment, and include motor operated valves, solenoid valves and limit switches. In all cases, they will have performed their safety function before becoming submerged. Refer to Table II.D-1 for a comparison of operating time vs. submergence time. A failure mode and effects analysis for the three types of components is also provided.

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

TABLE II.D-1

Component	El.	Time to Function	Time to Submergence
Q1E21ZS8149A	111'	30 sec.	1260 sec.
Q1E21ZS8149B	111'	30 sec.	1260 sec.
Q1E21ZS8149C	111'	30 sec.	1260 sec.
Q1E21V038A (MOV8808A)	111'-6"	30 sec.	1390 sec.
Q1E21V038B (MOV8808B)	112'-6"	30 sec.	1660 sec.
Q1E21V038C (MOV8809C)	113'-6"	30 sec.	1950 sec.
N1G21SV1003B	110'	30 sec.	983 sec.
N1G21ZS1003B	110'	30 sec.	983 sec.
N1G21ZS3376	109'	30 sec.	714 sec.
N1G21SV3376	109'	30 sec.	714 sec.
Q1E21SV8149AB	111'	30 sec.	1260 sec.
Q1E21SV8149BB	111'	30 sec.	1260 sec.
Q1E21SV8149CB	111'	30 sec.	1260 sec.
Q1E21ZS8808AB	111'-6"	30 sec.	1390 sec.
Q1E21ZS8808BB	112'-6"	30 sec.	1660 sec.
Q1E51ZS8808CB	113'-6"	30 sec.	1950 sec."

With regard to chemical spray, the Licensee stated:

"In all cases the chemical spray portion of the equipment qualification tests utilized a boric acid solution concentration that meets or exceeds the Farley FSAR value of 2000 ppm boric acid. These concentrations are further delineated in Section III of this appendix."

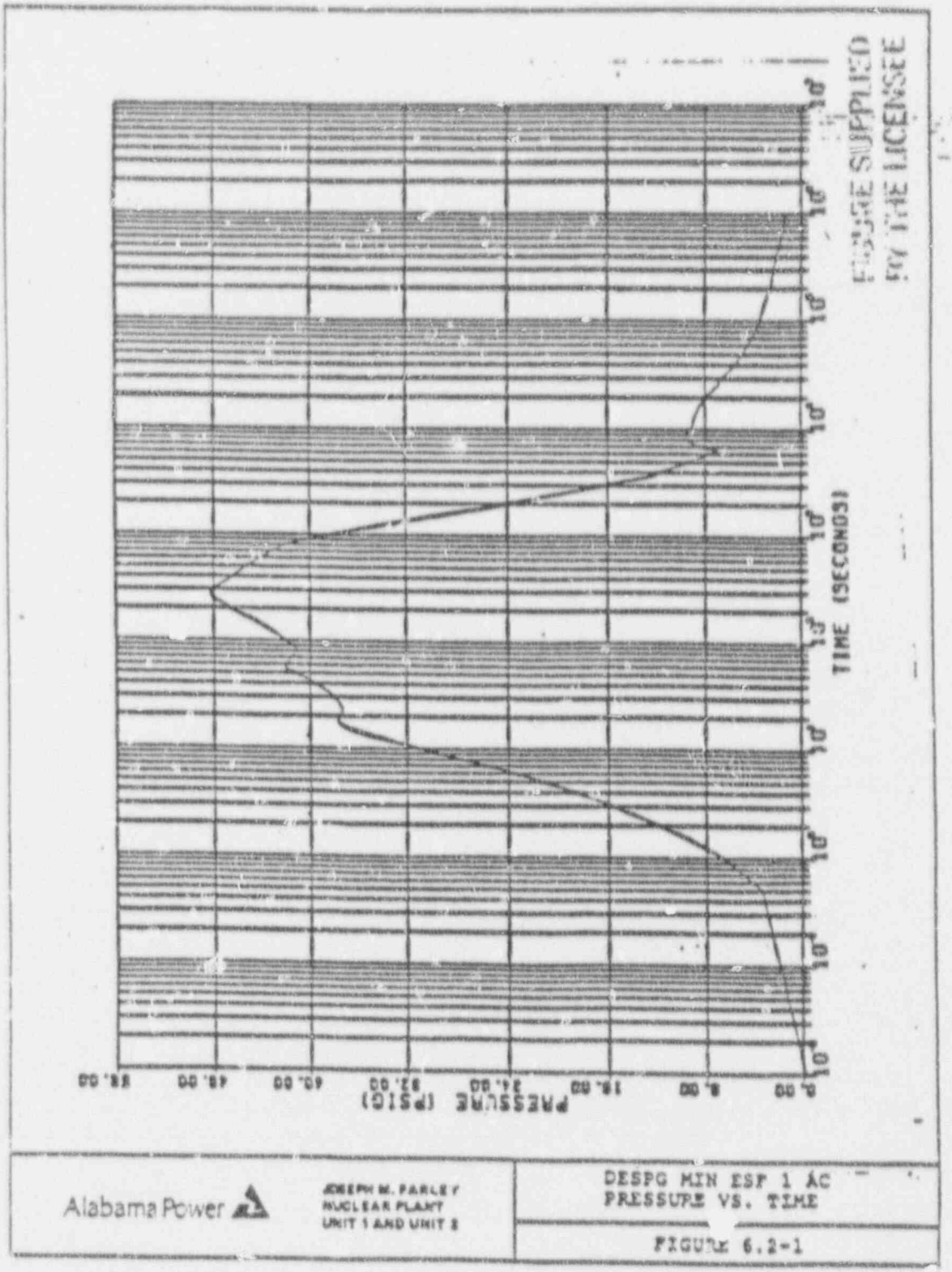

Figure A-1. DESPG MIN ESF 1AC, Pressure vs. Time (Licensee Figure 6.2-1)

Alabama Power	JOSEPH M. FARLEY NUCLEAR PLANT UNIT 1 AND UNIT 2	DESPG MIN ESF 1 AC PRESSURE VS. TIME
		FIGURE 6.2-1

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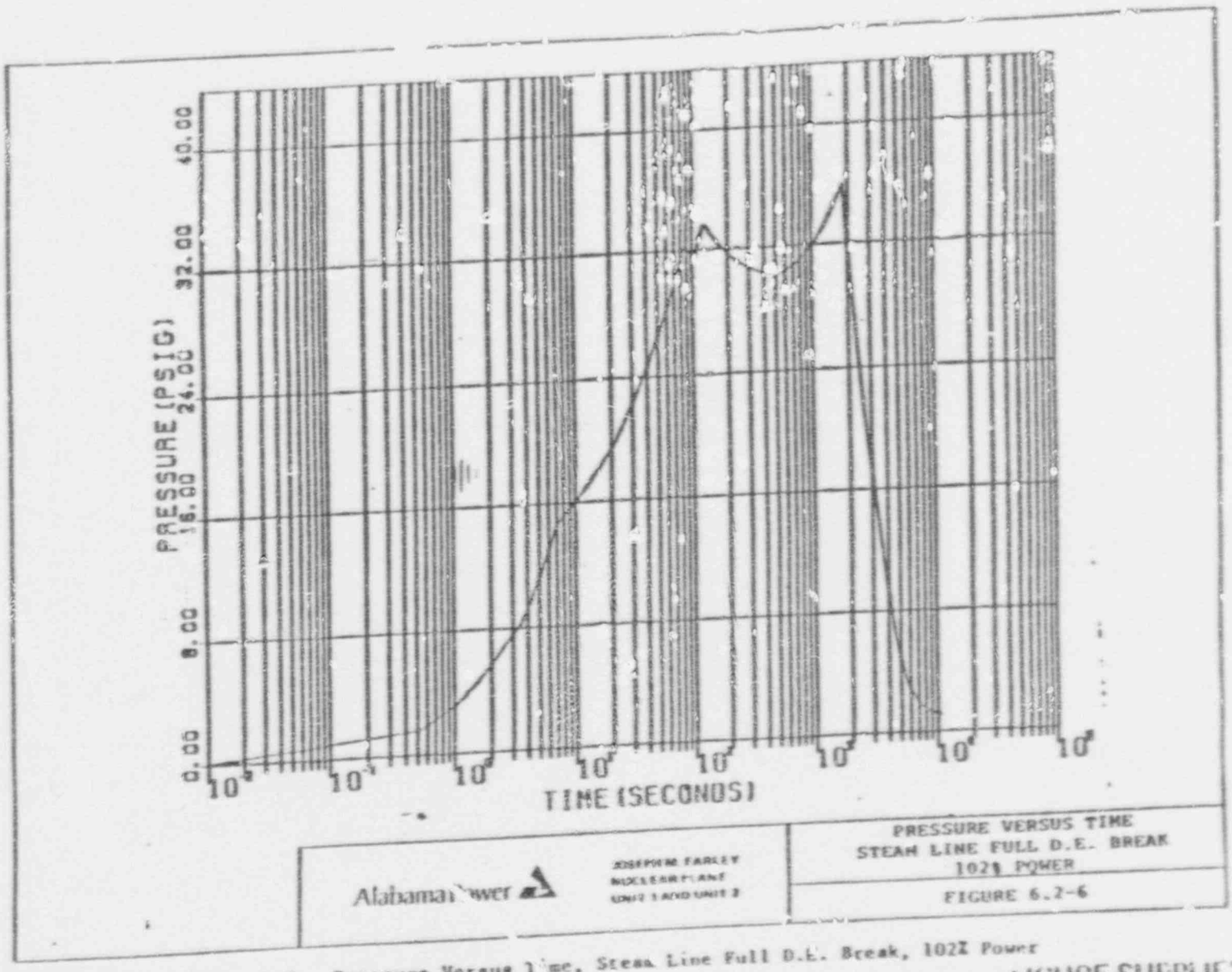
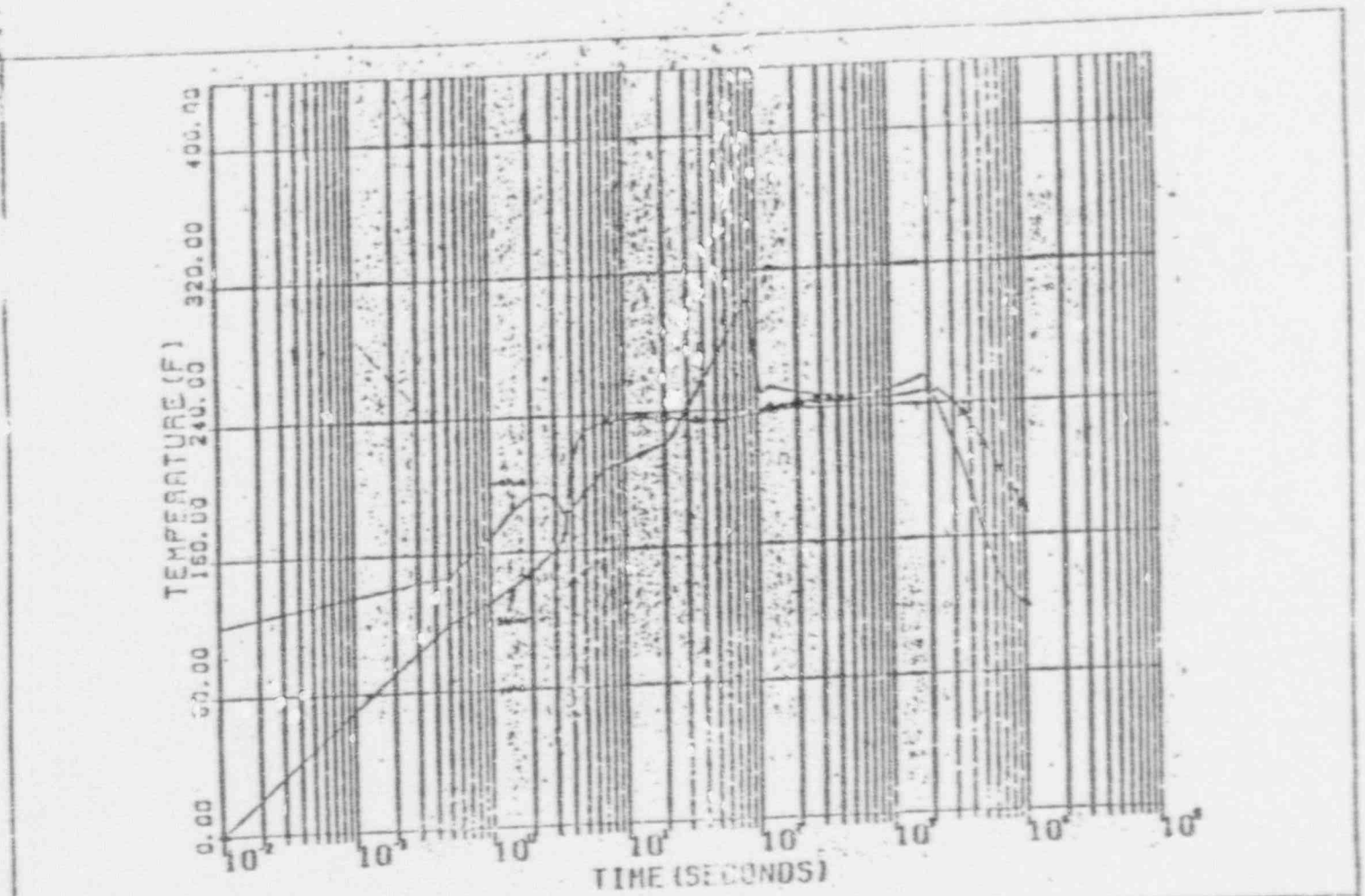


Figure A-2. Pressure Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-6)

FIGURE SUPPLIED BY THE LICENSEE



Alabama Power	TEMPERATURE VERSUS TIME FSAR LINE FULL D.E. BREAK 102% POWER FIGURE 6.2-7

Figure A-3. Temeprature Versus Time, [illegible] Full D.E. Break, 102% Power (Licensee Figure [illegible])

FIGURE SUPPLIED BY THE LICENSEE

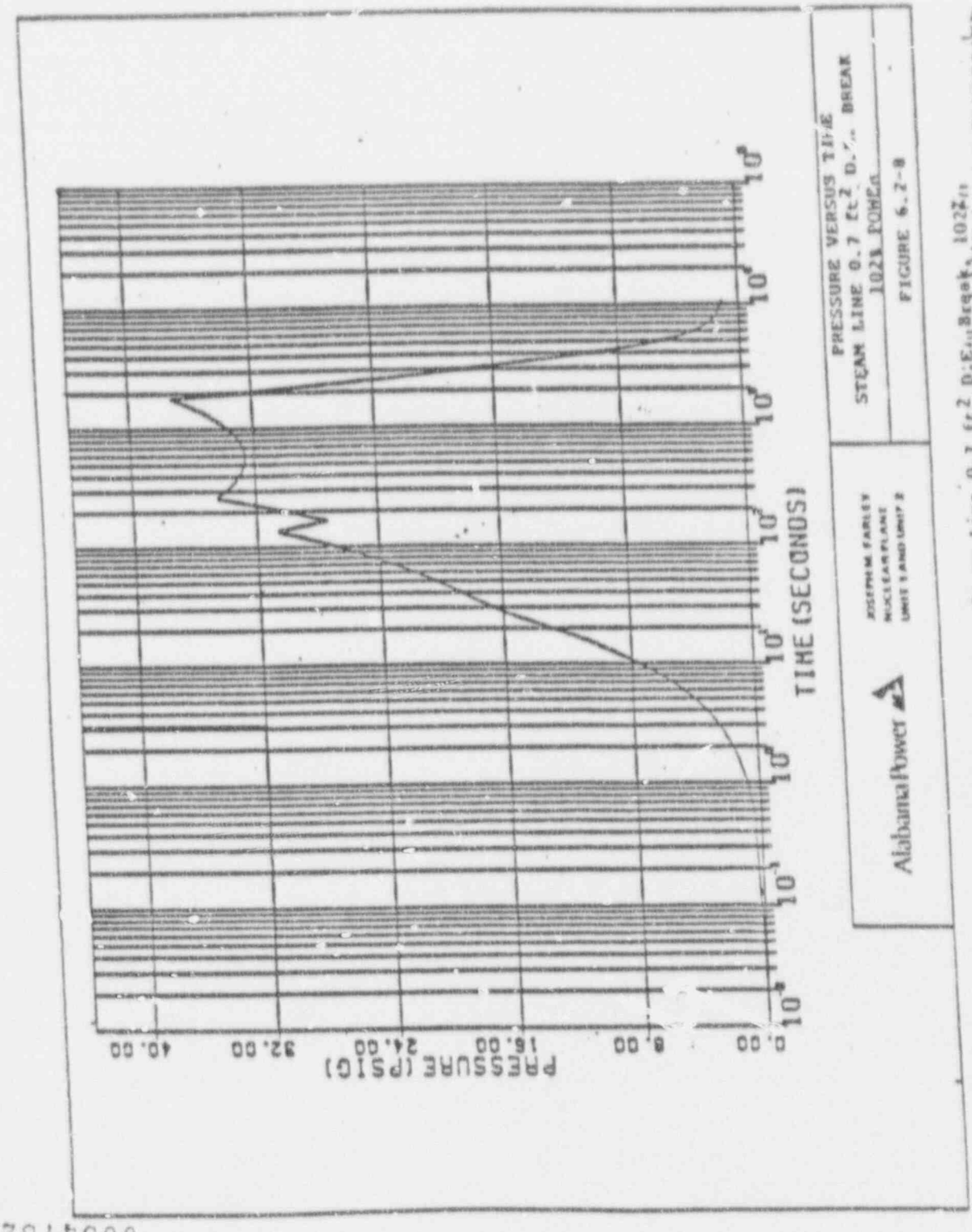


Figure A-4: Pressure Versus Time, Steam Line 0.7 ft² D.E. Break 102% Power (Licensee Figure 6.2-8)

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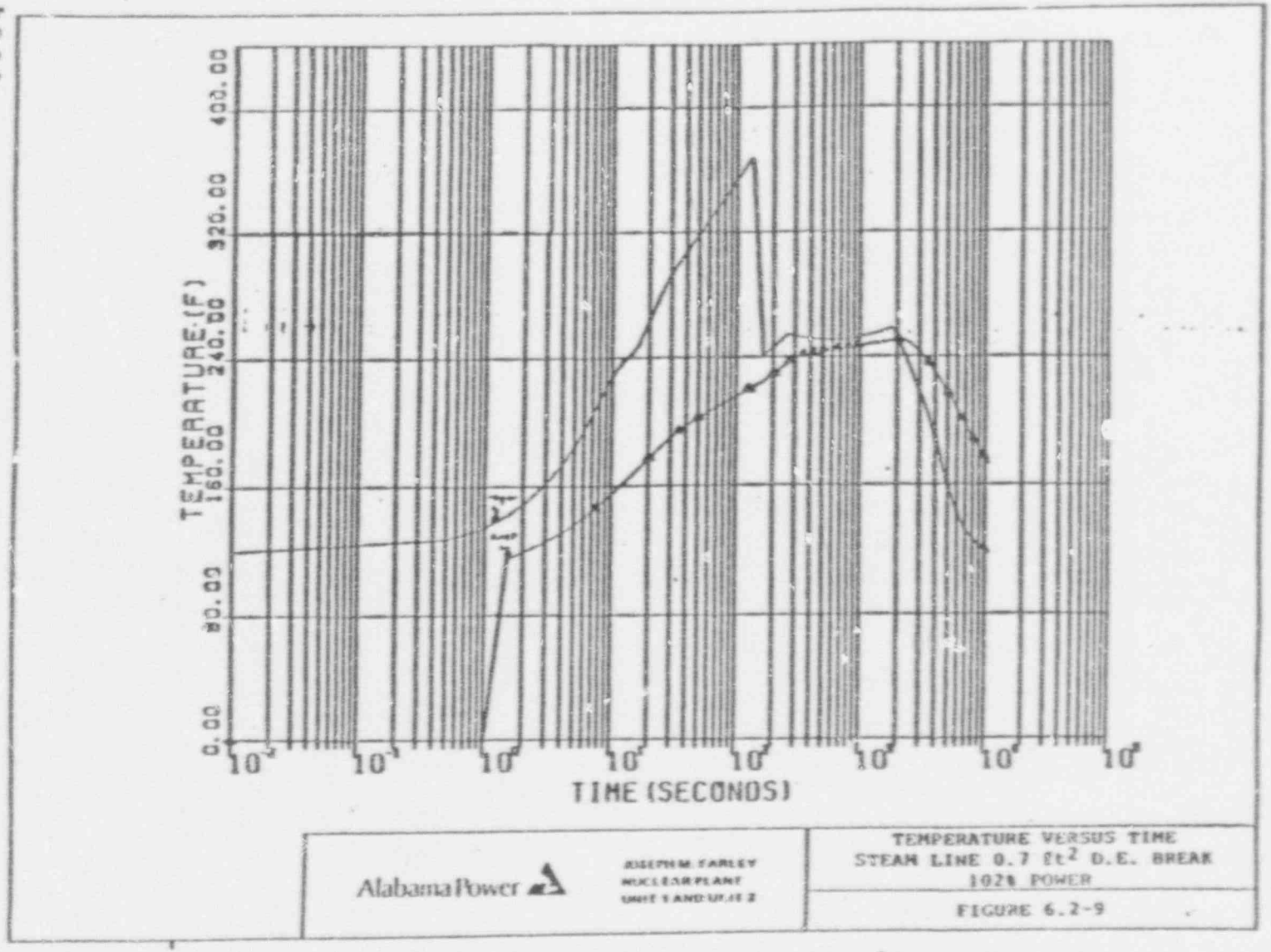

Figure A-5. Temperature Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-9)

FIGURE SUPPLIED BY THE LICENSEE

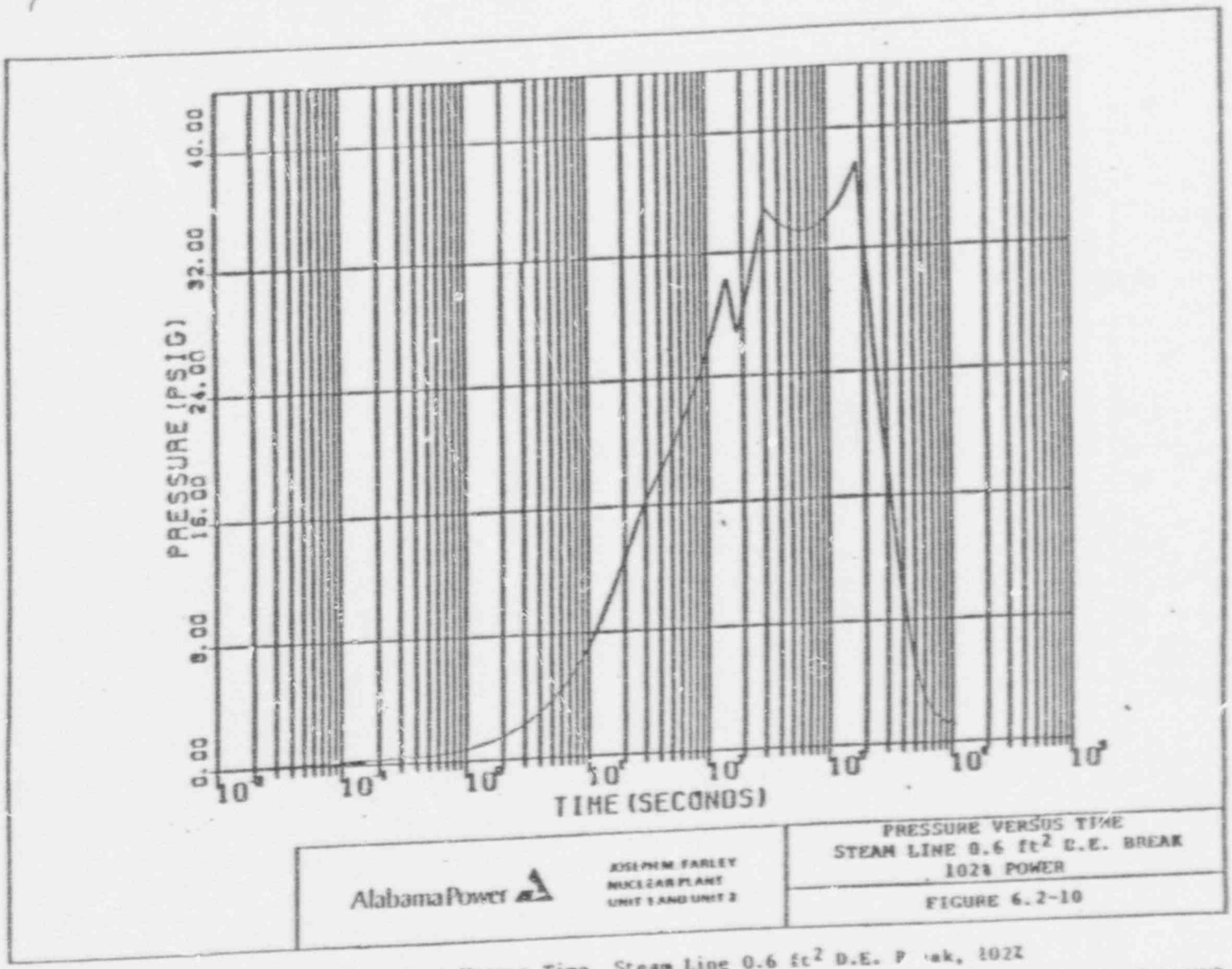

Figure A-6. Pressure Versus Time, Steam Line 0.6 ft^2 D.E. Peak, 102% Power (Licensee Figure 6.2-10)

FIGURE SUPPLIED BY THE LICENSEE

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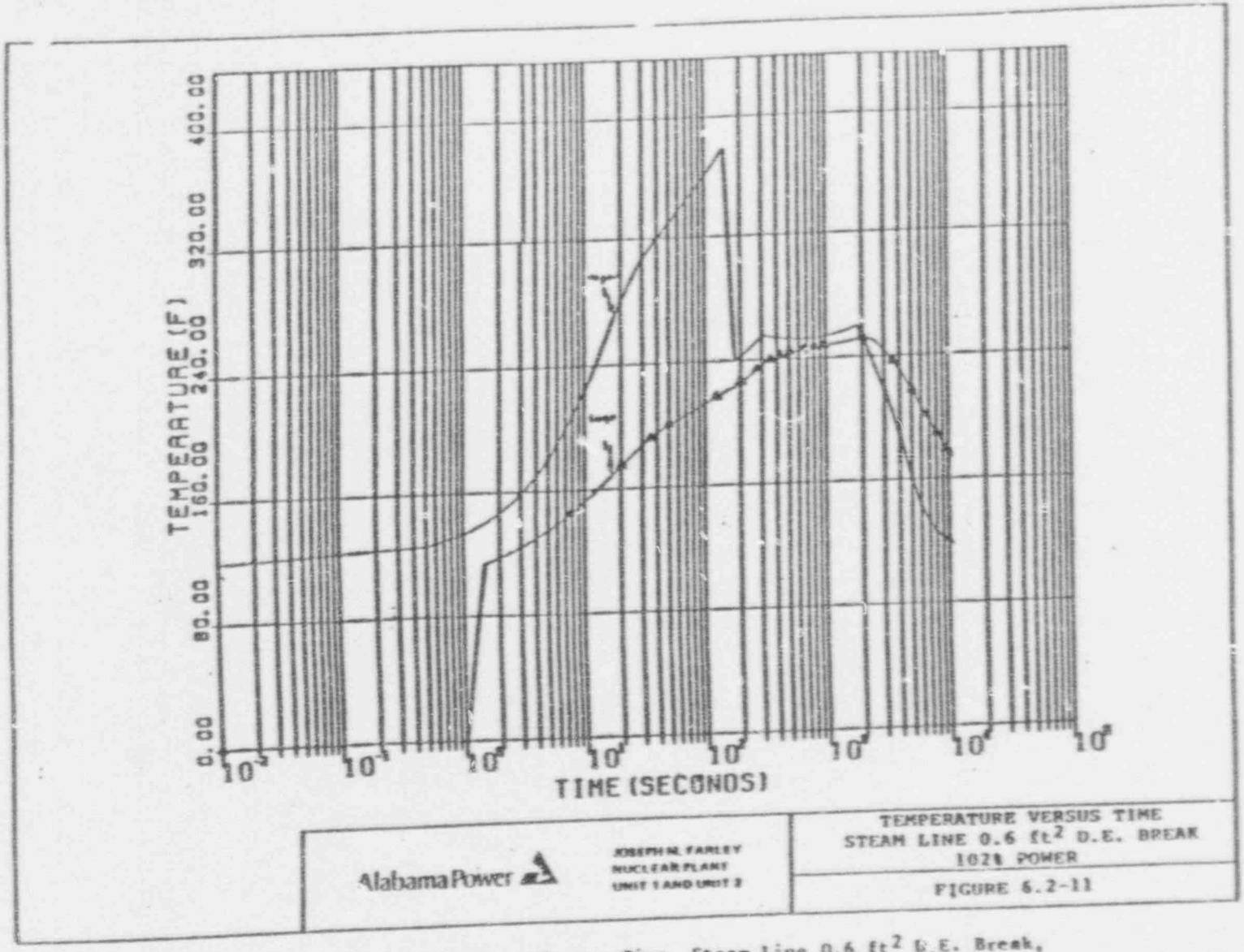

Figure A-7. Temperature Versus Time, Steam Line 0.6 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-11)

FIGURE SUPPLIED BY THE LICENSEE

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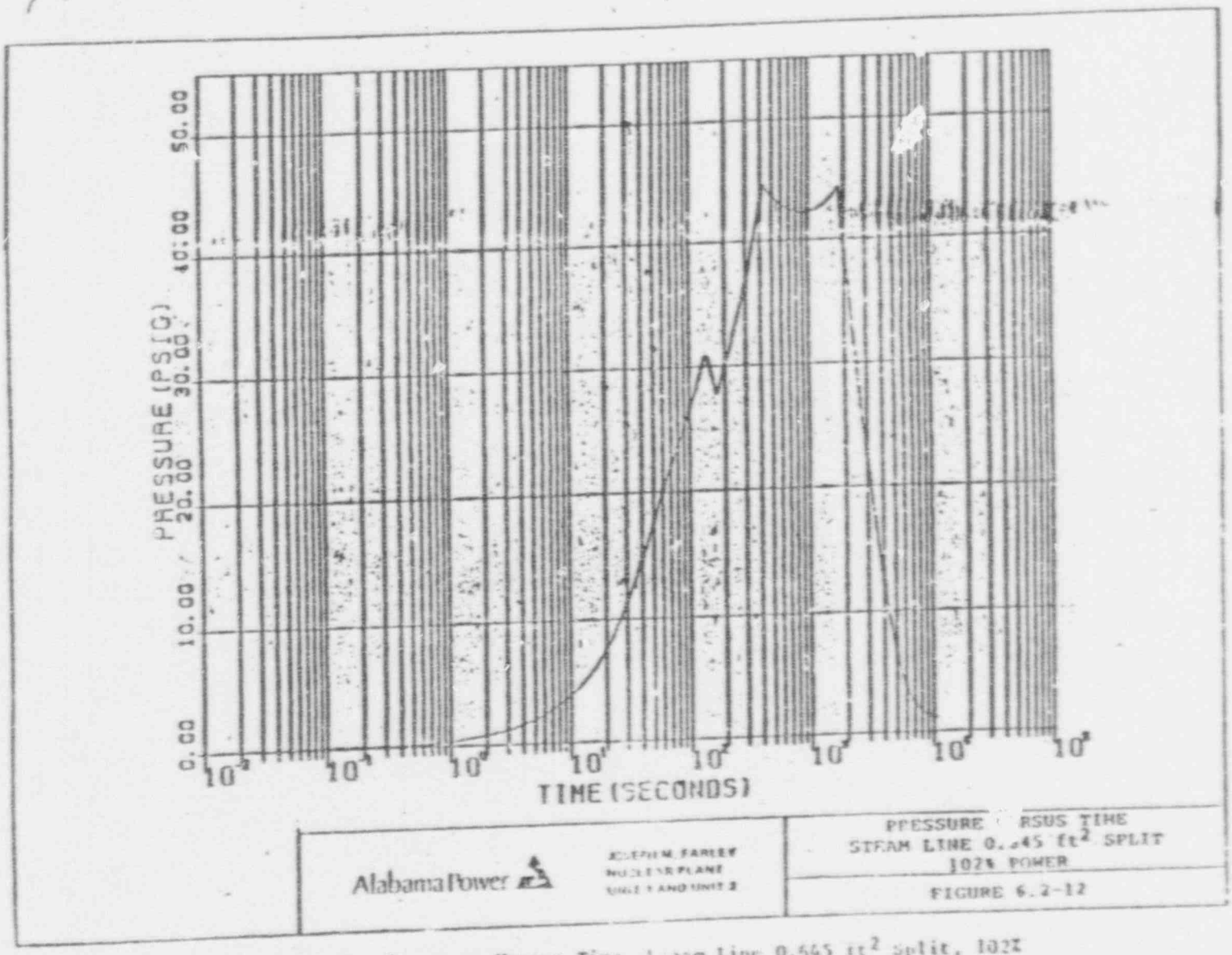

Figure A-8. Pressure Versus Time, Steam Line 0.645 ft² Split, 102% Power (Licensee Figure 5.2-12)

FIGURE SUPPLIED BY THE LICENSEE

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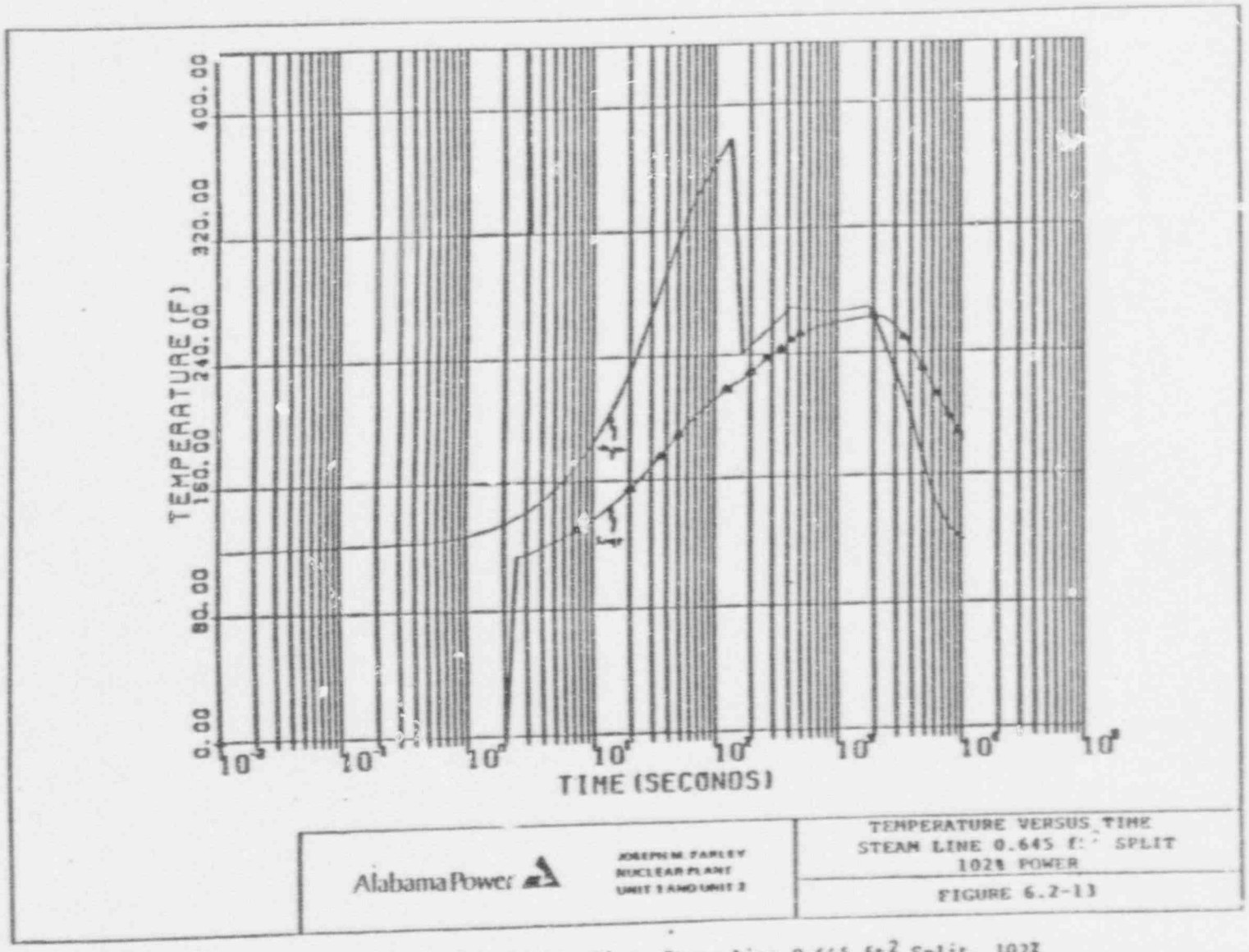

Figure A-9. Temperature Versus Time, Steam Line 0.645 ft^2 Split, 102% Power (Licensee Figure 6.2-13)

FIGURE SUPPLIED BY THE LICENSEE

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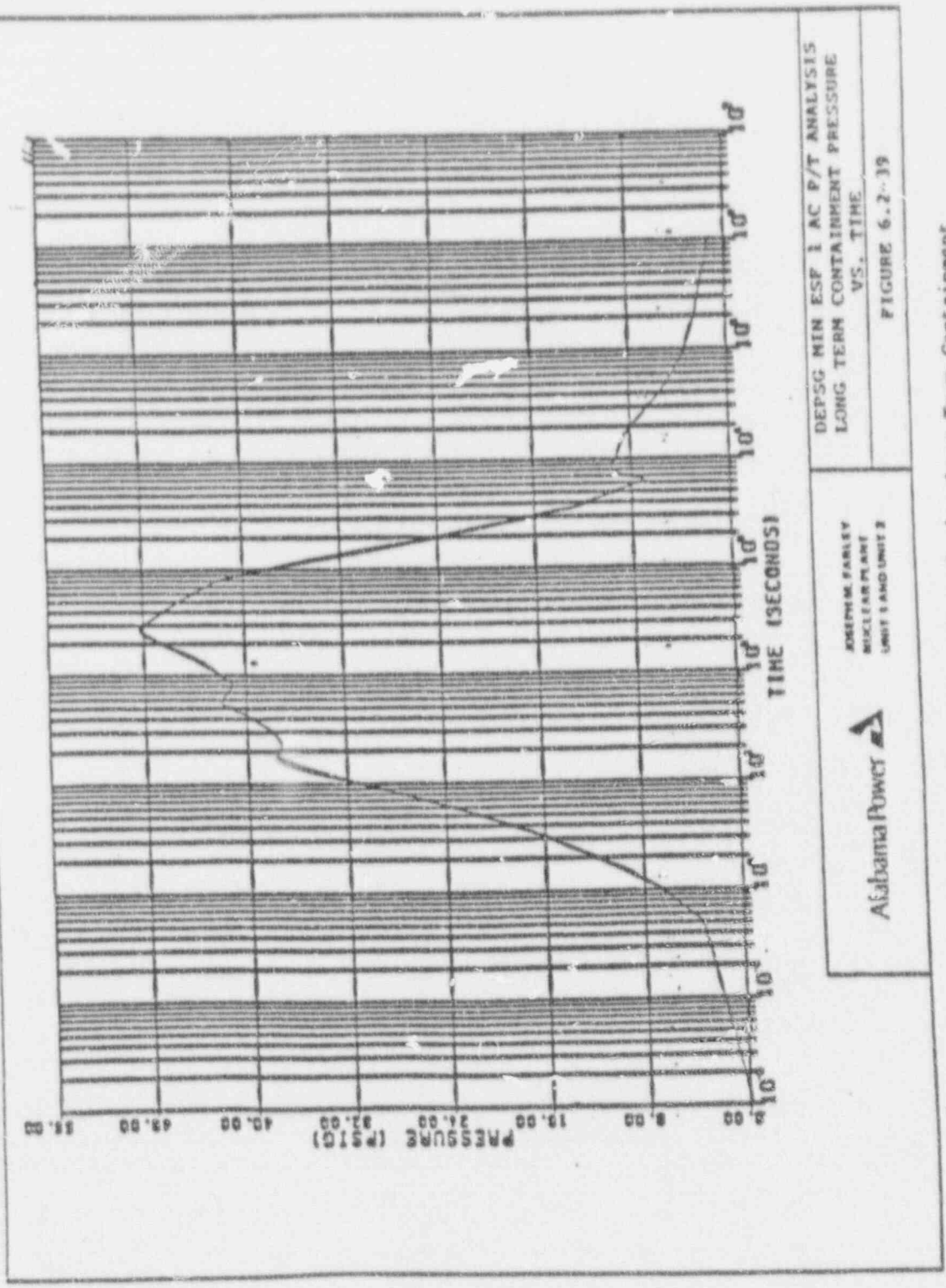

Figure A-10. DESPG MIN ESF 1 AC P/T Analysis, Long Term Containment Pressure vs. Time (Licensee Figure 6.2-39)

FIGURE SUPPLIED BY THE LICENSEE

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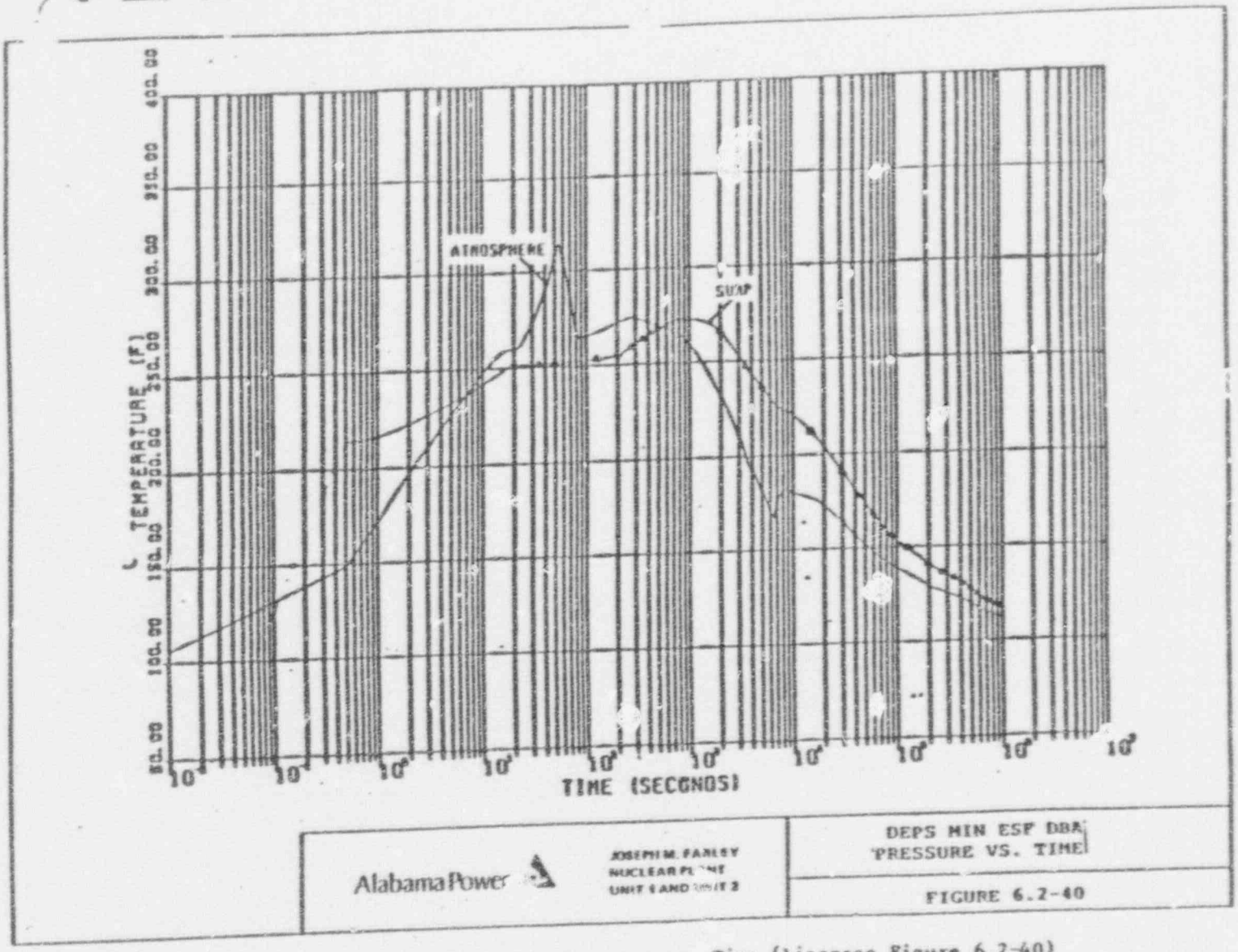

Figure A-11. DEPS MIN ESF DBA, Pressure vs. Time (Licensee Figure 6.2-40)

FIGURE SUPPLIED
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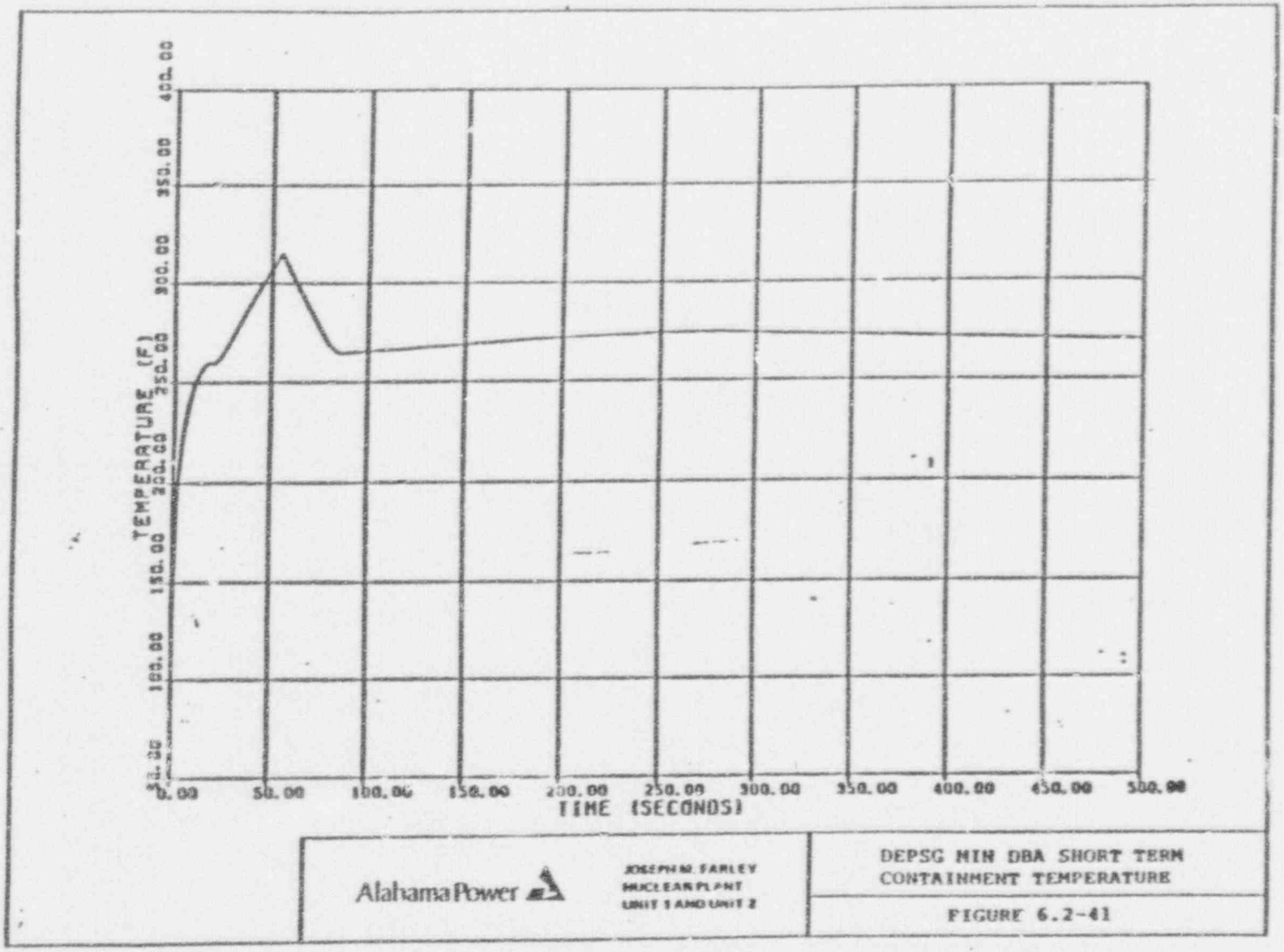

Figure A-12. DEPSG MIN DBA Short Term Containment Temperature (Licensee Figure 6.2-41)

FIGURE SUPPLIED BY THE LICENSEE

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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 Farley Nuclear Plant Unit 1. 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 [5, 8, 22].

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 1082496, 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 referenc

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EQUIPMENT ITEM NO. 1
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
LIMITORQUE MODEL SMB; SIZES 1, 4T
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 1
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (MOV3350A, B, C (Q1N23V011A, B, C))
SERVICE: AUXILIARY FEEDWATER
LICENSEE SUBMITTAL: SCEW(S): C.2.16.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3232A, B, C (Q1N21V001A-B, B-B, C-B))
SERVICE: FEEDWATER SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.2 [5]

EQUIPMENT ITEM NO. 2
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 111'6"
LIMITORQUE MODEL SMB4
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 2
LICENSEE REFERENCE(S): 695, 1590
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (MOV8808A, B, C (Q1E21V038A, B, C))
SERVICE: CVCS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.4 [5]

EQUIPMENT ITEM NO. 3
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 134'6" & 116'0"
LIMITORQUE MODEL SMB; SIZES 00, 000
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 3
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (MOV3536 (Q1E23V021))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3530 (Q1E23V003))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3528A, B, C, D; (Q1E23V022A, B, C, D))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3835A, B; (Q1E23V025A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3872A, B (Q1E22V001A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.3 [5]

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EQUIPMENT ITEM NO. 3 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV8112 (Q1E21V249A))
SERVICE: CVCS/SAFETY INJECTION
LICENSEE SUBMITTAL: SCEW(S): C.2.9.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3660 (Q1E14V002))
SERVICE: CONTAINMENT COOLING
LICENSEE SUBMITTAL: SCEW(S): C.2.6.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3318B (Q1E14V004))
SERVICE: CONTAINMENT COOLING
LICENSEE SUBMITTAL: SCEW(S): C.2.6.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3046 (Q1P17V097))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.20.2 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3441A, B, C, D (Q1P16V207A, B, C, D))
SERVICE: WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3131 (Q1P16V081))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.4 [5]

EQUIPMENT ITEM NO. 4
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 129'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 4
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P13SV2867B, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.7 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P12SV[illegible]9A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.7 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1E21SV8871)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.6 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1G21SV7126)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1B31SV8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.2 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P17SV3443)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P17SV3184)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.3 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P15SV3103, 3765, 3766, 3179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1P15SV3103, 3180A, B, C; 3181A, B, C; 3104)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [5]

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EQUIPMENT ITEM NO. 5
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 105'0"
AUTOMATIC VALVE MODEL C5439
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 5
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (QE12SV3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.8 [5]

EQUIPMENT ITEM NO. 6
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 6
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1E31SV0444BA, BB; 445AA, AB)
LICENSEE SUBMITTAL: SCEW(S): TMI-3.5 [5, 22]

EQUIPMENT ITEM NO. 7
SOLENOID VALVE LOCATED IN THE CONTAINMENT
TARGET ROCK MODEL 79AB001
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 7
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): REACTOR VESSEL HEAD VENTILATION (Q1B13SV2213A, B; 2214A, B)
SERVICE: REACTOR VESSEL HEAD VENTILATION
LICENSEE SUBMITTAL: SCEW(S): TMI-2.2 [5, 22]

EQUIPMENT ITEM NO. 8
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 111'0"
ASCO MODEL 2063816RF
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. C
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1E21SV8149AB, BB, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.9 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1G21SV1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.4 [5]

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EQUIPMENT ITEM NO. 9
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 109'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 9
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1G21SV3376)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.2 [5]

EQUIPMENT ITEM NO. 10
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL HT8300 SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 10
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N12SV3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N25SV3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.2 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N23SV3228AA, BA, CA; 3227AA, BA, CA)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.5 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1C22SV0478A, B; 0488A, B; 498A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.5 [5]

EQUIPMENT ITEM NO. 11
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 11
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3368AA, BA, CA; 3976A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.10 [5]

EQUIPMENT ITEM NO. 12
SOLENOID VALVE LOCATED IN THE AUXILIARY BUILDING, ELEV. 131'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 12
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N12SV3234A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.2 [5]

EQUIPMENT ITEM NO. 13
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 130'0"
ASCO MODEL HT 8200 SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 13
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3369BC, 3369CC, 3370BC, 3370CC)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.8 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N1SV3369BA, 3370BA)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.11 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1C22SV0479A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.6A [5]

EQUIPMENT ITEM NO. 14
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL HV2023013U
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 14
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N1C22SV0489A, B; 499A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.6 [5]

EQUIPMENT ITEM NO. 15
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
ASCO MODEL HT8200 SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 15
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3369CA, 3370CA)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.12 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q1N11SV3369AC, 3370AC)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.7 [5]

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EQUIPMENT ITEM NO. 16
HYDROGEN RECOMBINER LOCATED IN THE CONTAINMENT, ELEV. 155'0"
WESTINGHOUSE MODEL TYPE A
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 16
LICENSEE REFERENCE(S): 1571, 1572, 1573, 1574, 1575
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (K001A, B (Q1E17G001A, B))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.7.2 [5]

EQUIPMENT ITEM NO. 17
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
JOY MANUFACTURING MODEL TYPE P
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 17
LICENSEE REFERENCE(S): 1803
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (C001A, B (Q1E22M001A, B))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.2 [5]
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (C001A, B, C, D (Q1E19M001A, B, C, D))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.8.2 [5]
FUNCTION (PLANT ID): NOT STATED (H001A, B, C, D (Q1E12M001A, B, C, D))
SERVICE: CONTAINMENT HEAT REMOVAL
LICENSEE SUBMITTAL: SCEW(S): C.2.6.9 [5]

EQUIPMENT ITEM NO. 18
RTD LOCATED IN THE CONTAINMENT, ELEV. 124'0"
ROSEMOUNT MODEL 176KF
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 18
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID) REACTOR TRIP (N1B13TE412B, D; 422B, D; 432B, D)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.2 [5]

EQUIPMENT ITEM NO. 19
RTD LOCATED IN THE CONTAINMENT, ELEV. 122'9"
ROSEMOUNT MODEL 176KS
REQUIRED OPERATING TIME: 14 DAYS
TER CHECKSHEET NO. 19
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID) REACTOR TRIP (N1B21TE410, 413, 420, 423, 430, 433)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.3 [5]

EQUIPMENT ITEM NO. 20
RADIATION DETECTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
VICTOREEN MODEL 8771
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 20
LICENSEE REFERENCE(S): 2883
FUNCTION (PLANT ID) RADIATION MONITOR (Q1D21RE0027A-A, B-B)
SERVICE: POST ACCIDENT MONITOR
LICENSEE SUBMITTAL: SCEW(S): TMI-5.2 [5, 22]

EQUIPMENT ITEM NO. 21
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 109'0"
BARTON MODEL 763 (LOT 1)
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 21
LICENSEE REFERENCE(S): 3836
FUNCTION (PLANT ID) POST-ACCIDENT MONITOR (N1B21PT402, 403)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.2 [5]

EQUIPMENT ITEM NO. 22
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 166'6"
FOXBORO MODEL E11GM (MCA)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 22
LICENSEE REFERENCE(S): 710
FUNCTION (PLANT ID) REACTOR TRIP (Q1B31PT455, 456, 457)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.7 [5]

EQUIPMENT ITEM NO. 23
LEVEL SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 127'6"
DE LAVAL MODEL LS36497
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 23
LICENSEE REFERENCE(S): 2587
FUNCTION (PLANT ID) MAIN FEED PUMP TRIP (Q1N21LSH2828A, B, C; 2829A, B, C)
SERVICE: FLOOD LEVEL SENSOR
LICENSEE SUBMITTAL: SCEW(S): C.2.15.3 [5]

EQUIPMENT ITEM NO. 24
LEVEL SENSOR LOCATED IN THE CONTAINMENT
DE LAVAL MODEL XM54854323
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 24
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): LEVEL INDICATION (7782A-A, 7782B-B)
SERVICE: CONTAINMENT SUMP
LICENSEE SUBMITTAL: SCEW(S): TMI-7.2 [5, 22]

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EQUIPMENT ITEM NO. 25
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
DE LAVAL MODEL 3436495
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 25
LICENSEE REFERENCE(S): 1887, 2587
FUNCTION (PLANT ID) POST-ACCIDENT LEVEL MONITOR (Q1E11L73594A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.2 [5]

EQUIPMENT ITEM NO. 26
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 159'0"
BARTON MODEL 764 (LOT 1)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 26
LICENSEE REFERENCE(S): 3836
FUNCTION (PLANT ID) PRESSURIZER LEVEL (Q1B31LT459, 460, 461)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.6 [5]
FUNCTION (PLANT ID): FEEDWATER CONTROL (Q1C22LT474 TO 476, 484 TO 486, 494 TO 496)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.9 [5]

EQUIPMENT ITEM NO. 27
FLOW TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 180'0"
FOXBORO MODEL E13DM
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 27
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID) FEEDWATER CONTROL (Q1C22FT474, 475, 484, 485, 494, 495)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.10 [5]

EQUIPMENT ITEM NO, 28
LIMIT SWITCH LOCATED IN THE CONTAINMENT
NAMCO MODEL EA180
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 28
LICENSEE REFERENCE(S): 3293, 5909
FUNCTION (PLANT ID) VALVE POSITION INDICATION (Q1B13ZS2034, 2035, 2036)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [5, 22]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1B31ZS0444B, 445A)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [5, 22]

EQUIPMENT ITEM NO. 29
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
NAMCO MODEL D2400X
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 29
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N25ZS3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.3 [5]

EQUIPMENT ITEM NO. 30
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
MICRO SWITCH MODEL OPDAR
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 30
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N12ZS3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3368B, 3976B)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]

EQUIPMENT ITEM NO. 31
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
NAMCO MODEL EA170
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 31
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1C02ZS0478, 488, 498, 489, 499)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3368A, C; 3976A, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.6 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N22ZS3228A, B, C; 3227A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.4 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N12ZS3234A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.3 [5]

EQUIPMENT ITEM NO. 32
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 117'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 32
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID) VALVE POSITION INDICATION (Q1P17ZS3184, 3443)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.4 [5]

EQUIPMENT ITEM NO. 32 (CONTINUED)
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1P17ZS3103, 3765, 3766, 3179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1P17ZS3180A, B, C; 3181A, B, C; 3104)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1P13ZS3196, 2867B, 3197, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1E21ZS8871)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.7 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1G21ZS7126)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.10 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1B31ZS8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3 [5]

EQUIPMENT ITEM NO. 33
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 109'0"&110'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 33
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID) VALVE POSITION INDICATION (Q1P12ZS3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1E21ZS8149A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.8 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1E21ZS8808AB, BB, CB)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.8 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1G21ZS3376; N1G21ZS1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.3 [5]

EQUIPMENT ITEM NO. 34
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT, ELEV. 143'0"
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 34
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID) CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.19.5 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.7 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.16 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.6 [5]

EQUIPMENT ITEM NO. 34 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.11.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.10.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.10 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.8.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.7.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.11 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.3 [5]

EQUIPMENT ITEM NO. 35
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 35
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID) CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-7.4 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-5.3 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-4.4 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-3.4 [5, 22]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-2.3 [5, 22]

EQUIPMENT ITEM NO. 36
TERMINAL BLOCK LOCATED IN THE CONTAINMENT, ELEV. 116'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 36
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID) CONDUCTOR TERMINATION (11TB001, 003, 004; 21TB001, 002, 005)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (11TB001, 002; 21TB003, 004; 31TB001, 002)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1B21SV8047-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1G21SV3376-B/JB; N1G21SV1003A-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (SV7126-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1E21SV8149AA-A/JB; BA-A/JB; CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1E21SV8871-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P13SV3196-B/JB, 2867B-B/JB, 3197-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P13SV2866B-B/JB;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1E12SV3999A-A/JB, B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P17SV3184-B/JB; 3443-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.20.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3765-A/JB, 3766-A/JB, 3103-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

EQUIPMENT ITEM NO. 36 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3179A-A/JB, 3179B-A/JB, 3179C-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3180A-A/JB, 3180B-A/JB, 3180C-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P15SV3181A-A/JB, 3181B-A/JB, 3180C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1P14SV3104- JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

EQUIPMENT ITEM NO. 37
TERMINAL BLOCK LOCATED IN THE CONTAINMENT
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 37
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID) CONDUCTOR TERMINATION (Q1T52B016-B; B1TB025; Q1B13SV2113B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [5, 22]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1B13SV2114B-B/JB; 2213A-A/JB; A1TB007)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [5, 22]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1B31SV0444BA-B/JB; SV0445AA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.3 [5, 22]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N1B31SV0444BA-B/JB; SV0445AA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.3 [5, 22]

EQUIPMENT ITEM NO. 38
TERMINAL BLOCK LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 38
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID) CONDUCTOR TERMINATION (N1C22SV0475A-A/JB, 488A-A/JB, 49A-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.7 [5]

EQUIPMENT ITEM NO. 38 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N25SV3772A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.17.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N23SV3227AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N23SV3228AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (A1TB034)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N12SV3234A-A/JB, B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (3235A-A/JB, BB-JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3368AA-A/JB, BA-A/JB, CA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3369AA-A/JB, BA-A/JB, CA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3370AA-B/JB, BA-B/JB, CA-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q1N11SV3376A-B/JB, B-B/JB, C-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.13 [5]

EQUIPMENT ITEM NO. 39
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
BOSTON INSULATED WIRE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 39
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.8 [5]

EQUIPMENT ITEM NO. 40
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, ELEV. 115'0"
BOSTON INSULATED WIRE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 40
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]

EQUIPMENT ITEM NO. 41
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, 115'0"
BOSTON INSULATED WIRE, MODEL NOT STATED
REQUIRED OPERATING TIME: 4 HOURS
TER-CHECKSHEET NO. 41
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.7.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.9 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.13.15 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.13 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.6 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.9 [5]

EQUIPMENT ITEM NO. 42
ELECTRICAL CABLE, CONTROL LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 42
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID) ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.17.5 [5]

EQUIPMENT ITEM NO. 42 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.16.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.13.14 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.15.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.4.8 [5]

EQUIPMENT ITEM NO. 43
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT, ELEV. 115'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 43
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID) ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.20.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.19.6 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.18.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.5.4 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.6.12 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.7.4 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.8.4 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.12 [5]

EQUIPMENT ITEM NO. 43 (CONTINUED)
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.10.5 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.11.7 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.12.8 [5]
FUNCTION (PLANT ID): ELECTRIC POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.3.8 [5]

EQUIPMENT ITEM NO. 44
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT
OMONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 44
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID) ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-7.3 [5, 22]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.2 [5, 22]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.2 [5, 22]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.4 [5, 22]

EQUIPMENT ITEM NO. 45
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 109'0"
BARTON MODEL 764 (LOT 1)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 45
LICENSEE REFERENCE(S): 3836
FUNCTION (PLANT ID) LEVEL INDICATION (Q1N11LT477, 487, 497)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.7 [5]

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EQUIPMENT ITEM NO.: 46
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 828'0"
NAMCO MODEL EA170
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO.: 46
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3369A, B, C; 3370A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q1N11ZS3369AJ, BJ, CJ; 3370AJ, BJ, CJ)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.5 [5]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N1C22ZS0479)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.4A [5]

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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 upon information in the Licensee's submittal, the equipment location references, and in some cases conversations with the Licensee, the NRC staff verified that the systems included in the Licensee's submittal were those 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 surrounding environment. With the exception of items deferred for later review (cold-shutdown equipment and TMI Lessons-Learned modifications), the staff concluded that the systems identified by the Licensee were acceptable. The list of systems identified by the Licensee and accepted by the NRC staff is as follows:

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Function	System[1]
Emergency Reactor Shutdown	Reactor Protection
	Engineered Safeguards Actuation
	Reactor Coolant
	Chemical and Volume Control
Containment Isolation	Main Feedwater and Condensate
	Auxiliary Feedwater
	Main and Auxiliary Steam
	Residual Heat Removal
	Chemical Injection
	Chemical and Volume Control
	Liquid Waste Disposal
	Component Cooling Water
	Service Water
	Containment Spray
	Sampling
	Containment Cooling and Purge
Reactor Core Cooling	Chemical and Volume Control/Safety Injection
	Safeguards System, RHR/LHSI

1. The NRC 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.

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Function	System
Containment Heat Removal	Containment Spray
	Containment Cooling and Purge
	Residual Heat Removal
Core Residual Heat Removal	Auxiliary Feedwater
	Main Feedwater and Condensate
	Main Steam
	Residual Heat Removal[2]
	Component Cooling Water
	Service Water
	Chemical and Volume Control
Prevention of Significant Release of Radioactive Material to Environment	Containment Spray (Iodine Removal)
	Containment Post-LOCA Air Mixing
	Reactor Cavity Post-LOCA Dilution
	Hyrdogen Recombiner
	Radiation Monitoring
	Sampling
Supporting Systems	Emergency Power
	Control Room Habitability
	Safety Equipment Area Ventilation

2. Only equipment required to achieve hot shutdown following an accident is included in the master list submitted by the Licensee. Cold shutdown equipment is to be addressed later.

C.2 SAFETY-RELATED INSTRUMENTATION

In Section 3.1 of the NRC SER dated May 21, 1981 [7], 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 8, the Licensee provided the following response:

> "In accordance with the requirements of IEB 79-01B Alabama Power Company has conducted a review of the Emergency Operating Procedures to verify that equipment utilized by the operator for accident mitigation and that could be subjected to the accident environment is adequately qualified to perform its function. This review has determined that the subject instruments are adequately qualified to perform their intended function. Component work sheets have been completed for required instrumentation in the harsh environment.
>
> With reference to instruments which are not fully qualified for the environment resulting from a HELB inside containment, these were included in the EOP's solely as a source of additional information for the operator. These instruments could be deleted from the EOP's if qualification for HELB inside containment was the sole determining factor for incorporation. These instruments, should they fail, would not mislead the operator because operators are trained to take actions based on a combination of plant parameters rather than indication from a single instrument. In addition, as part of the human factors review conducted by the NRC in the licensing of Farley 2, the EOP's were reviewed and approved by the NRC, taking into account the fact that in some cases non-qualified instrumentation was listed. Since the EOP's for Unit 1 are identical to those of Unit 2, this review also applies to Unit 1. A listing of these instruments with appropriate justification is provided in the following attachment [see Table C-1 of this TER]."

Evaluation

The justifications stated by the Licensee in the Table C-1 provide a technical basis for exclusion of the identified instruments. This item is considered resolved.

Table C-1. EOP Instrumentation Not Fully Qualified for Harsh Environment [8]

EOP INSTRUMENTATION NOT FULLY QUALIFIED FOR HARSH ENVIRONMENT

EQUIPMENT ITEM TFWS #	PRIMARY ELEMENT LOCATION	INSTRUMENT DESCRIPTION	INSTRUMENTATION EXCLUDED FROM ENVIRONMENTAL QUALIFICATION REPORT BECAUSE:
N1D21R10002A	RE 0002A CTMT. 135' elev.	CTMT. Area Rad. Monitor	High-range CTMT. rad. monitors have been installed and are environmentally qualified. These monitors provide adequate post-accident indication.
N1D21R10007A	RE 0007A CTMT. 129' elev.	Seal Table Area Rad. Monitor	Not required for accident monitoring or mitigation. High-range CTMT. rad. monitors have been installed and are environmentally qualified. These monitors provide adequate post-accident [illegible]ation.
N1C55N10041A 42A 43A 44A NR0045	NE 0041B, 42B, 43B, 44B CTMT.	Excore Power Instrumentation	IEB 79-01B - Supplement 2 - Item 12 states that nuclear instrumentation and its associated components do not have to be environmentally qualified for a LOCA or a HELB.
N1B13T1411A 421A 431A	TE 411, 421, 431 CTMT. 105' elev.	Narrow Range RCS Temp. Indication	Wide Range RCS Temp. Indication is environmentally qualified. This instrumentation spans the narrow range indication.
N1B31T1463	TE 463 CTMT. 129' Elev.	PZR. PORV Downstream Temp. Indication	Qualified limit switches have been installed on the PORV's for reliable valve position indication. Temperature indication is for backup only.

FIGURE SUPPLIED BY THE LICENSEE

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Table C-1 (Cont.)

EOP INSTRUMENTATION NOT FULLY QUALIFIED FOR HARSH ENVIRONMENT

EQUIPMENT ITEM TRNS #	PRIMARY ELEMENT / LOCATION	INSTRUMENT DESCRIPTION	INSTRUMENTATION EXCLUDED FROM ENVIRONMENTAL QUALIFICATION REPORT BECAUSE:
MIB31YI465 467 469	YE 465, 467, 469 CIMT. 129' Elev.	PIR. Safety Downstream Temp. Indication	Qualified limit switches have been installed on the Safety Valves for reliable valve position indication. Temperature indication is for backup only.
MIB31LI92D YI471 PI472	LE470, YE471, PT472 CIMT. 103' Elev.	PIR. Relief Tank Level, Temp. and Pressure Indication	Instrumentation is backup for PORV and Safety Valve position indication.
MIB2ILI92D, 922 924, 926 928, 930	LY920, 922, 924, 926, 928, 930 CIMT. 129' Elev.	Accum. Tank Level Indication	Instrumentation provided for Tech. Spec. purposes only. Qualified pressure instrumentation given indication of accum. status.
MIY12YR3188	YE3188 CIMT. 103' Elev.	CIMT. Air Temperature	Instrumentation provided for Tech. Spec. purposes only. CIMT. heat removal indication provided by CIMT. cooler instrumentation.
MIB2IFI414 415 416	FT414, 415, 416 CIMT. 103' Elev.	RCS Flow Indication	For design bases accidents indication would not be available due to lack of forced flow. Natural circulation verified by core differential temperature to ensure decay heat removal.

FIGURE SUPPLIED BY THE LICENSEE

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Table C-1 (Cont.)

EOP INSTRUMENTATION NOT FULLY QUALIFIED FOR HARSH ENVIRONMENT

EQUIPMENT ITEM TYPE #	PRIMARY ELEMENT LOCATION	INSTRUMENT DESCRIPTION	INSTRUMENTATION EXCLUDED FROM ENVIRONMENTAL QUALIFICATION REPORT BECAUSE:
H|C56C001 ↓ C052	C001 - C052	Incore Thermocouples	Instrumentation provided for backup purposes only. Wide Range RTD's, which are qualified serve as primary indication of RCS temperature.
	CTMT. 833' Elev.		

II.E-4

FIGURE SUPPLIED
BY THE LICENSEE

TER-C5257-509

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 [7]:

> "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:
>
> - 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.

- 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: Alabama Power Company
Plant Name: Joseph M. Farley Unit 1
NRC Docket No. 50-348
NRC TAC No. 42462
NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 509

References:

a. F. L. Clayton, Jr.
Letter to J. P. O'Reilly, NRC
Subject: Joseph M. Farley Nuclear Plant Unit 1; Response to SER
(Revision 5 to July 30, 1980 Submittal)
Alabama Power Company, 25-August-81

b. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Joseph M. Farley Nuclear Plant Unit 1
Environmental Qualification of Safety-Related
Electrical Equipment
NRC, 21-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 as a basis for justification for continued plant operation; with the following exceptions:

Equipment Item	Equipment Description/ Function	SCEW Sheet No.	Status Code	Basis for Deficiency
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."

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.

TER-C5257-509

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

Alabama Power Company

Joseph M. Farley Unit 1

NRC Docket No. 50-348

December 16, 1981

NRC TAC No. 42462

Rev. 1, April 7, 1982
Rev. 2, May 19, 1982
Rev. 3, July 7, 1982

1951 154

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 April 29, 1980 [1] and August 25, 1981 [2].* FRC previously requested TMI Action Plan information by a telephone memorandum dated July 24, 1981 [3].

By a letter dated February 19, 1982 [7], Alabama Power Company (APC) has provided a response to the RAI. APC states that,(1)**

> "Certain vendors have stated that their qualification information is proprietary and expressed concern as to possible unfair trade advantage and conflict of interest regarding the review by Franklin Research Center. Specifically, Westinghouse has requested (Attachment) that Alabama Power Company not submit their proprietary information to Franklin Research Center. Pursuant to an agreement reached between Westinghouse and Mr. E. C. Shomaker of the NRC Office of the Executive Legal Director, who has discussed this matter with Mr. Z. Rosztoczy of the Equipment Qualification Branch, Westinghouse will ensure that the requested information is, or has been, submitted to the NRC on a timely basis. Therefore, the information other than proprietary Westinghouse qualification documents has been retrieved from our auditable central file and is forwarded directly to your office to ensure the proprietary understandings between Alabama Power Company and the vendors have not been disregarded or neglected.

*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.

Alabama Power Company requests that the entire submittal be reviewed by your office and only information which is not proprietary, as designated below, be submitted to Franklin Research Center. Additionally, no part of this submittal should be released for public disclosure or reproduced, and the entire submittal must be returned to Alabama Power Company upon the completion of the review."(1)

The Licensee has also stated that item A.1.e has been superseded by a revision dated September 5, 1978, which it provided to NRC. Items A.1.a, A.1.f, and A.1.g have been identified by APC to be the same document.(1)

APC has also submitted additional information regarding environmental qualification and fire protection in a letter dated March 8, 1982 [8]. This information consists of a status report on the corrective actions taken to date on each of these areas (committed to by the Licensee on August 25, 1981 and May 11, 1981 for environmental qualification and fire protection, respectively), a revised schedule for completion of these actions, and justification for interim operation for the deficient items identified by the NRC EEQ SER. The Licensee has cited a main generator failure which forced an earlier than planned refuel outage as the cause for the delay.(1)

By letter dated April 23, 1982 [9], Alabama Power Company has committed to address the qualification of TMI-Action Plan equipment by submitting qualification information for all Units 1 and 2 TMI Action Plan equipment requiring environmental qualfication. The Licensee has committed to a submittal date of June 23, 1982 by letter [9] and by telecon [10].(2)

By letter dated June 23, 1982 [11], the Licensee submitted the information regarding TMI Action Plan equipment [12] committed to by Reference 9.(3)

A. FRC REVIEW OF THE LICENSEE'S 90-DAY RESPONSE TO THE NRC EEQ SER

INFORMATION REQUEST	DATE RECEIVED BY FRC***
1. In reference to the Licensee's 90-day response [2] to the NRC SER [5], a legible single copy of each of the following qualification documents is requested in order that the FRC evaluation may proceed:	

***This column will be completed by FRC as the requested information is received.

DATE RECEIVED BY FRC***

a. Deleted (same as Item A.1.f)(1)

b. Wyle Laboratories NEQ Test Report 44354-1 March 8, 1979 — Received 3/11/82 for Task 505(1)

c. Boston Insulated Wire and Cable Company Test Report 73E062, September 7, 1973

d. Westinghouse letters NS-TMA-1950 and NS-TMA-2120 for Barton (Lot 1) Level and Pressure Transmitters — Received 3/4/82 for Tasks 497/498(1)

e. ACME-Cleveland Development Company Qualification Report, September 5, 1978,(1) and Report No. QTR/105, August 28, 1980, for NAMCO Controls Limit Switch Model EA 180 — Received for Assignment 13(2) Received 2/8/82 for Tasks 502/503(2)

f. WCAP-7820 with Supplements 1 through 4, and Westinghouse letter to SCSI (O. Batum), February 14, 1980, for Electric Hydrogen Recombiners

g. Deleted (same as Item A.1.f)(1)

h. Boston Insulated Wire & Cable Company Test Report 74A023, January 24, 1974

i. Okonite Engineering Report No. 143, March 20, 1972

2. FRC requests further identification of installed cable identified in Reference 2 with respect to wire size; number of conductors; type, thickness, and construction of insulation and jacket materials; identification of shielding (where applicable); rated voltage; and type of application (i.e., power, control, instrument). This information is required to provide traceability of the installed equipment to the equipment tested in the test report cited as evidence of qualification.

B. FRC REVIEW OF INSTALLED TMI ACTION PLAN ITEMS

Reference 4 provides identification of all TMI Action Plan equipment installed as of 1-1-81, along with a System Component Evaluation Worksheet (SCEW) (in accordance with 79-01B format).

INFORMATION REQUESTED	DATE RECEIVED BY FRC***
1. Reference 4 does not provide adequate detail with respect to identification of TMI Action Plan equipment installed as of 1/1/81.	
a. Identification of TMI Action Plan equipment installed with implementation dates after 1/1/81 is requested.	6/30/82 [11] (3)
b. The correlation of the equipment items identified with the specific sections of NUREG-0737 [6] presented below is requested. IIE1.2, IIE4.2, IIE3.1, IIC1, IIF2, IID3, IIK3.12(Wx), IIK3.9(Wx), 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?]	6/30/82 [11] (3)
c. 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.	6/30/82 [11] (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.]	
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.	

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:

   - complete package directly to the NRC project manager

     or

   - copy of cover letter to NRC project manager and complete package to FRC.

REFERENCES

1. F. L. Clayton, Jr. and R. P. MacDonald
Letter to J. P. O'Reilly, NRC
Subject: Response to IE Bulletin 79-01B for Farley Nuclear Plant Unit 1
Alabama Power Company, 29-April-1980

2. F. L. Clayton, Jr.
Letter to J. P. O'Reilly, NRC
Subject: Joseph M. Farley Nuclear Plant Unit 1; Response to SER (Revision 5 to July 30, 1980 Submittal)
Alabama Power Company, 25-August-81

3. Telephone Memorandum Dated July 24, 1981
J. A. Murphy (FRC) Conversation with E. Reeves (NRC, PWR, Farley 1)
Subject: Request for Additional Information, Farley 1 (TMI Action Plan)

4. F. L. Clayton, Jr.
Letter to J. P. O'Reilly, NRC
Subject: Alabama Power Company's Response and Revised Responses to IEB 79-01B, Dated 4/4/80, 7/30/80, 10/30/80, 11/12/80 and 2/2/81
Alabama Power Company, 12-Feb-81

5. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Joseph M. Farley Nuclear Plant Unit 1
Environmental Qualification of Safety-Related
Electrical Equipment
NRC, 21-May-81

6. NUREG-0737, "Clarification of TMI Action Plan Requirements"
NRC, November 1980

7. F. L. Clayton, Jr.
Letter to S. A. Varga, NRC
Subject: Joseph M. Farley Nuclear Plant - Unit 1 Environmental Qualification Request for Additional Qualification Information
Alabama Power Co., 19-Feb-82
Proprietary(1)

8. F. L. Clayton, Jr.
Letter to J. P. O'Reilly, NRC
Subject: Joseph M. Farley Nuclear Plant - Unit 1; NRC Commitment Compliance Status Additional Information Related to Environmental Qualification
Alabama Power Co., 08-Mar-82(1)

9. F. L. Clayton, Jr.
Letter to S. A. Varga, NRC. Subject: Joseph M. Farley Nuclear Plant - Units 1 and 2 Environmental Qualification
Alabama Power Company, 23-Apr-82(2)

10. D. J. Schmitz (FRC) Telephone Memorandum. Conversation with M. Lawlor (APCo). Subject: Farley 1 and 2 TMI-Action Plan supplement
1-May-82(2)

11. O. D. Kingsley, Jr.
Letter to C. J. Crane, FRC. Subject: Joseph M. Farley Nuclear Plant Units 1 and 2; Environmental Qualification of TMI Action Plan Electrical Equipment
25-Jun-82
NT-82-0772(3)

12. F. L. Clayton, Jr.
Letter to J. P. O'Reilly, NRC. Subject: Joseph M. Farley Nuclear Plant - Unit 1; Environmental Qualification of Safety Related Electrical Equipment
Alabama Power Co., 23-Jun-82(3)

Franklin Research Center
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APCo Exhibit 17

CONTAINS PROPRIETARY INFORMATION

TECHNICAL EVALUATION REPORT

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

ALABAMA POWER COMPANY
JOSEPH M. FARLEY NUCLEAR PLANT UNIT 2

0056322

NRC DOCKET NO. 50-364
NRC TAC NO. 42534
NRC CONTRACT NO. NRC-03-79-118

FRC PROJECT C5257
FRC ASSIGNMENT 13
FRC TASK 518

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

FRC Group Leader: G. J. Tumm

Prepared for
Nuclear Regulatory Commission
Washington, D.C. 20555

Lead NRC Engineer: P. Shemanski

January 17, 1983

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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.

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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 are stamped PROPRIETARY.

1. INTRODUCTION

1.1 PURPOSE OF THE EVALUATION

The purpose of this report is to:

- 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.

- 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.

- 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 79-01B, Supplement 3 (Item 2) [11],* 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.

1.2 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.

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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:

- the chemical and volume control system (CVCS) letdown line
- 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
- 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 plants, qualification was based on the fact that electrical components were of high industrial quality. After 1971, qualification was judged on the basis of IEEE 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

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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" [7]. (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 79-01B, which expanded the scope of IE Bulletin 79-01 and requested additional information on environmental qualification of safety-related electrical equipment at operating facilities, excluding the 11 facilities undergoing the SEP review. This Bulletin 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 Dual Safety Equipment of SEP Operating Reactors for Which Environmental Qualification Is To Be Addressed" [7], 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 [12], 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 25, 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.

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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.

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

guide'ines for meeti.; the NRC Commissioners proposed rule on equipment qu n.

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.

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The NRC Office of Inspection and Enforcement performed an onsite verification inspection (December 2-5, 1980) of selected safety-related electrical equipment. Selected components in the reactor coolant, reactor cavity post-LOCA dilution, containment post-LOCA air mixing, hydrogen recombiner, chemical and volume control, and containment cooling and purge systems were inspected at Unit 2. The inspection verified proper installation of equipment, overall interface integrity, and manufacturers' nameplate data. The manufacturer's name and model number from the nameplate data were compared to information given in the component evaluation work sheets (CES) of the Licensee's report. The site inspection is documented in report IE 50-364/80-49. No deficiencies were noted.

NRR performed audits on August 5 and 6, 1980 and December 17-19, 1980 of environmental qualification documentation and/or test data for 14 items. No significant concerns were identified during the IE inspection or the NRC audits.

On October 30, 1980 [1], Alabama Power Company provided the NRC with an equipment environmental qualification submittal in response to IE Bulletin 79-01B for Farley Nuclear Plant Unit 2.

On February 20, 1981 [3], Alabama Power Company submitted to the NRC further equipment environmental qualification information in response to IE Bulletin 79-01B.

The NRC issued a Safety Evaluation Report (SER) to Alabama Power Company in 1981 [4].

Requests for information [22, 25] 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 Jull 1, 1981 [5], Alabama Power Company transmitted to the NRC a response to the SER.

In Reference 13, 18, and 19, Alabama Power Company responded to the FRC requests for additional information.

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:

- DOR Guidelines, "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," November 1979 [7]
- NUREG-0588, Revision 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," July 1981 [14].

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

- IE Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment," January 14, 1980; Supplement No. 1, February [illegible]; Supplement No. 2, September 29, 1980; and [illegible] 24, 1980 [8, 9, 10, 11]
- 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 4.7 of Supplement 2 to IE Bulletin 79-01B [10] describe the application of the DOR Guidelines and NUREG-0588 to operating reactors (OLs),

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	CP SER	
DOR GUIDELINES	Before 7/1/74	After 7/1/74	
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 license 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 [10] 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 [11] 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 [10] 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 [11] 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 [10], "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 [10] 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 postulated 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 [10] 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 that envelops the 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 [10] 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 [10] 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 produce the most bounding conditions. The following table summarizes these considerations:

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

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

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Gamma equivalents may be used when consideration of the contribution 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 [13] 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 activities[1] 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:

- 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.

[1]Such 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).

- 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 conservatisms. Such sample calculations and a statement by the licensee that the values of radiation 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 review.

7. Containment Service Conditions

Q. Must the Staff value (identified in the SERs) of T_{SAT} for PWRs and T_{SAT} + 20°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 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'.

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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, Alabama Power Company, provided a response to the SER and additional qualification information in its submittals [5, 6, 15, 18, 19] to the NRC for Farley Nuclear Plant Unit 2.

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

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

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

- Equipment item information (see Figure 3-1), for example:

  Solenoid Valve Located in Turbine Building (Area 37)
  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

- Qualification deficiencies identified in the SER (see Figure 3-1)
- Licensee's response to the SER
- Licensee's statements and rationale for qualification
- Licensee's corrective action and replacement schedule
- Evaluation of qualification including identification of all deficiencies
- Evaluation of system considerations presented by the Licensee and 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

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. ____

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 - CIRCLE 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

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 evaluations 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

- NRC Category I.a
  EQUIPMENT THAT SATISFIES ALL APPLICABLE REQUIREMENTS [illegible] DOR GUIDELINES OR NUREG-0588, OR HAS ACCEPTABLE DEVIATIONS FROM THE [illegible] CRITERIA

  This category includes equipment items which are fully accept[illegible] the basis that all applicable criteria defined in the DOR Guidel[illegible] 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.

- 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 criteria requirements. Examples of specific modifications are [illegible] of unqualified equipment with qualified equipment, (2) equipment hardware

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. ____

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.e	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.

- 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).

- 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 raported 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.

- 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 intepreted 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.]

- 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.

- 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 [illegible] 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.

- 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.

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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.

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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 [illegible] 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.

UNIT 2

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).: 11, 28, 29, 30, 31, 32, 33, 33]	7
I.B	EQUIPMENT QUALIFICATION PENDING ADJIFICATION [EQUIPMENT ITEM NO(S).: 6, 7, 9, 13, 14, 15, 19, 19]	7
II.A	EQUIPMENT QUALIFICATION NOT ESTABLISHED [EQUIPMENT ITEM NO(S).: 1, 3, 4, 12, 24, 26, 38, 39, 40, 41]	10
II.B	EQUIPMENT NOT QUALIFIED [EQUIPMENT ITEM NO(S).: 18, 20]	2
II.C	EQUIPMENT SATISFIES ALL REQUIREMENTS EXCEPT QUALIFIED LIFE OR REPLACEMENT SCHEDULE JUSTIFIED [EQUIPMENT ITEM NO(S).: 5, 8, 10, 23, 25, 27]	6
III.A	EQUIPMENT EXEMPT FROM QUALIFICATION [EQUIPMENT ITEM NO(S).: 2]	1
III.B	EQUIPMENT NOT IN THE SCOPE OF THE REVIEW	0
IV	DOCUMENTATION NOT MADE AVAILABLE [EQUIPMENT ITEM NO(S).: 16, 17, 21, 22, 34, 35, 36, 37]	8
	TOTAL	41

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TABLE 4-2

QUALIFICATION DEFICIENCY SUMMARY

NRC REQUIREMENT	NUMBER OF DEFICIENT EQUIPMENT ITEMS
1. DOCUMENTED EVIDENCE OF QUALIFICATION ADEQUATE	0
2. ADEQUATE SIMILARITY BETWEEN EQUIPMENT AND TEST SPECIMEN ESTABLISHED (EQUIPMENT ITEM NO(S).: 1, 3, 12, 15, 18, 20, 38, 39, 40, 41)	10
3. AGING DEGRADATION EVALUATED ADEQUATELY (EQUIPMENT ITEM NO(S).: 1, 3, 13, 14, 18, 20, 24, 24)	7
4. QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED) (EQUIPMENT ITEM NO(S).: 1, 3, 4, 5, 8, 10, 13, 14, 23, 25, 26, 27)	12
5. PROGRAM ESTABLISHED TO IDENTIFY AGING DEGRADATION	0
6. CRITERIA REGARDING AGING SIMULATION (IF REQUIRED)	0
7. CRITERIA REGARDING TEMPERATURE/PRESSURE EXPOSURE:	
A. - PEAK TEMPERATURE ADEQUATE	0
B. - PEAK PRESSURE ADEQUATE	0
C. - DURATION ADEQUATE	0
D. - REQUIRED PROFILE ENVELOPED ADEQUATELY	0
E. - STEAM EXPOSURE (IF REQUIRED) ADEQUATE	0
8. CRITERIA REGARDING SPRAY SATISFIED (EQUIPMENT ITEM NO(S).: 13, 14)	2
9. CRITERIA REGARDING SUBMERGENCE SATISFIED (EQUIPMENT ITEM NO(S).: 4, 24, 26)	3

Table 4-2 (Cont.)

TABLE 4-2

QUALIFICATION DEFICIENCY SUMMARY

NRC REQUIREMENT	NUMBER OF DEFICIENT EQUIPMENT ITEMS
10. CRITERIA REGARDING RADIATION SATISFIED	0
11. CRITERIA REGARDING TEST SEQUENCE SATISFIED	0
12. CRITERIA REGARDING TEST FAILURES OR SEVERE ANOMALIES (IF ANY) SATISFIED [EQUIPMENT ITEM NO(S).: 18, 20]	2
13. CRITERIA REGARDING FUNCTIONAL TESTING SATISFIED [EQUIPMENT ITEM NO(S).: 13, 14]	2
14. CRITERIA REGARDING INSTRUMENT ACCURACY SATISFIED [EQUIPMENT ITEM NO(S).: 13, 14]	2
15. TEST DURATION MARGIN (1 HOUR + FUNCTION TIME) SATISFIED	0
16. CRITERIA REGARDING MARGINS SATISFIED (NUREG-0588, 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).: 7, 9, 13, 14)	4
2. EQUIPMENT MODIFICATION (EQUIPMENT ITEM NO(S).: 15)	1
3. EQUIPMENT RELOCATION ABOVE SUBMERGENCE LEVEL	0
4. RELOCATE OR SHIELD EQUIPMENT FROM RADIATION SOURCE	0
5. VERIFY QUALIFICATION BY ADDITIONAL TESTING/ANALYSIS	0
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT	0
7. QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS (EQUIPMENT ITEM NO(S).: 6, 19)	2
8. OTHER (FOR DETAILED DESCRIPTION SEE SPECIFIC EQUIPMENT ITEMS) (EQUIPMENT ITEM NO(S).: 18, 20)	2
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN PROVIDED (SEE SPECIFIC EQUIPMENT ITEM FOR COMPLETION DATE) (EQUIPMENT ITEM NO(S).: 7, 9, 19)	3

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Table 4-4

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Table 4-4

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

	FRC EQUIPMENT ITEM NUMBERS																			
	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015					
FRC 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	X		X																	
4. QUALIFIED LIFE OR REPLACEMENT SCHEDULE ESTABLISHED (IF REQUIRED)	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						X	X		X				X	X	X					
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										
III.A EQUIPMENT EXEMPT FROM QUALIFICATION		X																		
III.B EQUIPMENT NOT IN THE SCOPE OF THE REVIEW																				
IV DOCUMENTATION NOT MADE AVAILABLE																				
CORRECTIVE ACTION SPECIFIER (DESIGNATION: X = ACTION SPECIFIED)																				
1. EQUIPMENT REPLACEMENT WITH QUALIFIED EQUIPMENT							X		X				X	X						
2. EQUIPMENT MODIFICATION															X					
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 IN A MILD ENVIRONMENT																				
7. QUALIFICATION TESTING OF EQUIPMENT IN PROGRESS						X														
8. OTHER (___ SEE SPECIFIC EQUIPMENT ITEM IF CHECKED ___)																				
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN PROVIDED							X		X											

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Table 4-4 (Cont.)

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EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

	NRC EQUIPMENT ITEM NUMBERS											
	031	032	033	034	035	036	037	038	039	040	041	
NRC 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)												
NRC QUALIFICATION CATEGORY (DESIGNATION: X = CATEGORY)												
I.A EQUIPMENT QUALIFIED	X	X	X									
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												
III.A EQUIPMENT EXEMPT FROM QUALIFICATION												
III.B EQUIPMENT NOT IN THE SCOPE OF THE REVIEW				X	X	X	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												
6. EQUIPMENT RELOCATION TO A MILD ENVIRONMENT												
7. QUALIFICATION TESTING OF EQUIPMENT IF PROGRESS												
8. OTHER (___SEE SPECIFIC EQUIPMENT ITEM IF CHECKED___)												
SCHEDULE FOR COMPLETION OF CORRECTIVE ACTION(S) HAS BEEN PROVIDED												

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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:

"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 environment 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 661 items of equipment which were assessed by the staff."

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

"In accordance with the requirements of NUREG-0588, Alabama Power Company has conducted a review of the Emergency Operating Procedures to verify that equipment utilized by the operator for accident mitigation and that could be subjected to the accident environment is adequately qualified to perform its function. This review has determined that the subject instruments are adequately qualified to perform their intended function. Component work sheets have been completed for required instrumentation in the harsh environment.

With reference to instruments which are not fully qualified for the environment resulting from a HELB inside containment, these were included in the EOP's solely as a source of additional information for the operator. These instruments could be deleted from the EOP's if qualification for HELB inside containment was the sole determining factor for incorporation. These instruments, should they fail, would not mislead the operator because operators are trained to take actions based on a combination of plant parameters rather than indication from a single instrument. In addition, as part of the human factors review conducted by the NRC in the

licensing of Farley 2, the EOP's were reviewed and approved by the NRC, taking into account the fact that in some cases non-qualified instrumentation was listed. A listing of these instruments with appropriate justification is provided in the following attachment."

It is concluded that the Licensee has provided a satisfactory response to the NRC concern. Refer to Appendix C of this TER for further details.

4.3.2 Containment Spray System

Section 3.2 of the NRC SER [4] identified the following concern:

"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 assumed, and requires the licensee to verify, that the containment spray system is not subjected to a disabling single-component failure and therefore satisfies the requirements of Section 4.2.1 of the DOR guidelines."

The Licensee did not respond to the NRC concern.

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:

	Max Temp (°F)	Max Press (psig)	Humidity (%)
LOCA	300	47.5	100
MSLB	381	44.8	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 temperature profile does not appear to fully envelop in all cases the saturation temperature profile recommended by the staff. The peak temperature and peak pressure conditions do not occur at the same time. The saturation temperature of 295°F at the pressure of 47.5 psig should be used instead. The licensee temperature of 272°F at 47.5 psig does not satisfy the above requirement. 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 either provide justification that the equipment will perform its intended function under the specified conditions or propose corrective action.

The licensee has provided the results of the analysis, which was performed based on the NUREG-0588, to predict the equipment surface temperature during the MSLB event. Furthermore, the licensee has also provided information to show that equipment qualification temperature is higher than expected equipment surface temperature during the MSLB event. However, the licensee has failed to list higher equipment surface temperature as the required temperature in the Component Evaluation Worksheets. The Licensee is requested to update the Component Evaluation Worksheets to reflect the higher equipment surface temperature expected due to the MSLB event as the required temperature."

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

"The containment pressure/temperature analysis and calculations of the equipment surface temperature in the harsh environment are performed using the Bechtel COPATTA computer program. COPATTA was derived from the COMTEMPT program written for the Loss-of-Fluid Test (LOFT) program. A detailed description of COPATTA is contained in Bechtel Topical Report BN-TOP-3, Revision 4, 'Performance and Sizing of Dry Pressure Containments.' This report has been reviewed and approved by the NRC.

The following discussion outlines the procedures used to model the temperature response of safety-related electrical equipment following a postulated main steam line break (MSLB). The methodology which is used to calculate the heat transfer rates to the surface of a component is taken from the NRC Interim Evaluation Model for Equipment Qualification, NUREG 0588. An outline of this methodology, which is programmed into the containment analysis code COPATTA, is given in section II.B.1. In section II.B.2 the modeling of a solenoid valve typical of those used in the Farley containment is shown to demonstrate the specific modeling techniques used.

II.B.1 METHODOLOGY FOR SAFETY RELATED COMPONENT THERMAL ANALYSIS IN SUPERHEATED CONTAINMENTS

Component thermal analyses may be performed to justify environmental qualification test conditions less than those calculated during the containment environmental response calculation. The thermal analysis

should be performed for the potential points of component failure such as thin cross-sections and temperature-sensitive parts where thermal stressing, temperature-related degradation, steam or chemical interaction at elevated temperatures, or other thermal effects could result in failure of the components electrically or mechanically. The heat transfer rate to components is calculated as follows:

a. Condensing heat transfer rate

$$q/A = h_{cd} \cdot (T_s - T_w)$$

where q/A = component surface heat flux

h_{cd} = the larger of 4x Tagami Correlation or 4x Uchida Correlation

T_s = saturation temperature (dew point)

T_w = component surface temperature.

Both the Uchida and Tagami Correlations are empirical condensing heat transfer relationships. The Uchida Correlation is based on the ratio of steam to air masses. The Tagami Correlation is based on the free containment volume and the ratio of instantaneous to maximum energy release rates.

b. Convective heat transfer

A convective heat transfer coefficient should be used when the condensing heat flux is calculated to be less than the convective heat flux. During the blowdown period, a forced convection heat transfer correlation is used. For example:

$$Nu = C\,(Re)^n$$

where Nu = Nusselt No.
Re = Reynolds No.
C,n = empirical constants dependent on geometry and Reynolds No.

The velocity used in the evaluation of Reynolds Number is determined as follows:

$$V = 25\,\frac{M_{BD}}{V_{CONT}}$$

where V = veolcity in ft/sec
M_{BD} = the blowdown rate in lbm/hr
V_{CONT} = containment volume in ft^3

After the blowdown has ceased or reduced to a negligibly low value, a natural convection heat transfer correlation is acceptable. However, use of a natural convection heat transfer coefficient must be fully justified whenever used ($h_{convection} = 2.0$).

II.B.2 COMPONENT MODELING

As an example of the modeling techniques used, the model of a three-way direct-acting solenoid valve manufactured by the Automatic Switch Company is presented in this section. This solenoid valve is typical of those in the Farley containment. Figure 1 [Figure 4-1 of this TER] shows several scaled views of the component including its internal construction. The critical region to be analyzed here is the upper housing, a four inch diameter circular cylinder, which contains the core assembly and coil used to energize the valve.

An implicit finite difference solution of the one-dimensional multi-region transient heat conduction equation is employed to determine the component's thermal response.

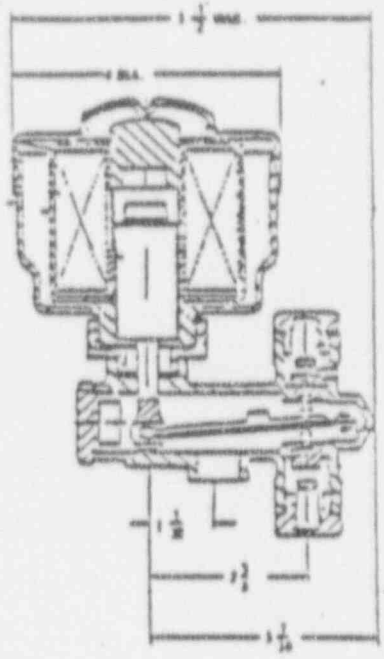
Mesh points, which define the length of nodes, are placed so that they lie on the external boundaries of the component, at the interface between materials, and at equal intervals between the interfaces and boundaries. The COPATTA computer code used for this analysis allows up to 20 material regions and 101 mesh points per component. A component is modeled, as appropriate, in a rectangular, a cylindrical, or a spherical geometry.

Figure 2 [Figure 4-2 of this TER] is a diagram of the valve, modeled as a cylinder with the center line on the left and the cylinder surface on the right. The material regions from left to right correspond to the steel core assembly with 15 nodes, the copper coil with 10 nodes, the steel coil housing with 10 nodes, the air gap separating the coil and housing with 40 nodes, and the painted steel upper housing with 15 nodes in the steel and 5 nodes in the paint.

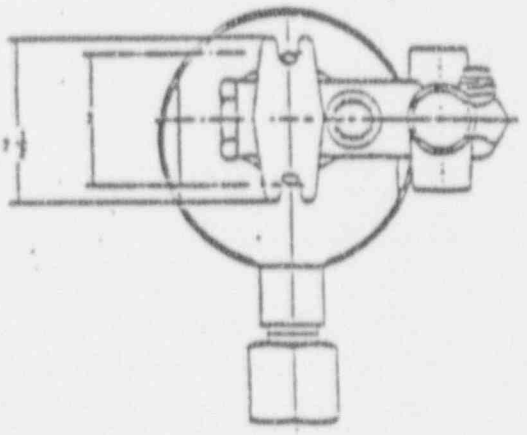
Typical thermal conductivities and volumetric heat capacities for each material are also given in Figure 2. The valves characteristic length of 2.75 inches, the height of the solenoid valve, is used in the calculation of the time dependent convective heat transfer coefficient described in section IIb. As the component is symmetrical, left side centerline boundary condition is insulated (no heat transfer). The right side surface is exposed to the containment MSLB atmosphere.

The component's temperature distribution is hence calculated by the COPATTA computer code for limiting MSLB transients. From this, the maximum surface temperature of the component can be identified and used to determined if a component is qualified for the MSLB environment.

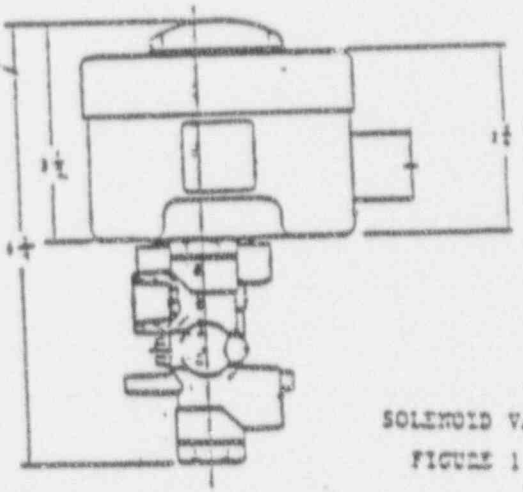
TER-C5257-518



SIDE VIEW
INTERNALS



BOTTOM VIEW



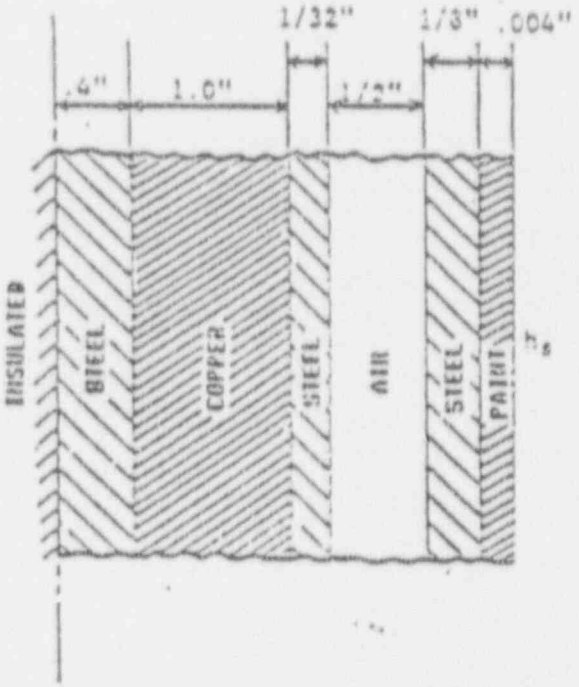
SIDE VIEW

FIGURE SUPPLIED BY THE LICENSEE

SOLENOID VALVE
FIGURE 1

Figure 4-1. Solenoid Valve (Licensee Figure 1)

MODELED AS CYLINDER



K_{PAINT} = 0.5 Btu/hr-ft-°F
C_{PAINT} = 31.2 Btu/ft^3-°F

K_{STEEL} = 29.5 Btu/hr-ft-°F
C_{STEEL} = 52.6 Btu/ft^3-°F

K_{AIR} = 0.017 Btu/hr-ft-°F
C_{AIR} = 0.0145 Btu/ft^3-°F

K_{COPPER} = 227. Btu/hr-ft-°F
C_{COPPER} = 51.0 Btu/ft^3-°F

FIGURE SUPPLIED BY THE LICENSEE

CHARACTERISTIC LENGTH = 2.75"

SOLENOID VALVE

FIGURE 2

Figure 4-2. Solenoid Valve (Licensee Figure 2)

Temperatures reported as qualification temperatures were in all cases the measured ambient temperature. However, analysis shows that for the qualification test steam envriornment, the equipment surface temperature and ambient temperature are essentially identical. Using the calculation methodology previously described the surface temperature was calculated as a function of autoclave temperature and time. For this analysis only 1x Uchida is used to conservatively calculate the heat transport to the modelled components.

The component's surface temperature approaches within 3°F of the ambient temperature in no more than about 200 seconds in a saturated steam environment. This is true of all the components types modelled. Since the qualification test procedure for all components maintained the temperature above the qualification temperature for a period of at least 20 to 240 minutes, we judge the components to be qualified.

Component Evaluation Worksheets will not be updated to reflect the higher equipment surface temperature expected due to the MSLB event. These higher temperatures have been reported in Table B.1-1."

The Licensee has responded to 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 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 5×10^7 rads to 1×10^8 rads. This value envelopes the minimum requirements of NUREG-0588 and is therefore acceptable.

The licensee has not provided the range of required values outside containment used to specify limiting radiation levels within the auxiliary building. These values must be provided, and they should consider the radiation levels influenced by the source term methodology associated with post-LOCA recirculation fluid lines. The licensee must

provide this range along with any corrections necessary for the associated summary sheets."

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

"The range of required values outside the containment used to specify limiting radiation levels within the auxiliary building has been provided previously in Section C.4 of the NUREG 0588 submittal. The source term methodology associated with post-LOCA recirculation fluid lines was used to establish dose rates and integrated doses for each affected component. The radiation qualification level of each component was then compared to the calculated dose."

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 2000 ppm boric acid solution; the exact volume percent used by the vendor for qualification testing should be verified by the licensee. Therefore, for the purpose of this review, the effects of chemical spray will be considered unresolved. 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]:

"In all cases the chemical spray portion of the equipment qualification tests utilized a boric acid solution concentration that meets or exceeds the Farley FSAR value of 2000 ppm boric acid. These concentrations are further delineated in Section III of this appendix."

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 values for maximum submergence are 115 ft 0 in. in the containment and 130 ft 5 in. in the main steam room. Equipment below these levels has been identified by the licensee, along with some justifications. The licensee identified 51 safety-related electrical components for Unit 2 as having the potential for becoming submerged after a postulated event.

In these instances, the licensee stated that the components in question perform their function before becoming submerged and are not required to operate after an HELB. In each of these cases, the licensee should provide an assessment of the failure modes associated with submergence. The licensee should also provide assurance that the subsequent failure of these components will not adversely affect any other safety functions or mislead an operator. Additionally, the licensee should discuss operating time, across the spectrum of events, in relation to the time of submergence. If the results of the licensee's assessment are acceptable, then these components may be exempt from the submergence parameter of qualification."

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

"Of the 51 safety related electrical components previously identified as having a potential for becoming submerged after a postulated event, all but 13 have been relocated above the flood level. These thirteen components are located in the containment, and include motor operated valves, solenoid valves and limit switches. In all cases, they will have performed their safety function before becoming submerged. Refer to Table II.C-1 for a comparison of operating time vs. submergence time. A failure mode and effects analysis for the three types of components is also provided.

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

TABLE II.C-1

Component	El.	Time to Function	Time to Submergence
Q2E21ZS8149A	111'	30 sec.	1260 sec.
Q2E21ZS8149B	111'	30 sec.	1260 sec.
Q2E21ZS8149C	111'	30 sec.	1260 sec.
Q2E21V038A (MOV8808A)	111'-6"	30 sec.	1390 sec.
Q2E21V038B (MOV8808B)	112'-6"	30 sec.	1660 sec.
Q2E21V038C (MOV8808C)	113'-6"	30 sec.	1950 sec.

TABLE II.C-1 (Cont.)

Component	El.	Time to Function	Time to Submergence
N2G21SV1003B	110'	30 sec.	983 sec.
N2G21ZS1003B	110'	30 sec.	983 sec.
N2G21ZS3376	109'	30 sec.	714 sec.
N2G6215V3376	109'	30 sec.	714 sec.
Q2E21SV8149AB	111'	30 sec.	1260 sec.
Q2E21SV8149BB	111'	30 sec.	1260 sec.
Q2E21SV8149CB	111'	30 sec.	1260 sec."

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:

"NUREG-0588 Category II delineates two aging program requirements. Valve operators committed to IEEE Standard 382-1972 and motors committed to IEEE Standard 334-1971 must meet the Category I requirements of the NUREG. This requires the establishment of a qualified life, with maintenance/replacement schedules based on the findings. All other equipment must be subjected to an aging program which identifies aging-susceptible materials within the components. Additionally, the staff requires that the licensee

(1) establish an ongoing program to review surveillance and maintenance records to identify potential age-related degradations;

(2) 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 example, 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.

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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 enviornments.

The licen[illegible] indicate[illegible] that this phase of the response is outstanding and that the [illegible]ew is in progress. The staff will review the licensee's response wh[illegible] it is submitted and discuss its evaluation in a supplemental report."

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

"The safe[illegible]y-related valve operators and motors have been qualified by testing to meet the requirements of IEEE 382-1972 and IEEE-33[illegible]-1971 respectively. For this equipment, the requirements of NUREG 0588, Category I, Section 4 have been met.

For other equipment covered by the response to NUREG 0588 where artificial (accelerated) aging methods were employed to demonstrate qualified life, the methodology in documented form has been extracted and condensed, and is presented in Section III for each type of equipment.

Where qualified life is demonstrated by methods other than accelerated aging, the methodology, together with appropriate justification for its use has been provided.

For equipment with no aging credentials, a qualified life has been established using analytical methodology based on Arrhenius models, which is acceptable to the staff. 'Weak link' age susceptible materials have been identified, and used as the basis for establishing qualified life of the equipment. Alabama Power Company will evaluate and review current surveillance and maintenance programs for possible modification for monitoring or potential age-related degradation and replacement schedules."

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 :
: TABLE 2 :
****

FRC ITEM NO.	COMPONENT	MANUFACTURER	MODEL NUMBER	LOCATION
1	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SMB; SIZES 1,4%	MAIN STEAM ROOM, ELEV. 133'5"
2	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SMB4	CONTAINMENT, ELEV. 113'6"
3	MOTORIZED VALVE ACTUATOR	LIMITORQUE	SMB; SIZES 00,000	CONTAINMENT, ELEV. 126'6"
4	SOLENOID VALVE	ASCO	HP SERIES	CONTAINMENT, ELEV. 116'0"
5	SOLENOID VALVE	ASCO	HP SERIES	MAIN STEAM ROOM, ELEV. 135'0"
6	SOLENOID VALVE	TARGET ROCK	79A8001	CONTAINMENT
7	SOLENOID VALVE	AUTOMATIC VALVE	C5439	CONTAINMENT, ELEV. 89'4"
8	SOLENOID VALVE	ASCO	HP SERIES	CONTAINMENT, ELEV. 129'0"
9	SOLENOID VALVE	ASCO	HT8320A22V	CONTAINMENT
10	SOLENOID VALVE	ASCO	HV20638140	AUXILIARY BUILDING, ELEV. 121'0"
11	HYDROGEN RECOMBINER	WESTINGHOUSE	TYPE A	CONTAINMENT, ELEV. 155'0"
12	ELECTRIC MOTOR	JOY MANUFACTURING	TYPE B	CONTAINMENT, ELEV. 155'0"
13	RTD	ROSEMOUNT	176RS	CONTAINMENT, ELEV. 122'9"
14	RTD	ROSEMOUNT	176RF	CONTAINMENT, ELEV. 124'0"
15	RADIATION DETECTOR	VICTOREEN	8771	CONTAINMENT, ELEV. 155'0"
16	PRESSURE TRANSMITTER	BARTON	763 (LOT 2)	CONTAINMENT, ELEV. 116'0"
17	PRESSURE TRANSMITTER	BARTON	764 (LOT 2)	CONTAINMENT, ELEV. 116'0"
18	LEVEL SWITCH	DE LAVAL	LS36497	MAIN STEAM ROOM, ELEV. 133'5"
19	LEVEL SENSOR	DE LAVAL	XM54854323	CONTAINMENT, ELEV. 80'0"
20	LEVEL TRANSMITTER	DE LAVAL	XM36495	CONTAINMENT, ELEV. 116'0"
21	LEVEL TRANSMITTER	BARTON	764 (LOT 2)	CONTAINMENT, ELEV. 116'0"
22	FLOW TRANSMITTER	BARTON	764 (LOT 2)	CONTAINMENT, ELEV. 121'0"
23	LIMIT SWITCH	NAMCO	EA180	AUXILIARY BUILDING, ELEV. 121'0"
24	LIMIT SWITCH	NAMCO	EA180	MAIN STEAM ROOM, ELEV. 131'7"
25	LIMIT SWITCH	NAMCO	EA180	CONTAINMENT, ELEV. 118'0" & ABOVE
26	LIMIT SWITCH	NAMCO	EA180	CONTAINMENT, ELEV. 104'0"
27	LIMIT SWITCH	NAMCO	EA180	CONTAINMENT
28	ELECTRICAL PENETRATION	GENERAL ELECTRIC	100 SERIES	CONTAINMENT
29	ELECTRICAL PENETRATION	GENERAL ELECTRIC	100 SERIES	CONTAINMENT, ELEV. 143'0"
30	TERMINAL BLOCK	STATES	TYPE ZNM	AUXILIARY BUILDING, ELEV. 121'0"
31	TERMINAL BLOCK	STATES	TYPE ZNM	CONTAINMENT
32	TERMINAL BLOCK	STATES	TYPE ZNM	MAIN STEAM ROOM, ELEV. 144'0"
33	TERMINAL BLOCK	STATES	TYPE ZNM	CONTAINMENT, ELEV. 135'9"
34	ELECTRICAL CABLE, INSTRUMENT	NOSTON INSULATED WIRE	LSS1802	MAIN STEAM ROOM, ELEV. 135'0" & ABO
35	ELECTRICAL CABLE, INSTRUMENT	NOSTON INSULATED WIRE	LSS1802	MAIN STEAM, ELEV. 116'0"
36	ELECTRICAL CABLE, INSTRUMENT	NOSTON INSULATED WIRE	LSS1802	CONTAINMENT, ELEV. 121'0"
37	ELECTRICAL CABLE, INSTRUMENT	NOSTON INSULATED WIRE	LSS1802	CONTAINMENT, ELEV. 122'9"
38	ELECTRICAL CABLE, CONTROL	[illegible]	NO	AUXILIARY BUILDING, ELEV. 121'0"
39	ELECTRICAL CABLE, CONTROL	[illegible]	NO	MAIN STEAM ROOM, ELEV. 135'0"
40	ELECTRICAL CABLE, CONTROL	[illegible]	NO	CONTAINMENT
41	ELECTRICAL CABLE, CONTROL	[illegible]	NO	CONTAINMENT, ELEV. 118'0"

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FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

EQUIPMENT ITEM NO. 1
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM ROOM, ELEV. 137'5"
LIMITORQUE MODEL SMB; SIZES 1, 4T
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 1
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3232A, B, C; (Q2N21V001A-B, B-B, C-B))
SERVICE: FEEDWATER SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.2 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3350A, B, C; (Q2N23V001A, B, C))
SERVICE: AUXILIARY FEEDWATER
LICENSEE SUBMITTAL: SCEW(S): C.2.16.3 [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:

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. 577

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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 O: 'PMENT ITEM NO. 1

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS	DESIGNATION: X = DEFICIENCY
Documented Evidence of Qualification Adequate	X
Adequate Similarity Between Equipment and Test Specimen Established	X
Aging Degradation Evaluated Adequately	X
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. 1

COMPONENT: MOV's - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the motor operated valves to meet the requirements of IEEE 382-72. Arrhenius techniques were used to establish a qualified life. Based on this methodology, qualified life of 40 years was established

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

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

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION Equipment Type	MVA	MOTORIZED VALVE ACTUATOR	
Manufacturer's Name (5.2.2/-/-)	LIMITORQUE	LIMITORQUE	
Model Number (5.2.2/-/-)	SMB; SIZES 1, 4T	SMB-0	
Serial Number	NOT STATED	189835(O/N 600456-A)	NOTE A
Features/Mounting (5.2.6/-/-)	NOT STATED	RELIANCE CLASS RH INSUL. MOTOR, ID# 2Y267074A1IZ, TYPE P	X - NOTE B
Connections/Interfaces (5.2.6/-/-)	NOT STATED	CONTROL & POWER LEADS THRU FLEXIBLE, PRESSURE-TIGHT CONDUIT	NOTE B
Location/Elevation	MAIN STEAM ROOM/EL 131'-0"	AUTOCLAVE	
Equipment ID No.	See Pg. 1a	———	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	———	600456	
Report Date	———	751201	
Issued by	———	LIMITORQUE	
Prepared for	———	LIMITORQUE	
Referenced Reports	———	LOCKHEED 3521-4811	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	———	SIMULTANEOUS AND SEQUENTIAL TEST	-
QUALIFICATION TEST PROGRAM Function and Description (5.2.5/2.2.9)	———	VALVE ACTUATION AND IR MEASUREMENTS	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	40 ft-#/460 Volts/60 Hz	NOTE B

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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)	—	SUCCESSFUL OPERATION OF THE MVA	
Accuracy (5.2.5/-/-)	—	—	
Number of Specimens	—	1 COMPLETE MVA AND 1 ADDITIONAL MOTOR	
Test Instruments Calibrated	—	YES	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	ACTIVE	—	
Test Duration (5.2.1/-/-)	—	30 DAYS	NOTE C
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	Few Seconds	—	NOTE C
Required Function Time	1 hour (max.)	—	NOTE C
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	—	—	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	—	—	
1. Representative Sample		—	
2. Baseline Data		—	
3. Performance Extremes		—	
4. Thermal Aging		YES	
5. Radiation Aging		YES	
6. Wear Aging		YES	
7. Vibration/Seismic		YES	
[illegible] Exposure		YES	
9. Post-DBE Exposure		YES	
10. Inspection		YES	
Aging (5.2.4, 7.0/4.0/4.0) Thermal Aging/Basis	104°F (MAX.)* for 40 years Design	100 HOURS @ 180 C FOR THE MOTOR STATORS ONLY NO BASIS	X - NOTE D
Material Aging Evaluation (7.0/-/-)	NONE	NO	NOTE D
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	—	NOT STATED	
Radiation Aging, Type + Accum.	NONE	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)	———	4 Mrd (COMPLETE UNIT)	
Radiation Aging, Dose Rate	———	1 Mrd/Hr	
Radiation Aging, Method	———	TEST (SEQUENTIAL)	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	———	NOT STATED	
Operational Aging (-/4.2/-)	———	1208 OPEN/CLOSE CYCLES+ 803 (LOCA+POST-LOCA) CYCLES + 2184 CYCLES OF MVA WITH BASE TEST MOTOR INSTALLED	
Other Age Conditioning (-/4.2/-)	———	SEISMIC/VIBRATIONAL	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 years/ NONE	NONE	X - NOTE D
Normal Ambient Temperature *	104°F	———	
Normal Ambient Radiation	———	———	
Normal Ambient Humidity *	20-90%	———	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	yes	———	
On-Going Analysis of Failures and Degradation (7.0/-/-)	yes	———	
Margin (General) (6.0/3.0/3.0)	———	———	
Margin (NUREG-0588, Cat. I) (-/3.2/-)		NOT STATED, EXCEPT FOR THE POST-LOCA ADDITIONAL MVA CYCLING	
1. Temperature (+15°F)		———	
2. Pressure (+10%, 10 psig max)		———	
3. Radiation (not required)		———	
4. Time (+10%, +1 hour + function time minimum)		———	

* Assumed

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NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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)	HELB	LOCA	
Radiation Type	NONE	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)		200 Mrd	
Radiation Dose Rate (rd/hr)		1 Mrd/Hr	
Radiation Qual. Method (5.3.1/-/-)		TEST	
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/-/-)		204 Mrd TOTAL DOSE	
Plateout Dose Considered (-/1.48/1.48)		———	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		———	

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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	1000°F/sec; ≈ 50psi/sec. for 0.2 sec	10F/SEC., 2.5 psig/SEC.	
Peak: °F/psig/RH/Time	388/58/100/ ≈ 2 sec.	310/78/100/30 min.	2 PEAKS, NOTE C
Decrease To: °F/psig/RH/Time	214/0/100/ Greater Than 2 sec	255/30/100/91 hours	
Decrease To: °F/psig/RH/Time		195/10/100/423 hours	
Decrease To: °F/psig/RH/Time		COOL TO AMBIENT	
Equipment Surface Temperature (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)	N/A	TEST PER IEEE-323-1974	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	↓	3000 PPM BORON(0.28 molar H_3BO_3),0.064 molar $Na_2S_2O_3$ NaOH to pH of 10.5 @ 77F	
Spray Density (gpm/ft^2)	↓	1.2 gpm	
Spray Duration	↓	24 hours (ASSUMED)	
Submergence Duration (4.1.3/2.2.5/2.2.5)	NONE	—	
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. 1

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).

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.

____ 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:

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

NOTES:

A. The licensee has not provided any serial and/or order number(s) on the System Component Evaluation Worksheets (SCEWs) for this equipment item.

B. The licensee has not fully identified the installed equipment (see page 5f) to the point where similarity to the test specimen can be established, nor has the licensee provided documentation from the manufacturer (Limitorque) which would establish similarity via their records.

C. The test profile and simulated accident conditions envelop the required conditions adequately. The test duration also envelopes the required accident duration.

D. The thermal aging performed in PGR #706 was limited to the thermal aging of the motor stator only. Nowhere in PGR #706 was it stated or implied that the thermal aging that was performed on the motor stator used the Arrhenius technique (or any acceptable method) as the basis for the thermal aging times and temperatures that were chosen. No additional information has been supplied by the licensee which would justify or support the claim of a 40 year qualified life. No additional features (motor-brake assemblies, type of torque or limit switch ...) have been identified, nor have any of the materials of construction been identified (i.e. teflon lead wire insulation...). In order to calculate a conservative qualified life estimate, the installed equipment, including all components and materials of construction, must be identified and analyzed.

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FRC Task No. 513

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1

NOTES:

CONCLUSION:

This equipment item is assigned to NRC Qualification Category II.a — Qualification Not Established because similarity between the installed and tested equipment has not been established by the licensee. If similarity can be established, then thermal aging/qualfied life remains as the only issue to be resolved.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

EQUIPMENT ITEM NO. 2
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 111'6"
LIMITORQUE MODEL SMB4
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 2
LICENSEE REFERENCE(S): 695, 1590
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV8088A, B, C; (Q2E21V038A, B, C))
SERVICE: CVCS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.4 [5]

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

R, T, QV, RT, P, H, (CS) (A) (S) (R), M, I, QM, RPN, EQN, 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 Project No. C5257
FRC Assignment No. 13
FRC Task No. 579

PAGE

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITE

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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 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 _____)

X 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 - 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. 3

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)	
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		DESIGN X = CA
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	

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Page 3a

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

COMPONENT: MOV's - INSIDE CONTAINMENT

NRC DEFICIENCY	APCs RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the motor operated valves to meet the requirements of IEEE 382-72. Arrhenius techniques were used to establish a qualified life. Based on this methodology, qualified life of 40 years was established.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm (Reference: Limitorque Report 600556). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of MOV's inside the containment subject to submergence, refer to Appendix 4, Section II.C.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 2

LICENSEE RESPONSE TO NRC SER (Continued)

SUBMERGENCE OF MOV 8808 A, B, C

LOCATION AND SAFETY FUNCTION

MOV's 8808 A, B, and C are located inside containment in the accumulator injection lines.

MOV's 8808 A, B, and C are required per technical specification to be open whenever the plant is in the power operation, startup, or hot standby (above 1000 psig) mode of operation. Under these modes, power to the valve control circuits is required to be disconnected. If an isolation valve is closed, technical specifications require the valve to be immediately opened or the plant to be in hot standby within 1 hour and hot shutdown within the next 8 hours. These valves receive a confirmatory safety injection signal to automatically open the valves should they be closed within technical specification limits.

The safety function of MOV's 8808 A, B, and C is to be in the open position during the injection phase of post-LOCA operation. The technical specifications, power lockout, and confirmatory safety injection signal features ensure that these valves are not mispositioned during the injection phase of post-LOCA operation. Once open, no further mechanical movement of MOV's 8808 A, B, and C is required to accomplish a post-LOCA safety function.

The motor operators for MOV's 8808 A, B, and C are located approximately 6 feet above floor level inside containment. Therefore, submergence of the motor operators can occur following a design basis accident. The following failure mode analysis and justification have been developed assuming submergence and is a conservative approach.

FAILURE MODE ANALYSIS

The failure modes to be identified are those which could cause the valve to go closed prior to the pressurized injection of the accumulator into the reactor coolant system. This single mode needs to be identified because the valves are normally opened and the control power disconnected.

The circuit to be analyzed is shown on Figure II.C.-1 and operates as follows. The valve motor is operated by the application of 575 Vac power to the motor terminals by standard reversing contactors. The contactors are controlled by a remote switch. Switch closure applies control power to the contactor coil causing the contactors to energize the valve motor and seal itself in until the valve has completed its travel. At this point, limit or torque switches located at the valve, interrupt the seal-in, de-energize the contactor coil and thereby remove power from the valve motor. Control circuits are transformer isolated and ungrounded. Furthermore, when the contactor is de-energized, only one leg of the control circuit is directly exposed to the containment. The other

LICENSEE RESPONSE TO NRC SER (Continued)

FAILURE MODE ANALYSIS (CONT.)

the control switch or by position indication lights.

Two circuits need to be analyzed for failures: the power circuit and the control circuit. The power feed to the motor is de-energized immediately after valve closure and remains de-energized throughout the submergence period. Therefore, submergence has no direct impact on the power circuit.

The control circuit is shown on Figure 17.C-1. The multiplicity limit switches LS1-LS5 and the torque switches TS1-TS2 are the only components in the control circuit that could be submerged. The question to be analyzed is whether the open valve can be spuriously moved to the closed position by submergence. LS1, LS2, LS3 and TS1 need not be addressed because they are located in the open circuit, and their status cannot cause closing of the valve. Short circuits need not be addressed for LS4 and LS5 because these switches are already closed when the valve is open.

The effect of a short circuit on limit switches, while the valve is open, would be erroneous valve position indicating only. This is the only result of a short circuit caused by submergence.

Ground path circuits need not be addressed because the closing contactor coil is open-circuited by a control switch contact.

From the foregoing analysis, the only undesired result that needs to be addressed further is the possible erroneous lighting of the indicating lights.

JUSTIFICATION FOR OPERATION

With the failure analysis conclusions indicated above safe and reliable operation can be assured for the following reasons. When in the power operation, startup, and hot standby modes, valves 8808 A, B, and C are open and no mechanical operation is required. Inadvertent closure as a result of submergence is not possible since control power is disconnected.

Should a valve be closed during the power operation, startup or hot standby mode of operation, any closed valve will open upon receipt of a safety injection signal. For a LOCA, the water level in containment will not rise above the operator prior to completion of valve opening.

Once opened, no further mechanical movement of the valves is required following a LOCA. Note that associated limit switches may give an incorrect valve position indication when submerged. This incorrect position indication is acceptable since the operator is trained to utilize a combination of plant parameters rather than indication from a single instrument. With the exception of submergence, the MOV's 8808 A, B, and C are environmentally qualified. The matter of submergence has been addressed here in sufficient depth to demonstrate that the safety related position of the valves will not be compromised.

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Job No. 7597-03/20

Electrical Correspondence

E-91 Environmental Qualifications

Southern Company Services Letter dated Feb. 16, 1983

Attachment - Page 3d

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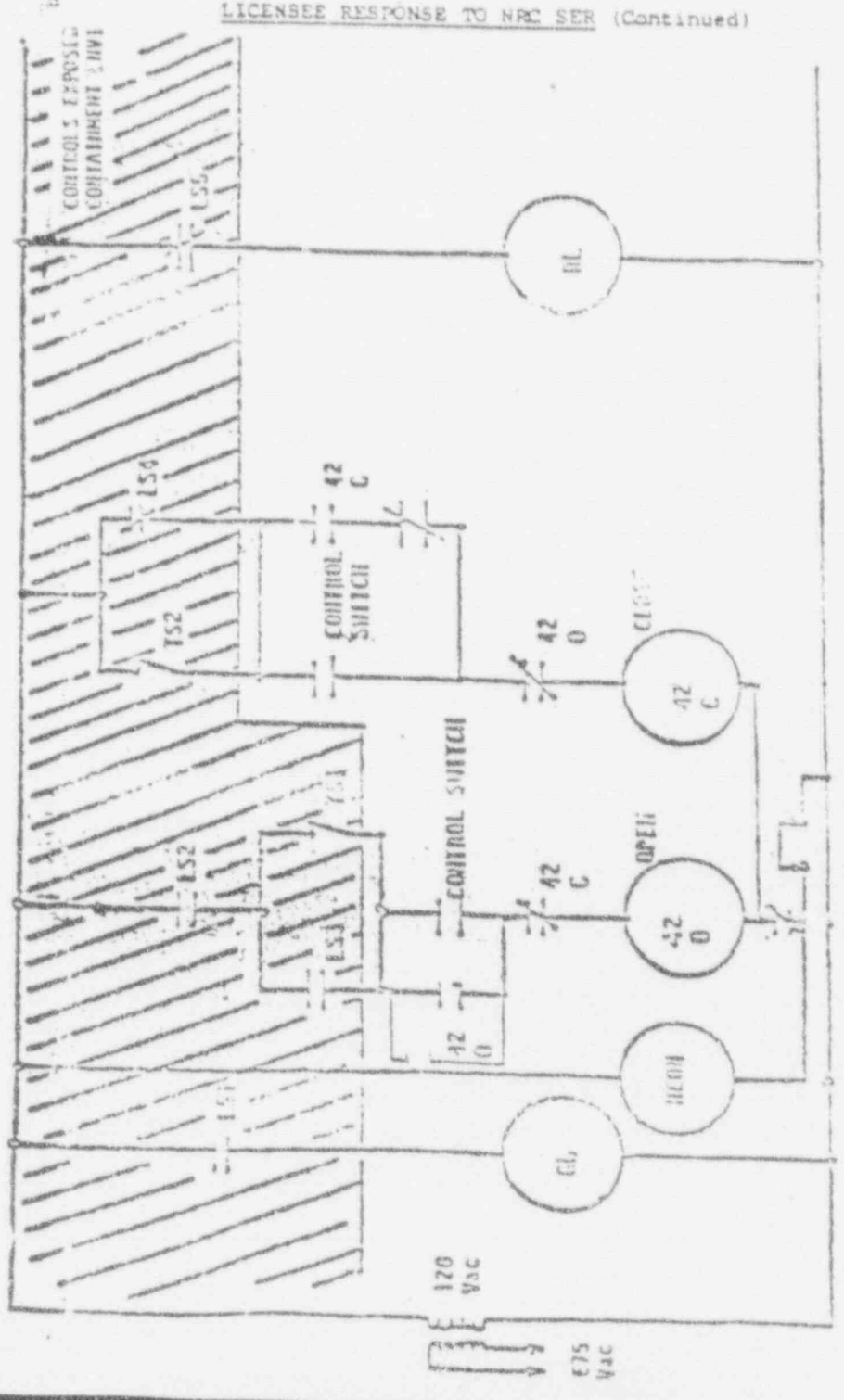
FRC Assignment No. 13
FRC Task No. 5/8

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

LICENSEE RESPONSE TO NRC SER (Continued)



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

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. 2

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)

X Other (see page 4b)

X Resultant NRC Qualification Evaluation Category (IIIa/~~IIIb~~)

X 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 3c)

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 evaluate an ESF system is performing the intended safety function.

___ The rationale presented by the Licensee is not supported by objective technical evidence.

___ Other (see page ___)

LICENSEE STATEMENT

See page 3e of this checksheet.

EVALUATION OF LICENSEE STATEMENT

This equipment is locked open with power removed during power operation. It is locked in its safety position and does not have to operate to perform its safety function.

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ITEM NO. 3
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 126'6"
LIMITORQUE MODEL SMB; SIZES 00, 000
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 3
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3660, MOV3318B; (Q2E14V002, 004))
SERVICE: CONTAINMENT COOLING
LICENSEE SUBMITTAL: SCEW(S): C.2.6.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV8112 (Q2E21V249A))
SERVICE: CVCS/SAFETY INJECTION
LICENSEE SUBMITTAL: SCEW(S): C.2.9.7 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3872A, B (Q2E22V001A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3536 (Q2E23V021))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3530 (Q2E23V003))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.4 [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, EQN, SEN, QI, RPS, None, Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a1, 1a2
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. 3

EQUIPMENT ITEM NO. 3 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3528A, B, C, D (Q2E23V022A, B, C, D))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3835A, B (Q2E23V025A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3441A, B, C, D (Q2P16V207A, B, C, D))
SERVICE: WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3121 (Q2P17V097))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3046 (Q2P17V097))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.20.2 [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, UM, RFN, EXN, SEN, QI, RFS, None, Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a
Summary of Licensee Response to the NRC SER	1b
Equipment Environmental Qualification Summary Form	2
Licensee Response to NRC SER	3a, 3b, 3c, [illegible]
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. 3

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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 leve
___ 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. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

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	

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

COMPONENT: MOV's - INSIDE CONTAINMENT

NRC DEFICIENCY	APCs RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the motor operated valves to meet the requirements of IEEE 382-72. Arrhenius techniques were used to establish a qualified life. Based on this methodology, qualified life of 40 years was established.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm (Reference: Limitorque Report 60[illegible]). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of MOV's inside the containment subject to submergence, refer to Appendix A, Section II.C.

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FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 578

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

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

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION Equipment Type	MVA	MOTORIZED VALVE ACTUATOR	
Manufacturer's Name (5.2.2/-/-)	LIMITORQUE	LIMITORQUE	
Model Number (5.2.2/-/-)	SMB, SIZES 00, 000	SMB-0	
Serial Number	NOT STATED	189635(O/N 600456-A)	NOTE A
Features/Mounting (5.2.6/-/-)	NOT STATED	RELIANCE CLASS RH INSUL. MOTOR, ID# ZY267074A1EZ, TYPE P	X-NOTE B
Connections/Interfaces (5.2.6/-/-)	NOT STATED	CONTROL & POWER LEADS THRU FLEXIBLE, PRESSURE-TIGHT CONDUIT	NOTE B
Location/Elevation	CONTAINMENT Elev. 134'-6" & 116'-0"	AUTOCLAVE	
Equipment ID No.	See Pg. 1a	———	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	———	600456	
Report Date	———	751201	
Issued by	———	LIMITORQUE	
Prepared for	———	LIMITORQUE	
Referenced Reports	———	LOCKHEED 3521-4811	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	———	SIMULTANEOUS AND SEQUENTIAL TEST	-
QUALIFICATION TEST PROGRAM Functional Test Description (5.2.5/2.2.9/2.2.9)	———	VALVE ACTUATION AND IR MEASUREMENTS	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	40 ft-#/460 Volts/60 Hz	NOTE B

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FRC Assignment No. 13
FRC Task No. 518

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)	—	SUCCESSFUL OPERATION OF THE MVA	
Accuracy (5.2.5/-/-)	—	—	
Number of Specimens	—	1 COMPLETE MVA AND 1 ADDITIONAL MOTOR	
Test Instruments Calibrated	—	YES	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	ACTIVE	—	
Test Duration (5.2.1/-/-)	—	30 DAYS	NOTE C
Accident Duration (Envir. Above Normal) (5.2.1/-/-)		—	
Required Function Time	1 hour (max.)	—	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	—	—	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	—	—	
1. Representative Sample		—	
2. Baseline Data		—	
3. Performance Extremes		—	
4. Thermal Aging		YES	
5. Radiation Aging		YES	
6. Wear Aging		YES	
7. Vibration/Seismic		YES	
8. DBE Exposure		YES	
9. Post-DBE Exposure		YES	
10. Inspection		YES	
Aging (5.2.4, 7.0/4.0/4.0) Thermal Aging/Basis	136°F (max.) for 40 yrs. Design #	100 HOURS @ 180 C FOR THE MOTOR STATORS ONLY No BASIS	X - NOTE D
Material Aging Evaluation (7.0/-/-)	NONE	NO	NOTE D
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	—	NOT STATED	
Radiation Aging, Type	IN. ACC. DOSE	GAMMA	

Assumed

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NRC Contract No. NRC-03-79-118
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FRC Task No. 518

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)	—	4 Mrd (COMPLETE UNIT)	
Radiation Aging, Dose Rate	—	1 Mrd/Hr	
Radiation Aging, Method	—	TEST (SEQUENTIAL)	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	—	NOT STATED	
Operational Aging (-/4.2/-)	—	1208 OPEN/CLOSE CYCLES+ 803 (LOCA+POST-LOCA) CYCLES + 2184 CYCLES OF MVA WITH BASE TEST MOTOR INSTALLED	
Other Age Conditioning (-/4.2/-)	—	SEISMIC/VIBRATIONAL	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 years/ NONE	NONE	X-NOTED
Normal Ambient Temperature*	135°F	—	
Normal Ambient Radiation	—	—	
Normal Ambient Humidity*	70-90%	—	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	yes	—	
On-Going Analysis of Failures and Degradation (7.0/-/-)	yes	—	
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)		NOT STATED, EXCEPT FOR THE POST-LOCA ADDITIONAL MVA CYCLING	

* Assumed

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (Y OR NOTE NO.)
ACCIDENT CONDITIONS			
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	GAMMA	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.6)	5.0E07rd	200 Mrd	
Radiation Dose Rate (rd/hr)	—	1 Mrd/Hr	
Radiation Qual. Method (5.3.1/-/-)	—	TEST	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	NOT STATED	—	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	—	—	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	5.0E07rd	204 Mrd TOTAL DOSE	
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. 3

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	36°F/sec.; 1.1 psi/sec	10F/SEC., 2.5 psig/SEC.	
Peak: °F/psig/RH/Time	300/47.5/100/ 2 minutes	310/78/100/30 min.	2 PEAKS, NOTE C
Decrease To: °F/psig/RH/Time	260/25/100/ 10 min.	255/30/100/91 hours	
Decrease To: °F/psig/RH/Time	180/12/100/ 8 hour	195/10/100/423 hours	
Decrease To: °F/psig/RH/Time	drop to AMBIENT WILSTD	COOL TO AMBIENT	
Equipment Surface Temperature (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 PER IEEE-323-1974	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	H_3BO_3 plus NaOH	3000 PPM BORON(0.28 molar H_3BO_3),0.064 molar $Na_2S_2O_3$ NaOH to pH of 10.5 @ 77F	NOTE C
Spray Density (gpm/ft^2)	NOT STATED	1.2 gpm	
Spray Duration	NOT STATED	24 hours (ASSUMED)	
Submergence Duration (4.1.3/2.2.5/2.2.5)	NONE	—	
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. 3

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).

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.

____ 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. 3

NOTES:

A. The licensee has not provided any serial and/or order number(s) on the System Component Evaluation Worksheets (SCEWs) for this equipment item.

B. The licensee has not fully identified the installed equipment (see page 5f) to the point where similarity to the test specimen can be established, nor has the licensee provided documentation from the manufacturer (Limitorque) which would establish similarity via their records.

C. The test profile and simulated accident conditions envelop the required conditions adequately. The test duration also envelopes the required accident duration.

D. The thermal aging performed in PGR #706 was limited to the thermal aging of the motor stator only. Nowhere in PGR #706 was it stated or implied that the thermal aging that was performed on the motor stator used the Arrhenius technique (or any acceptable method) as the basis for the thermal aging times and temperatures that were chosen. No additional information has been supplied by the licensee which would justify or support the claim of a 40 year qualified life. No additional features (motor-brake assemblies, type of torque or limit switch ...) have been identified, nor have any of the materials of construction been identified (i.e. teflon lead wire insulation...). In order to calculate a conservative qualified life estimate, the installed equipment, including all components and materials of construction, must be identified and analyzed.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 3

NOTES:

CONCLUSION:

This equipment item is assigned to NRC Qualification Categ.. II.a — Qualification Not Established because similarity between the installed and tested equipment has not been established by the licensee. If similarity can be established, then thermal aging/qualfied life remains as the only issue to be resolved.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

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EQUIPMENT ITEM NO. 4
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 110'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 4
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2E21SV8149AB, BB, CB)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.8 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N2G21SV1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.4 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2G21SV3376)
LICENSEE SUBMITTAL: SCEW'S): C.2.12.2 [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, E, (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 Response 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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Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

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

X 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.

X 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. 4

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)	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	X
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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Bechtel Power Corporation

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Job No. 7597-03/20

Electrical Correspondence

E-91 Environmental Qualifications

Southern Company Services Letter Dated 2-16-83

LSF-NS-1772 attachment sheets 3a & 3b

Document No. and/or Description

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LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	APC RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement). See Page 3a
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm (Reference: ASCO Test Report ASC 21678/TR). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix A, Section 11.C.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified.

(a) Temperature - The 340°F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated.

(b) Pressure - The 110 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia.

(c) Radiation - The 5×10^8 rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 5×10^4 rads. Therefore adequate margin exists.

0 5 5 7 1 0 3 8

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LICENSEE RESPONSE TO NRC SER (Continued)

ASCO SOLENOID VALVES

LOCATION AND SAFETY FUNCTION

The ASCO solenoid valves located inside containment are used in the air supply lines of several isolation valves. Their safety function is to go to the vent position following the de-energization of the solenoid. This permits the air to be vented from the operator of the air operated isolation valve and the valve to go to its fail safe position (closed) following a LOCA or MSLB inside containment. The solenoid is de-energized upon generation of a safety actuation signal.

FAILURE MODE ANALYSIS

A failure mode and effects analysis shows that for each failure mode two initial conditions for the associated coil must be considered: Solenoid initially energized and solenoid initially de-energized.
With the solenoid initially energized, coil failures will affect the solenoid and air-operated valves as follows. If the coil fails open circuited the solenoid will be de-energized and cause the associated air-operated valve to go to its fail safe position (closed) and need not be considered further as this is the required safety position. A failure resulting in a single ground would have no effect on the battery supply which is ungrounded. A short circuit would at most result in the trip of the circuit breaker that feeds the solenoid. This failure would de-energized the solenoid resulting in the associated air-operated valve going to its fail safe position (closed). If the solenoid is initially de-energized it will be due to any of three possible conditions, not including the coil failure itself. These three conditions are (1) loss of power, (2) control switch failed open or held continuously in CLOSE position, and (3) containment isolation signal. For the three above mentioned conditions, coil failure has no effect on the solenoid.

JUSTIFICATION FOR OPERATION

The coil de-energizing and the valve going to its fail safe position (closed) is the action that would be accomplished if the solenoid coil does fail since the containment isolation signal de-energizes the coil.
These components identified in the NUREG-0588 response as located below maximum containment flood level all perform their safety related function in

in the first 30 seconds of the DLA. The most conservative analysis for rate of rise in the containment is to assume RCS and Accumulators volumes are instantaneously dumped to the dome followed by immediate maximum ESF flows. The component located lowest in containment which is covered in our response to NUREG-0588 is located at elevation [illegible]. This component will not be submerged for the seconds under the most conservative assumptions. (Refer Table [illegible]).

LICENSEE RESPONSE TO NRC SER (Continued)

4. Name: ASCo

Model No.: NP-1 Series, 206-Series

Instrument: Solenoid Valve

Location: Containment and Main Steam Room

Results of Projection

Type test associated thermal and radiation aging techniques and accident analysis using a conservative approximation to the Arrhenius model have established a qualified life for these solenoids. The solenoids are used inside and outside the containment and, for both locations, have a qualified life beyond June 30, 1981 and for at least the next few refueling outages. A new test report has indicated an electrical component of these solenoids is not recommended for operation under the more limiting radiation aging conditions where the solenoids may be required to shift position following exposure to a total gamma radiation dose in excess of 20 megarads. APCo has completed an evaluation of the operational requirements of the solenoids containing this electrical component. APCo has determined the solenoids would have completed their position shifts before receiving an exposure to a dose in excess of 20 megarads or would not be required to shift in order to bring the plant to a safe shutdown condition. Therefore, the electrical component has been determined as acceptable for the harsh environmental conditions at Fermi-Unit 2.

APCo Position:

Surveillance and maintenance procedures are being implemented which reflect the results of the above evaluations, and will verify the continuing qualified service of the instruments throughout the life of the plant. The reactor is completing a material analysis in an attempt to further extend the qualified life of these solenoids. The results of this evaluation will be incorporated in the surveillance and maintenance procedures as necessary.

00549035

"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

8005131339

0054940

"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4

0054941

"ALL INFORMATION ON THIS PAGE REDACTED AS PROPRIETARY PER LICENSING BOARD ORDER"

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

EQUIPMENT ITEM NO. 5
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 135'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 10 MINUTES
TER CHECKSHEET NO. 5
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N25SV3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.2 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N23SV3228AA, BA, C A; 3227AA, BA, CA)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.5 [6]
FUNCTION (PLANT ID): ACTIVATE AIR OPERATED VALVE FOR ISOLATION (Q2N12SV3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.3.14.4 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N12SV3234A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.2 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N11SV3369AC, BC, C C; 3370AC, BC, CC)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.8 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N11SV3368AA, BA, C A; 3976A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.7 [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, UM, 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, 3c~~
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~~

0C54942

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

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

X 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.

X 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

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. 518	Page 2

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	
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	
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	

FOR EVALUATION REFER TO ITEM NO. 4 (EXCLUDING SUBMERGENCE).

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 5

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - WITHIN CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE SEISMIC QUALIFICATION METHOD HARSH RADIATION REPLACEMENT	All solenoid valves, outside containment, previously identified as requiring replacement have been replaced with fully qualified ASCO Catalog NP-1 models. System master lists and component evaluation worksheets have been revised to document the qualification of these solenoid valves. This component has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

0054945

LICENSEE RESPONSE TO NRC SER (Continued)

E. Make: APCs

Model No. EP-1 Series, 206-Series

Instrument: Solenoid Valve

Location: Containment and Main Steam Room

Results of Evaluation

Type test accelerated thermal and radiation aging techniques and material analysis using a conservative approximation to the Arrhenius model have established a qualified life for these solenoids. The solenoids are used inside and outside the containment and, for both locations, have a qualified life beyond June 30, 1982 and for at least the next few refueling outages. A new test report has indicated an elastomer component of these solenoids is not recommended for operation under the more limiting radiation aging conditions where the solenoids may be required to shift position following exposure to a total gamma radiation dose in excess of 20 megarads. APCs has completed an evaluation of the operational requirements of the solenoids containing this elastomer component. APCs has determined the solenoids would have completed their position shifts before receiving an exposure to a dose in excess of 20 megarads or would not be required to shift in order to bring the plant to a safe shutdown condition. Therefore, the elastomer component has been determined as acceptable for the harsh environmental conditions at Farley-Unit 2.

APCs Position:

Surveillance and maintenance procedures are being implemented which reflect the results of the above evaluations, and will verify the continuing qualified status of the instruments throughout the life of the plant. The vendor is completing a material analysis in an attempt to further extend the qualified life of these solenoids. The results of this evaluation will be incorporated in the surveillance and maintenance procedures as necessary.

0051946

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1a

EQUIPMENT ITEM NO. 6
SOLENOID VALVE LOCATED IN THE CONTAINMENT
TARGET ROCK MODEL 79AB001
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 6
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): REACTOR VESSEL HEAD VENTILATION (62B13SV2213A, B; 2214A, B)
LICENSEE SUBMITTAL: SCEW(S): TMI-2.2 [6, 11, 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, EQN, SEN, QI, RPS, None,

Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a
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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~~

0051947

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 5/8

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM

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

X 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.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X 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
X 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

00549048

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..AC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

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	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 Qualification Review	
IV	Documentation Not Made Available	

Franklin Research Center
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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. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 6

LICENSEE RESPONSE TO NRC SER

Qualification testing is scheduled to be completed by the fourth quarter of 1982. This equipment is not essential to achieve a safe shutdown condition for any licensed DBE, and, therefore, no operating time is specified.

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 5A

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 7

EQUIPMENT ITEM NO. 7
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 89'4"
AUTOMATIC VALVE MODEL C5439
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 7
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2E12SV3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.7 [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:

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~~

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. 518	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action FIRST REFUELING 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 ABOVE - CIRCLED ITEMS 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. 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	
I.b	Equipment Qualification Pending Modification	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 Qualification Review	
IV	Documentation Not Made Available	

0054954

LICENSEE RESPONSE TO NRC SER

SECTION 8.2

SUMMARY OF OUTSTANDING ITEMS

As a result of the NUREG 0588 Qualification review and the subsequent replacement of two generic types of components which were determined to be deficient in qualification documentation, four solenoid valves located inside containment remain outstanding. These deficiencies, together with corrective action commitments and justification for interim operation, are given below.

1. Solenoid Valves - Inside Containment

A total of 37 solenoid valves inside the containment were determined not to have adequate qualification documentation. Of these 37, all but 4 have been replaced with fully qualified ASCO HP series valves, and the associated component Evaluation Work Sheets have been revised to reflect the qualification parameters. Out of remaining 4 solenoid valves, 2 have been deleted and remaining 2 are used on containment isolation valves and perform their safety function prior to the effects due to the accident environment. Should failure occurs, the isolation function of these valves would be maintained and such failure would not adversely affect other safety-related equipment. Furthermore, these solenoid valves have high temperature coils and contain no plastic parts. Although complete qualification testing or analyses have not been performed on the specific assemblies, separate qualification tests have been performed on individual constituent components of the valve assembly. Based on the fact that no materials which have deleterious effects due to the harsh environments are included in these valves, and that previous [illegible] testing has successfully verified qualification, interim use of valves is acceptable.

LICENSEE RESPONSE TO NRC SER (Continued)

Purchase orders have not been issued for two of these solenoid valves because a qualified direct replacement was not available. As a result of an engineering evaluation a suitable qualified replacement solenoid valve has been established and a purchase order will be issued upon receipt of a variation from the original air operated valve vendor. The documentation of qualification for the replacement solenoid valve will be equal to that of the other qualified solenoid valves and the replacement will be completed by the end of the first refueling outage. If any problems arise beyond the control of Alabama Power Company which may impact this schedule, the NRC will be notified. Purchase orders were not issued for the remaining two solenoid valves due to the fact that a reevaluation has been performed in regard to the need for qualification of these components. These solenoid valves are utilized on the 48" containment purge ASVs. In a letter from F. L. Clayton, Jr., to A. Schwencer dated September 10, 1980, subject "Containment Purge System", Alabama Power Company committed to operation with these valves maintained in the closed position in all modes except mode 5 and mode 6 (cold shutdown and refueling). With the containment purge valves in the closed position, these two solenoid valves are in the deenergized position. Subsequent failure of these solenoid valves will not result in opening of the purge valves and containment isolation will be maintained. Based on this evaluation, these solenoid valves have been deleted from our Master List of equipment requiring qualification.

0054955

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

EQUIPMENT ITEM NO. 8
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 129'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 8
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2B31SV8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.2 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2G21SV7126)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.5 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2E21SV8871, 8149AB , BB, CB)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.5 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P13ZS2867B, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.6 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P17SV3443)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.5 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P17SV3184)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.3 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P15SV3103, 3766, 3 179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [6]

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

(R), (T), (QA) RT, (P), (E), (CS), (A), (S), (R), (M), I, QM, (RPN) EQN, SEN, QI, RPS, None, Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	1a$_1$, 1B$_1$
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~~

00549056

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

0051957

EQUIPMENT ITEM NO. 8 (CONTINUED)
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P15SV3180A B, C; 3 181A, B, C; 3104; 3765)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [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:

Contents	Checksheet Page No.
Equipment Item	1a
Summary of Licensee Responses to the NRC SER	1b
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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. 8

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

0054050

X 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.

X 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. 8

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)	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	
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	

FOR EVALUATION REFER TO ITEM NO. 4 (EXCLUDING SUBMERGENCE)

0054959

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

0054960

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVES - INSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1[illegible] based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm (Reference: ASCO Test Report ACS 21618/TR). This boric acid concentration exceeds the latest FSAR value of 2000 ppm.
SUBMERGENCE	For a discussion of the effects of submergence, refer to Appendix 4, Section II.C.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified. (a) Temperature - The 346°F qualification test condition exceeds the 300°F required temperature by 46°F thus adequate margin has been demonstrated. (b) Pressure - The 110 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.3 psia. (c) Radiation - The 1×10^8 rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment Level of 5×10^7 rads. Therefore adequate margin exists.
REQUIRED TIME	Deficiency shown on one solenoid valve Q2P15EF3745 appears to be a clerical error by the NRC. Operating and qualification time both have been shown on component evaluation sheets.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 8

0054961

LICENSEE RESPONSE TO NRC SER (Continued)

1. Model: ASCo

Model No.: EF-1 Series, 206-Series

Instrument: Solenoid Valve

Location: Containment and Main Steam Room

Results of Evaluation

Type test considered thermal and radiation aging temperature and material analysis using a conservative approximation on the Arrhenius model have established a qualified life for these solenoids. The solenoids are used inside and outside the containment and, for both locations, have a qualified life beyond June 30, 1983 and far at least the next few refueling outages. A new test report has indicated an electrical component of these solenoids is not recommended for operation under the more limiting radiation aging conditions where the solenoids may be required to shift position following exposure to a total gamma radiation dose in excess of 20 megarads. APCo has completed an evaluation of the operational requirements of the solenoids containing that electrical component. APCo has determined the solenoids would have completed their position shift to achieve restoration on exposure to a dose in excess of 20 megarads or would not be required to shift in order to bring the plant to a safe shutdown condition. Therefore, the electrical component has been determined as acceptable for the harsh environmental conditions at Farley-Unit 1.

APCo Position:

Surveillance and maintenance procedures are being implemented which reflect the results of the above evaluations, and will verify the continuing qualified status of the instruments throughout the life of the plant. The vendor is completing a material analysis in an attempt to further extend the qualified life of these solenoids. The results of this evaluation will be incorporated in the surveillance and maintenance procedures as necessary.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

EQUIPMENT ITEM NO. 9
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL HTX8320A22V
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 9
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): PILOT FOR AIR OPERATED VALVE (N2B21SV0444BA, BB; 445AA, AB)
SERVICE: PORV
LICENSEE SUBMITTAL: SCEW(S): TMI-3.2 [6, 11, 19]

0054962

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. 9

0054963

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

X 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.

X The Licensee (has/~~has not~~) proposed a corrective action for this equipment item whose qualification has not been fully established.

X Justification for interim operation (has/~~has not~~) been provided by the Licensee for this equipment item.

X Corrective action specified by the Licensee:

- X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action REPLACE AT NEXT REFUELING 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
(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. 9

8005190084

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC REQUIREMENTS	DESIGNATION: X = DEFICIENCY
Documented Evidence of Qualification Adequate	
Adequate Similarity Between Equipment and Test Specimen Ertablished	
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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 9

LICENSEE RESPONSE TO NRC SER

Qualification for this instrument has not been documented. It will be replaced during the next refueling outage.
This equipment is not essential to achieve a safe shutdown condition under any licensed DBE and, therefore, no operating time is specified.

8005190965

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

EQUIPMENT ITEM NO. 10
SOLENOID VALVE LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
ASCO MODEL HV20638l4U
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 10
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTIVATE AIR OPERATED VALVE FOR ISOLATION (N2C22SV0479A, B; 489A, B; 499A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.6 [6]
FUNCTION (PLANT ID): ACTIVATE AIR OPERATED VALVE FOR ISOLATION (N2C22SV0478A, B; 488A, B; 498A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.5 [6]

0054966

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

R, T, (QV), 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~~

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

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

X 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.

X 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

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. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

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)	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	
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	

FOR EVALUATION, REFER TO ITEM NO 4 (EXCLUDING SUBMERGENCE)

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

LICENSEE RESPONSE TO NRC SER

COMPONENT: SOLENOID VALVE - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING TEMPERATURE QUALIFICATION TIME PRESSURE HUMIDITY QUALIFICATION METHOD MARGIN RADIATION REPLACEMENT	All solenoid valves, outside containment, previously identified as requiring replacement have been replaced with fully qualified ASCO Catalog NP-1 models. System master lists and component evaluation worksheets have been revised to document the qualification of these solenoid valves. This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

LICENSEE RESPONSE TO NRC SER (Continued)

1. Maker: ASCo

Model No.: EP-1 Series, 206-Series

Instrument: Solenoid Valve

Location: Containment and Main Steam Room

Results of Evaluation

Type test accelerated thermal and radiation aging conditions and essential analysis using a temperature correlation to the Arrhenius model have established a qualified life for these solenoids. The solenoids are used inside and outside the containment and, for both locations, have a qualified life beyond June 30, 1982 and for at least the next few refueling outages. A new test report has indicated an elastomer component of these solenoids is not recommended for operation under the more limiting radiation aging conditions where the solenoids may be required to shift position following exposure to a total gamma radiation dose in excess of 10 megarads. ASCo has completed an evaluation of the operational requirements of the solenoids containing this elastomer component. ASCo has determined the solenoids would have completed their position shifts before encountering an exposure to a dose in excess of 10 megarads or would not be required to shift in order to bring the plant to a safe shutdown condition. Therefore, the elastomer component has been determined as acceptable for the known environmental conditions at Farley-Unit 1.

ASCo Position:

Surveillance and maintenance procedures are being implemented which reflect the results of the above evaluations, and will verify the continuing qualified status of the thermocouples throughout the life of the plant. The vendor is completing essential analysis in an attempt to further extend the qualified life of these solenoids. The results of this evaluation will be incorporated in the surveillance and maintenance procedures as necessary.

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

EQUIPMENT ITEM NO. 11
HYDROGEN RECOMBINER LOCATED IN THE CONTAINMENT, ELEV. 155'0"
WESTINGHOUSE MODEL TYPE A
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 11
LICENSEE REFERENCE(S): 1571, 1572, 1573, 1574, 1575
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (KD01A, B (Q2E17G001A, B))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.7.2 [5]

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

R, T, (T) RT, P, H, CS, (A) S, (R), (M) I, QM, RPM, EQN, 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~~

0051972

Bechtel Power Corporation

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- PHOTOGRAPH (PHOTO DOCUMENT) ☐
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- COMPUTER PRINTOUT ☐
- FLIMSY SOURCE DOCUMENT ☐

Job No. 7597-03/20

Electrical Correspondence

E-91

SCS Letter dated 2/16/83, LSF-NS-1772

Item #11, page 1b

Document No. and/or Description

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X The Licensee has presented information which shows there are no outstanding seismic/motion 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 RECOMMENDED QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW OF INFORMATION CONTAINED IN THE LICENSEE'S SUBMITTAL (See list 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. C5757
FRC Assignment No. 13
FRC Task No. 5718

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

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: Y = [illegible]
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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NRC Contract No. NRC-03-78-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

6

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY

AG 1.90

ACRS REPORT:

The metallic materials used in the H$_2$ Recombiner Heaters are not known to be susceptible to significant degradation due to aging.

All electrical components furnished with the W electric recombiner which may be exposed to post LOCA environments and which use electrical insulation were tested. The power cable, heater connector wire, heater elements, thermocouples and extension wire were subjected to thermal cycling of 80 heatup and cooldown cycles to simulate 40 years of operation. All of the above items plus the terminal blocks were subjected to a radiation exposure of 2×10^8 rads gamma followed by a LOCA test as described in WCAP 7709-L Supplement 2.

Due to the fact that no significant degradation was observed following the thermal cycling, radiation exposure, and LOCA cycle described in WCAP 7709-L and Supplements 1-4, the H$_2$ recombiner will provide adequate service for 40 years of normal operation plus 1 year post LOCA.

QUALIFICATION TIME

Qualification time for the H$_2$ recombiner heater was not addressed by 71 program testing. Operability for one year post LOCA was demonstrated by tests described in WCAP 7709-L and Supplements 1-4. The simplistic design and conservative test procedures indicate that the recombiner will provide adequate service during a 40 year service life followed by one year post LOCA environment.

IEEE 323-1971

IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, for most plant specific applications, there will be margin available between the generic test parameters employed by W and the plant specific requirements. In qualifying equipment required to operate in a HELB environment, W did not include any systematic margin on the specified duration of the safety function. Rather, margin is included in qualification testing by selecting conservative qualification parameters and test sequence. Margin is implicit in the test sequence as follows:

(1) Radiation - Tests are based on conservative calculations for 40 year operation plus 1 year post LOCA operation from the Westinghouse generic program which uses TID-14844 for the source term. This has resulted in a 2×10^8 rad γ qualification which provides adequate margin above the 5×10^7 rad γ requirement.

(2) A conservative estimate of 80 heat up and cooldown cycles were conducted in succession to simulate 40 years of operation prior to conducting HELB tests.

(3) Six LOCA tests were conducted on the thermally cycled unit.

(4) Additional post irradiation HELB testing was conducted on the irradiated components.

(5) Long term testing was conducted as described in Supplements 3 and 4 of WCAP 7709-L. These tests included high temperature heater tests conducted to evaluate heater element performance at temperatures in excess of post LOCA heater temperatures. Long term heater element and recombiner tests to evaluate recombiner operation at temperatures well in excess of post LOCA temperatures in a 4% hydrogen concentration environment, and long term steam chamber tests were conducted to demonstrate the recombiner operability long term post LOCA at low containment pressure.

(6) The H$_2$ recombiner qualification testing temperature of 329°F exceeds the specified qualification requirement of 300°F as shown on Component Evaluation Sheet C.2.7 Sheet 1.

(7) The H$_2$ recombiner qualification testing pressure of 77 psia exceeds the specified qualification requirement of 62.3 psia as shown on Component Evaluation Work Sheet, Section C.2.7 Sheet 1.

As stated in section 6.3.1.3 of IEEE 323-1974, margin may be demonstrated by increasing levels of testing, number of cycles, and test duration. It is felt that the above mentioned testing described in WCAP 7709-L and Supplements 1-4 demonstrates an acceptable level of margin.

REFERENCES

(1) WCAP 7709-L and Supplements 1-4

(2) NRC Letter Denwille to Eisenhut/Shapar of May 1, 1981 provides NRC acceptance of the H$_2$ recombiner to IEEE 344-1971 and 323-1971 standards.

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NRC Contract No. NRC-03-79-118
FRC Project No. 3257
FRC Assignment No. 13
FRC Task No. 518
PROPRIETARY

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

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

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION			
Equipment Type	Hydrogen Recombiner	Electrical Hydrogen Recombiner	
Manufacturer's Name (5.2.2/-/-)	Westinghouse	Westinghouse	
Model Number (5.2.2/-/-)	Type A	Model A	
Serial Number			
Features/Mounting (5.2.6/-/-)	Standard	standard	
Connections/Interfaces (5.2.6/-/-)		Junction boxes, cables, thermocouples, etc.	
Location/Elevation	Containment		
Equipment ID No.	See page 1a.		
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	See licensee references, page 1a.	WCAP-7709-L & Supplements 1 thru 7	
Report Date			
Issued by		Westinghouse	
Prepared for		AEC/DRL	
Referenced Reports			
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Type Test	
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)		Series of tests demonstrating heater operability under DBE conditions.	
Operating Conditions (-/2.2.10/2.2.10)			
Load/Cycles/Voltage/ Current/Freq.			

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257 PROPRIETARY
FRC Assignment No. 13 INFORMATION
FRC Task No. 528

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

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)		Must pass visual inspection & functional test	
Accuracy (5.2.1/-/-)	N/A	N/A	
Number of Specimens			
Test Instruments Calibrated			
Safety Function (Active/Passive) (-/2.1.3/2.1.3)	Active		
Test Duration (5.2.1/-/-)		5½ days to 12 months, depending on test	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)			
Required Function Time	30 days		
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Inspection / Baseline / Thermal Aging / Radiation / Mechanical stress / DBE / Post DBE / Inspection	
Test Sequence (NUREG-0588, Cat. 1) (-/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) Thermal Aging/Basis		80 thermal cycles / 40 cycles normal in 40 yrs.	-
Material Aging Evaluation (7.0/-/-)			See Note 1 page 5c
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)			
Radiation Aging, Type		Not stated	

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

PROPRIETARY INFORMATION

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)		2×10^8 Rad	
Radiation Aging, Dose Rate		3.3×10^5 Rad/hr	
Radiation Aging, Method		Irradiation chamber	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		Power cables	
Operational Aging (-/4.2/-)			
Other Age Conditioning (-/4.2/-)			
Qualified Life Claimed/ Established (5.2.4/4.10/-)		40 yrs./40 yrs.	See Note 1, page 5f
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity			
On-Going Surveillance and Preventive Maintenance (7.0/-/-)		Maintenance per vendor manual	
On-Going Analysis of Failures and Degradation (7.0/-/-)		Periodic checks per vendor manual	
Margin (General) (6.0/3.0/3.0)		Meets 4.0 & 5.2 of DOR guidelines.	
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 Contract No. NRC-05-78-116
FRC Project No. C537 PROPRIETARY
FRC Assignment No. 14 INFORMATION
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO 11

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (Y OR N) (OTH NO.)
ACCIDENT CONDITIONS			
LOCA/MSLB/MELB/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		Not stated	
Radiation Dose (rd) (4.1.2/1.4/1.4)		See Radiation Ap. page 5e.	
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/-/-)		N/A, with analysis	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	5×10^7		
Plateout Dose Considered (-/1.48/1.48)			
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		N/A, with analysis (i.e. same as gamma dose)	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	T. E.	QUALIFICATION DOCUMENTATION	DEFICIENCY (E OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS				
Rate of Temp./Press. Increase			from profiles, pages 5i & 5j	
Peak: °F/psig/RH/Time	300/47.5/100/-			
Decrease To: °F/psig/RH/Time				
Decrease To: °F/psig/RH/Time				
Decrease To: °F/psig/RH/Time				
Equipment Surface Temperature (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)			Open	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH		2500 ppm boric acid w/ NaOH to ~10 pH	
Spray Density (gpa/ft^2)			Not stated	
Spray Duration			10 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A			
In-Leakage Considered (5.2.6, 5.3.2/-/-)	N/A			
Time to Submergence	N/A			
Dust Environment (-/2.2.11/2.2.11)				

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257 PROPRIETARY
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

NOTES:

1 From reference [1777], the following statement is made regarding material aging:

The normal schedule of the recombiner calls for periodic testing to determine system availability plus periods of non-operating time in normal containment environment. Evaluation of these factors leads to the conclusion that the most significant aging factor was the fatigue life of the structure, due to thermal stresses induced by the periodic heat up and cool down tests. It was concluded that the metal structure and many enclosed thermal insulation would not be affected by these tests. The heater life for this type of heater element is far in excess of the duty cycles imposed by the periodic tests; however, the duty cycles were included in the aging program since they are a necessary part of the recombiner test. The power cables are subject to deterioration due to aging; they are covered by IEEE-383, "Standard for Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations" and have been qualified to Section 2.4 of this standard.

The reviewer finds this analysis [illegible]. The documentation which supports the claim of a 40 year qualified life is consistent with the DOR guidelines and IEEE standards

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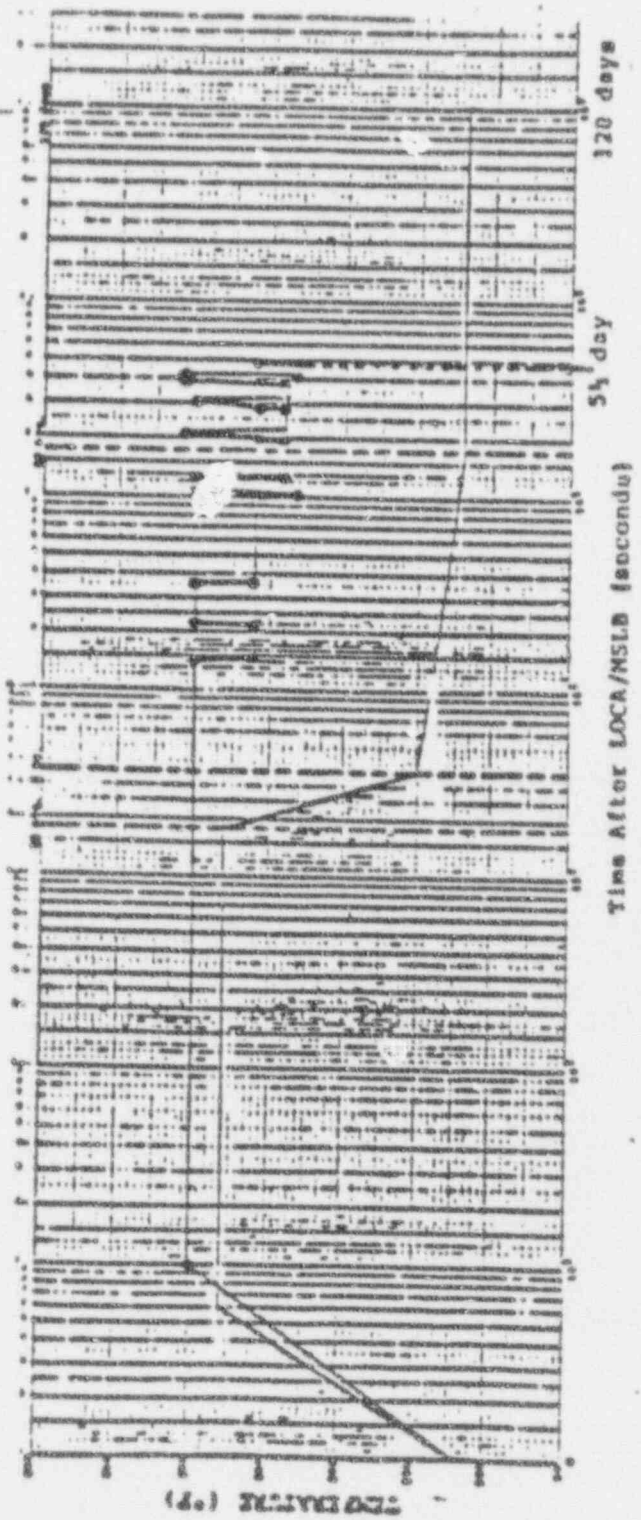
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

NOTES:



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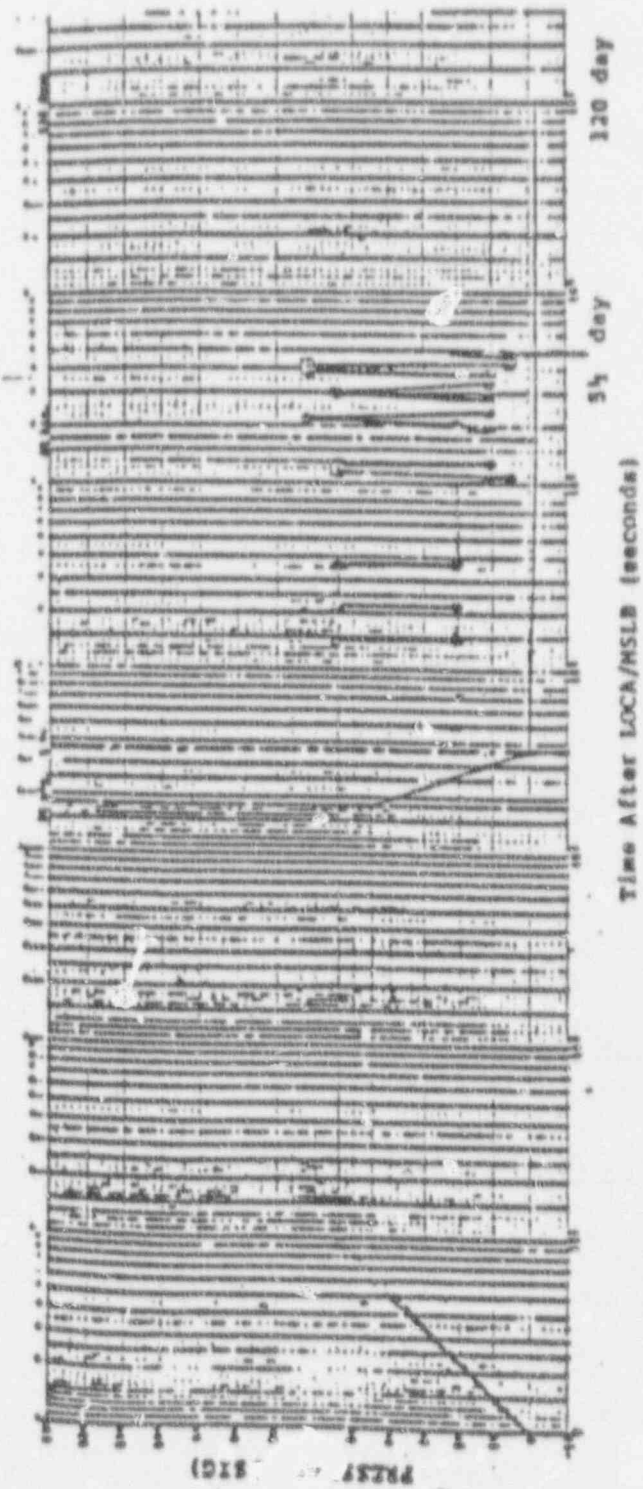
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 11

NOTES:



0054083

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1a

EQUIPMENT ITEM NO. 12
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
JOY MANUFACTURING MODEL TYPE P
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 12
LICENSEE REFERENCE(S): 1803
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (Q2E22MD01A, B)
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.2 [5]
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (Q2E29MD01A, B, C, D)
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.8.2 [5]
FUNCTION (PLANT ID): NOT STATED (Q2E12MD01, B, C, D)
SERVICE: CONTAINMENT HEAT REMOVAL
LICENSEE SUBMITTAL: SCEW(S): C.2.6.8 [5]

0054984

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

R, T, (MT), RT, P, H, (CS), (A), S, (B), (M), 1, QM, RPN, EXN, SEN, QI, RPS, None, Not stated, Not applicable

LISTING OF APPLICABLE CHECKSHEETS:

Content:	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. 18

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

0054985

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 12

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)	
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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- FLIMSY SOURCE DOCUMENT [ ]

Job No. 7597-03/20

Electrical Correspondence

E-91

SCS letter of 2/16/83, LSF-NS-1772

Item No. 12, pages 3a & 5a & 5b

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LICENSEE RESPONSE TO NRC SER

0054988

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age these motors to meet the requirements of IEEE 334-1974. Arrhenius models were used to establish a qualified life. The age susceptible materials of the motors were identified and an evaluation was made of their aging characteristics. Based on this methodology, a conservative qualified life of 40 years was established.
CHEMICAL-[illegible]	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 10,000 ppm (Reference: Joy Report [illegible]). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
QUALIFICATION TIME	Joy Manufacturing Co. has tested fan and motor sets through two LOCA cycles of 4 hours each followed by long term tests at slightly reduced temperatures. (Reference: Joy Report X-606). The peak temperature used in the tests exceeded the qualification temperature established for FMP. The qualified time exceeds the specification requirement of 4 hours.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified. a) Temperature - The 315°F qualification test temperature exceeds the 300°F required temperature. b) Pressure - The 92.7 psia qualification test pressure exceeds the [illegible] psia required pressure. c) Qualification Time - The 7 days operating time qualification exceeds 4 hours specification. d) Radiation - The total 1×10^8 rads qualification dose exceeds required total dose of 5×10^7 rads. This demonstrates adequate margin.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

The Licensee has cited as evidence of qualification a Joy Report which envelopes all of the required parameters for the Farley 2 plant. However, from the documentation submitted, it is not possible to ascertain that the unit tested and the units installed are in the same family of motors. The SCEW sheet identifies the motor as a type P. The report contains the following description:

8005080

INTRODUCTION

JOY Manufacturing Company and Reliance Electric Company have jointly developed a line of motors designed for Class 1E Containment service. Design parameters are identical for this entire line of motors, the most important of which are as follows:

1. Normal ambient of 122° F. (50° C.).
2. Temperature rise of 117° F. (65° C.).
3. Design life of forty (40) years.
4. Radiation maximum dosage of 1×10^8 rads over the life of the motor.
5. Insulation is Class H, Type B.
6. Short term (3 to 4 hours) ambient of 320° F., followed by a gradual reduction to 250° F.
7. One (1) year exposure to 100% relative humidity with water sprayed and slightly caustic atmosphere.
8. Ambient pressure of 85 psig during the emergency case.

In addition to all being designed to the above parameters, the materials and methods of construction are identical for the entire line of motors.

The objective of this report is to summarize the results of type testing undertaken at JOY on a representative motor driving a JOY AXIVANE fan for the purpose of qualifying it and thereby this line of motors and fan for Class 1E containment service for both E-B and PCR units as defined in IEEE-334-1974.

FAN/MOTOR DESCRIPTION

The fan selected for use in this testing of motor flow configuration consists of an inlet cone, inlet downstream of the fan rotor, and a beam for mounting and supporting the motor in the centerline of the inlet cone. (See typical cross section, Figure 1). The casing used for the simulated testing motor differs original as a typical production casing for nuclear service, while the outer casing for the LOCA simulation part of the pressure vessel. Power leads were connected in the same manner for the simulation portion of the testing, i.e., the connection was made in a conduit box mounted on the side of the fan casing.

For the LOCA simulation, the power leads were connected by means of [illegible] through an insulating the sealing plate. This was necessary to maintain the pressure boundary of the test chamber.

In both cases the leads were stripped [illegible] motor frame to the connector point at separated by having each lead inside a [illegible] tube.

The fan had a 60 inch diameter rotor at [illegible] for construction, which is made up of a hub and 12 airfoil pitch blades which are mounted directly on the [illegible] shaft and secured with a ball bearing locknut.

The motor used to drive the fan was a 150/75 horsepower Reliance Electric motor. This was a 1200/600 rpm motor in a P-5405 frame. The motor had Class H, Type B insulation, which is designed from the following conditions:

1. Radiation - maximum dosage of 1×10^8 rads of gamma radiation during the life of the motor (40 years typical).
2. Short time temperature during emergency peak of 320° F. and ambient (for 3 to 4 hours), then gradual reduction to 250° F.
3. Ambient pressure of 85 psig during the emergency case.
4. One (1) year exposure to 100% relative humidity with water sprayed and a slightly caustic atmosphere.
5. Design life of forty (40) years.

0054990

ATTACHMENT A
APPENDIX I
REPORT I-604

MOTOR IDENTIFICATION:

R-62787
E319739-A4-LT
LEDC5005
HP 150/75
RPM 1185/590
Volts 460
Hertz 60
Amps 187/144
Code N
Phase 3
Ambient Spcl.
Insulation Class B - Type RH
Duty Continuous
Drive End Bearing 95BC07XPP7B
Opposite Drive End Bearing 95BC07XPP7B

INSULATION SYSTEM:

Reliance Type RH Class B Insulation System was used in this motor that is designed to meet the requirements of the IEEE 323-1974 and IEEE 334-1974 for Class 1E Continuous Duty Motors Used in Containment Service Applications for Nuclear Power Generating Plants.

The report indicates that the test motor was the same unit as had been tested in 1970 except that the 1970 motor was rewound. The test report for that motor described the test unit as follows:

a.	Manufacturer	Reliance Electric Company
b.	Type	P/my
c.	Enclosure	TEAO
d.	Torque	Constant
e.	No. of Windings	One
f.	Frame Number	5005
g.	Horsepower Rating, bhp	150/75
h.	Operating Speed(s), rpm	1200/600
i.	Power Supply, v/ph/cy	575/3/60
j.	Insulation Class	Class M
k.	Temperature Rise	NEMA Class B
l.	Air-Over Capacity (Minimum) ft./min.	4000
m.	Mounting Configuration	C-face, Footless
n.	Bearings	Anti-friction
o.	Shaft Configuration	Straight, threaded
p.	Shaft Seals	Air Wall Labyrinth
q.	Reference Drawings:	

1. Outline Dimension SK-31081-2
2. Shaft Seals SK-600124WB

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GPD-2740-A 8/79

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

The Licensee should either provide a more complete description for the installed motors or obtain certification from the manufacturer that the test report is applicable to the Farley 2 motors.

0054992

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

EQUIPMENT ITEM NO. 13
RTD LOCATED IN THE CONTAINMENT, ELEV. 122'9"
ROSEMOUNT MODEL 176KS
REQUIRED OPERATING TIME: 14 DAYS
TER CHECKSHEET NO. 13
LICENSEE REFERENCE(S): .87
FUNCTION (PLANT ID): REACTOR TRIP (M2B21TE410, 413, 420, 423, 430, 433)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.3 [6]

00599

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, (NS), (A), S, (R), (M), I, QA, RPN, EQN, 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~~ - ~~4a, 4b, 4c, 4d, 4e, 4f~~
System Consideration Review	
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 5i, 5j
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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. 518	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

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

X 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.

X 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.

X Corrective action specified by the Licensee:

- X 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 (_____)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X 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

0054991

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

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	X
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	X
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	

0054095

LICENSEE RESPONSE TO NRC SER

C. Make: Rosemount

Model: 176 KS

Instrument: Wide Range RTD

Location: Containment

0054996

Results of Evaluation

Thermal aging was not a requirement in the qualification program for these instruments, which was developed to meet the requirements of IEEE 323-1971. Radiation aging of these items has been determined to be the limiting factor. Such qualified life has been shown to be at least beyond June 30, 1982 and the next few refueling outages. A previous material analysis has revealed the use of an age-susceptible material as compared to Appendix C of I.E. Bulletin 79-01B, and based on this analysis, no significant thermal or radiological degradation will occur during this extended qualified life. Additionally, a review of the operating experience of the instrument does not indicate an unexpected aging mechanism.

APCo Position

A favorable operating history, the large amount of tests and reviews performed on this instrument, and our NSSS vendor evaluation supports APCo's opinion that the RTD's would be capable of completing their intended function beyond June 30, 1982 and beyond the next few refueling outages. Surveillance and maintenance procedures are being implemented which ensure that radiation and thermal age-related degradation will be identified and the necessary action taken to verify the continuing qualified status of these instruments throughout the life of the plant.

LICENSEE RESPONSE TO NRC SER

APCo is presently completing an evaluation of various makes and models of RTD's which would be a suitable replacement for the Farley instruments. The selection will be made in a timely manner to support the scheduled replacement of the installed RTD's in accordance with their qualified life.

0054997

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

0054998

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

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

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION			
Equipment Type	Temperature Element	R T D	
Manufacturer's Name (5.2.2/-/-)	Rosemount	Rosemount	
Model Number (5.2.2/-/-)	176 KF & 176 KS	176KF	Notes 1,2
Serial Number	Not stated	Not stated	
Features/Mounting (5.2.6/-/-)	Not stated	Not stated	
Connections/Interfaces (5.2.6/-/-)	Not stated	RTD 4 conductor cable with terminal lugs	Note 3
Location/Elevation		N/A	
Equipment ID No.	See Page 1a	N/A	
QUALIFICATION REPORT (8.0/5.0/5.0)			
Report ID Number	WCAP 9157	WCAP 9157 [687]	
Report Date	00-Sep-77	00-Sep-77	
Issued by	—	Westinghouse	
Prepared for	—	Westinghouse	
Referenced Reports	—	None	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	Test	Test and Analysis	-
QUALIFICATION TEST PROGRAM			
Functional Test Description (5.2.5/2.2.9/2.2.9)	—	Monitoring and calibration	Note 4
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	—	Not stated	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

NRC REQUIREMENTS WITH SECTION REFERENCE (0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)		2 out-of-3 meet accuracy requirement	Note 5
Accuracy (5.2.5/-/-)	Spec: ±0.2% Demon: ±0.2%	± 5%	Note 6 X
Number of Specimens		3	
Test Instruments Calibratnd		Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	Reactor Trip	Active	
Test Duration (5.2.1/-/-)		6 days	Note 7
Accident Duration (Envir. Above Normal) (5.2.1/-/-)		Not stated	
Required Function Time	2 weeks Post SLB	Reactor trip 30 Sec. Post-accident RCS 14 day	Note 8
Test Sequence (General) (5.2.3/2.3.1/2.3.1)		Rad/Steam	
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)	See page 5a	Not performed	Note 15 X
Thermal Aging/Basis			-
Material Aging Evaluation (7.0/-/-)		Not performed	Note 15
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Not performed	Note 15
Radiation Aging, Type		Gamma	

8004290099

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	Not stated	Combined with DBE exposure	
Radiation Aging, Dose Rate			
Radiation Aging, Method			
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	Not stated	Not stated	
Operational Aging (-/4.2/-)		N/A	
Other Age Conditioning (-/4.2/-)		N/A	
Qualified Life Claimed/ Established (5.2.4/4.10/-)		Reactor trip 40 yr Post-accident RCS 12 yr	Note 9.10 X
Normal Ambient Temperature		120°F	
Normal Ambient Radiation		200 R/h	
Normal Ambient Humidity		Not Stated	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)		Not stated	
On-Going Analysis (7.0/-/-)	See page 3a	N/A	
Margin (General) (6.0/3.0/3.0)		Not stated	
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)			

0055000

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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)	MLB	S 1 b	
Radiation Type		Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	1×10^8 rad	Not Applicable	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)		1.6 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/-/-)		Not stated	
Radiation Dose (Normal + Accident) (4.1.2/-/-)		100 Mrd	Note 11
Plateout Dose Considered (-/1.48/1.48)		Not stated	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		100 Mrd	

0055001

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase		24°F/6.6 psig/S	*
Peak: °F/psig/RH/Time	300/47.5/100/-	340/66/-/255	
Decrease To: °F/psig/RH/Time	275/40/-/10^3s	320/66/-/12005	Notes 12,13
Decrease To: °F/psig/RH/Time	180/5/-/10^4s	220/20/100/23.67h	
Decrease To: °F/psig/RH/Time	140/5/-/10^5s	220/20/100/5 day	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)		80/14.7/100/not stated	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	Test	Not stated	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH	Test	Note 14
Spray Density (gpm/ft^2)	Not stated	1.14w/o boric acid 0.17 wt% NaOH	
Spray Duration	Not stated	Not stated	Note 14 X
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	Not stated	Note 14 X
In-Leakage Considered (5.2.6, 5.3.2/-/-)		N/A	
Time to Submergence		N/A	
Dust Environment (-/2.2.11/2.2.11)		N/A	
		N/A	-

* Deviation during transient is considered insignificant

8005002

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NOTES:

Note 1

Two applications for the 176KF(1) and 176KS(2) are considered in WCAP 9157:

1. Short term reactor trip (ΔT_{ave}); required duration is 30 s(1)
2. Post-accident reactor coolant temp. monitoring; required duration is 14 days(2)

WCAP 9157 stated on pg. 2-1 that "the narrow range RTD and wide range RTD are designed indentically; the only difference is their lengths." On pg. 2-2, Westinghouse states that the narrow range and wide range RCS temperature RTDs tested is the 176KF model. (The 176KF is shorter in length than the 176KS)

Westinghouse recommends the model 176KF for narrow range operation and the model 176KS for wide range. (WCAP 9157, Westinghouse response to Question III.9) [6 PP]

Note 2

The sensing end only of the model 176KS RTD was exposed to the steam environment in the test chamber, and therefore the 176 KS was used only as a reference RTD.

Note 3

Electrical interfaces, e.g., connections to terminal lugs on RTD cable, were not included or addressed in the qualification documentation.

Note 4 Calibration points used throughout the test program were 32°F and 250 °F. The manufacturer provides calibration points at 32°F, 525°F and 625°F.

The temperatures monitored by the RTDs during the test were not in the 500 - 600°F temperature range of expected operation. No data has been provided on the ability of the RTDs to operate accurately over this temperature range of interest. The report indicates that the RTDs were exposed to the environmental conditions only, and therefore, the functional test is inconclusive with respect to the ability of the RTDs to monitor reactor coolant temperature during the Design Basis Accident within the required accuracy.

NRC (1) Applies to Equipment Item #13 only.
(2) Applies to Equipment Item #14 only.

0055003

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NOTES:

Note 7(2)

The test described in WCAP 9157 consists of an initial 24 H transient period with temperature/pressure decreasing to 220° F/20 psig. A 5 day exposure at 220° F conditions is taken as equivalent to a 13 day severe environment exposure at 164° F. (In-containment average temperature over a 2 week period following a SLB is 164° F according to WCAP 9157)

The basis for accelerating test time is a simple chemical reaction rate law model given on pg 2-7 of WCAP 9157. (This model is more conservative than an Arrhenius model based on similar governing materials and temperatures)

Acceleration of the test interval through increased test temperatures is not usually acceptable for steam exposures, (and humidities) for the temperatures (220° F -vs- 164° F) and the devices considered here however, a test duration of 5 days vice 13 days after the initial 24 H transient period should be acceptable by engineering judgment.

Note 8(6)

Westinghouse has stated narrow range RTD (reactor trip) operat requirement is 30 S, however, no discussion of SLB size was provided. RTDs tested were required to operate for a minimum of 30 minutes in steam environment.

Note 9

Radiation doses for RTDs are based on application. Gamma dos for wide range RCS post-accident monitoring is determined from centerline dose in primary loop (hot leg) piping; narrow range reactor trip RTD dose is taken as the surface dose on this piping.

N.B. (1.) Applies to Equipment Item # 13 only.
(2) Applies to Equipment Item # 14 only.

00550004

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

NOTES:

0055005

Note 10

Qualified life claim in WCAP-9157 of 12 and 40 years is based on dose rate and operating time calculations performed by Westinghouse. Thermal aging has not been included in the qualified life evaluation. See Note 15.

Rosemount Dwg. No. 176KF (Rev.J) states "The Model 176KF will withstand radiation of 25 Rad/Hr."

Westinghouse has stated in Table 2.2 that the normal radiation dose rates at the reactor coolant leg pipe O.D. and general coolant system area are 200 R/h and 50 R/h, respectively.

No justification or analysis has been provided by Westinghouse or the Licensee for exceeding Rosemount's specified dose rates for the 176KF.

(Rosemount Dwg. No. 176KS (Rev.E) states 200R/Hr.)

Note 11

Normal operation radiation exposure from reactor coolant is dominant consideration. WCAP 9157 states 2 week dose of 0.5 Mrd for SLB; 100 day dose is less than 0.6 Mrd (Fig. 2-2 in WCAP 9157). RTDs used for long-term post-LOCA monitoring will be exposed to significantly higher doses.

Note 12

Peak test chamber controlled pressure is stated as 66 psig; however, no additional pressure data has been provided in WCAP 9157

Facility setup supplies steam at saturated conditions except for initial transient period where superheating is possible. [illegible] is assumed at saturation conditions.

NOTES:

Note 5

Westinghouse has stated 2-out of-3 RTDs must meet accuracy requirements corresponding to reactor trip (narrow range temperature) and post-accident monitoring (wide-range temperature) applications. A failure is permitted if it is random, i.e., not indicative of common mode failure. No rationale was provided for the 2-out of-3 acceptance criteria or technical bases for determining when a failure is not common mode. See related Note 6.

Note 6

WCAP - 9157 reports accuracy requirements of ± 5%. Testing performed did not provide information on worse case error under design basis accident conditions. Also, the qualification program did not address the ability of the RTDs' time response with respect to primary loop temperature changes and trip points under SLB conditions. It appears this information is an important consideration for this device.

Rosemount specifications on DWG 176KF (Rev E) states:

Calibration — Each sensor shall be precision calibrated in the accuracy shown, at the following temperatures:

Temperature	Accuracy
32°F(0°C)	±1°F(±.5°C)
525°F(273.9°C)	±1°F(±.5°C)
625°F(329.4°C)	±1°F(±.5°C)

The calibration shall be conducted in accordance with Rosemount Report 77154, and a computer output showing temperature curve from 30° F to 700° F at 1° F increments or 1° C to 400° C at 1° C increments and its response over each sensor.

WCAP - 9157 indicated that calculated temperatures based on manufacturer's resistance tables at the 32°F calibration point were not within specified accuracy (i.e. exceeded 0.05°F criterion). Calculated temperatures were 1.3 to 2.3°F below the calibration temperature of 32°F. Calibration temperatures of 525°F and 625°F were not used in the test program.
The Rosemount specification drawings, Dwg. No. 176KF (Rev.J) and 176KS (Rev, E) state

Repeatability

The sensor will withstand 10 consecutive temperature shocks within the design range of 2.1 [illegible] without shifting ice point resistance by more than an amount equivalent to .2° C (.11° C) or 1.0% of actual span encountered, whichever is greater.

One of three 176KF RTDs was not within the repeatability 1.0% (or 2.3° F) limits during the post environmental test calibration at 250° F.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 13

Note 13

Conditions stated are for test profile. Actual temperature data was provided for the first 25 S only. This data indicated an overshoot to approximately 340° F at 25 S.

Note 14

Spray density and duration are not stated. WCAP 9157 indicates on pg 5-1 that spray can be injected via spray nozzles or main inlet steam piping to test chamber. No information is provided on specific approach used in this test.

Note 15

Rosemount Dwgs. 176KF and 176KS state that the lead termination area should be limited to 200° F. Based on the construction of the RTD and reactor coolant piping temperatures this temperature specification appears to be easily exceeded. Thermal aging of component parts has not been addressed by test or analysis.

0055007

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

EQUIPMENT ITEM NO. 14
RTD LOCATED IN THE CONTAINMENT, ELEV. 124'0"
ROSEMOUNT MODEL 176KF
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 14
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID): REACTOR TRIP (N2B13TE412B, D; 422B, D; 432B, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.2 [6]

0055003

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

1, 2, (3) RT, P, H, (CS) (A) S, (R), (M) I, QM, RPN, EXN, SEN, QI, RFS, 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
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System Configuration Review	~~4a, 4b, 4c~~
Equipment Environmental Qualification Review	~~5a, 5b, 5c~~
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:

X 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.

X 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.

X Corrective action specified by the Licensee:

- X 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 (_____)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (~~has not~~/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

8005090

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. 518	Page 2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

0055010

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	X
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	X
Criteria Regarding Instrument Accuracy Satisfied	X
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	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 Qualification Review	
IV	Documentation Not Made Available	

See evaluation for Equipment Item no. 13.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 14

LICENSEE RESPONSE TO NRC SER

F. Make: Rosemount

Model No.: 176 KF

Instrument: Narrow Range RTD

Location: Containment

Results of Evaluation

Thermal aging was not required to be addressed in the qualification program which was developed to meet the requirements of IEEE 323-1971. Radiation aging requirements of FSAR Section 3.11 have been met by the vendor qualification program. The materials and components of this instrument have been previously evaluated and potential thermal age-susceptible material was identified. A re-evaluation of the past environmental exposure of the instrument compared to the qualification testing conducted on this material has demonstrated a qualified life beyond June 30, 1982 and beyond the next few refueling outages. Vendor evaluation of longer term potential thermal aging is underway.

APCo Position

Surveillance and maintenance procedures are being implemented which ensure that the age-related degradation will be identified and the necessary action taken to verify the continuing qualified status of the instruments throughout the life of the plant.

APCo is presently completing an evaluation of various makes and models of RTD's which would be a suitable replacement for the Farley instrument. The selection will be made in a timely manner to support the scheduled replacement of the installed RTD's in accordance with

8205110055

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

EQUIPMENT ITEM NO. 15
RADIATION DETECTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
VICTOREEN MODEL 8771
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 15
LICENSEE REFERENCE(S): 2883
FUNCTION (PLANT ID): RADIATION MONITOR (Q2D21RE0027A-A, B-B)
SERVICE: POST ACCIDENT MONITOR
LICENSEE SUBMITTAL: SCEW(S): TMI-5.2 [6, 11, 19]

0055012

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, APN, EQN, SEN, QI, RPS, None,

Not stated, (Not applicable) New Item

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~~

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. 518	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

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

0050013

X 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.

X 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.

X Corrective action specified by the Licensee:

___ Equipment replacement with qualified equipment
X 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 (_____)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X 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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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

Page 2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

0057014

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)	
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	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 Qualification Review	
IV	Documentation Not Made Available	

0055015

LICENSEE RESPONSE TO NRC SER

As discussed in Chapter 2, the following three types of equipment were installed without complete qualification documentation.

Manufacturer	Generic Name	Model	No of Items	Chapter 2 Reference
Target Rock	Solenoid valve	79AB001	4	Section 2
ASCO	Solenoid valve	HTXB320A22V	4	Section 3
Victoreen	Radiation detector	877-1	2	Section 4
GEMS-Delaval	Level sensor	XM-54854	2	Section 7

The Target Rock solenoid valves and GEMS-Delaval level transmitters are presently undergoing qualification testing, which is expected to be completed during the fourth and third quarter of 1982, respectively. The test report for the Victoreen radiation detectors was recently evaluated. As discussed in Chapter 2, the evaluation of the test report indicates a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. This modification will be completed during the next refueling outage. The ASCO solenoid valves lack adequate qualification documentation and are scheduled to be replaced at the next refueling outage.

Other than the ASCO solenoid valves, all of the above equipment were installed prior to the completion of the qualification test program and the evaluation of the associated test reports. Alabama Power Company installed this equipment in order to provide the state-of-the-art coincident with the implementation dates required by NUREG-0737. Alabama Power Company will continue to monitor the progress of these ongoing qualification test programs. The ASCO solenoid valves will be installed to satisfy NUREG-0588.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 15

NOTES:

1. Cable assembly 907341 and detector #103 were irradiation aged to 41 Mrd, cable assembly 878-5000 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. 16

EQUIPMENT ITEM NO. 16
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
BARTON MODEL 763 (LOT 2)
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 16
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): POST-ACCIDENT MONITOR (N2B21PT402, 403)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.2[5]

8005017

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. 16

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

X 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.

X 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

8005010

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	
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	X

License did not supply documentation for review

0055019

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4a

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
AGING	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
QUALIFICATION TIME	The test program demonstrates that the transmitter will perform its trip function for 5 minutes and post-accident monitoring function for 4 months following the LOCA. The post accident time used during testing is fifteen (15) days. This time/temperature relationship is a conservative simulation of the four months post-accident operability requirements.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2750 ppm. This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified: (a) Temperature - The 380°F qualification test condition exceeds the 300°F required temperature by 80°F, thus adequate margin has been demonstrated. (b) Pressure - The 75 psig qualification test condition provides adequate margin above the maximum calculated Farley Unit 2 containment pressure of 47.3 psig. (c) Radiation - The Barton transmitter equipment qualification tests were based on a conservative calculations from the Westinghouse generic program which uses TID-14844 source terms and a 4100 MW_t plant as a basis. This conservative calculation established 3×10^7 rad as the qualification basis. The maximum calculated dose for Farley - Unit 2 Barton Transmitters would be substantially reduced.

NRC DEFICIENCY	APCo RESPONSE
MARGIN	from this amount by a ratio of the Farley power rating (2652 MW_t) over the calculational basis. Therefore, adequate margin exists. (d) Operating Time - The Barton transmitter qualification test program utilized a 15 day test period simulating a four (4) month post-DBE environment based on conservative aging procedures referenced in N WCAP-8687. This documented conservative basis ensures that adequate margin exists.

8055020

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 17

EQUIPMENT ITEM NO. 17
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
BARTON MODEL 764 (LOT 2)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 17
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): REACTOR TRIP (Q2B31PT455, 456, 457)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.6 [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:

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. 17

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

X 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.

X 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 SER 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

0055072

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

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	X

Licensee did not provide documentation for review

0055023

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 12

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
ACCURACY	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to review the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
QUALIFICATION TIME	The test program demonstrates that the transmitter will perform its trip function for 5 minutes and post-accident monitoring function for 4 months following the LOCA. The post accident time used during testing is fifteen (15) days. This time/temperature relationship is a conservative simulation of the four months post-accident operability requirements.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 1750 ppm. This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified: (a) Temperature - The 380°F qualification test condition exceeds the 300°F required temperature by 80°F, thus adequate margin has been demonstrated. (b) Pressure - The 75 psig qualification test condition provides adequate margin above the maximum calculated Farley Unit 2 containment pressure of 47.5 psig. (c) Radiation - The Barton transmitter equipment qualification tests were based on a conservative calculation from the Westinghouse generic program which used TID-14844 source terms and a 4100 MW_t plant as a basis. This conservative calculation established 3×10^7 rad as the qualification basis. The maximum calculated dose for Farley - Unit 2 Barton Transmitters would be substantially reduced.

NRC DEFICIENCY	APCo RESPONSE
MARGIN	from this amount by a ratio of the Farley power rating (2652 MW_t) over the calculational basis, therefore, adequate margin exists. (d) Operating Time - The Barton transmitter qualification test program utilized a 15 day test period simulating a four (4) month post-DBE environment based on conservative aging procedures referenced in WCAP-9485. This documented conservative basis ensures that adequate margin exists.

0055024

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

EQUIPMENT ITEM NO. 18
LEVEL SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 133'5"
DE LAVAL MODEL LS36497
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 18
LICENSEE REFERENCE(S): 2587
FUNCTION (PLANT ID): MAIN FEED PUMP TRIP (Q2N21LSH2828A, B, C; 2829A, B, C)
SERVICE: FLOOD LEVEL SENSOR
LICENSEE SUBMITTAL: SCEW(S): C.2.15.3 [6]

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

R, T, (QV), RT, P, H, CS, (A), S, (R), (M), I, QM, RHN, EQN, SEN, QI, RPS, [illegible],
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~~

0055025

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 1B

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

X 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.

X 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.

X 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
X Other (evaluating replacements if needed)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X 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

8205050029

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

8205270055

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)	
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	X
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	X
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. 18

LICENSEE RESPONSE TO NRC SER

8. Make: GEMS Delaval

Model No.: LS-36497/TM-36495

Instruments: Level Switches/Transmitters

Location: Containment and Main Steam Room

0055028

Results of Evaluation

Thermal aging was not a requirement in the qualification program for these instruments, which was developed to address IEEE 323-1971. Radiation aging requirements of FSAR Section 3.11, however, have been adequately met by the vendor qualification program. A material list of the equipment and a complete material list of the manufacturer's analogous equipment has been previously evaluated and found [illegible] thermal age-susceptible materials. A review of the key aging data of the materials in comparison to the Farley environmental requirements has indicated an expected life beyond June 30, 1982 and beyond the next few refueling outages. Furthermore, the operating history of the instruments does not indicate a short-term deleterious thermal aging mechanism. No new test reports or information is available at this time.

APCo Position

A favorable operating history, a successful radiological-aging test, a review of the thermal aging characteristics of the material, and the A/E evaluation supports APCo's opinion that the instruments would be capable of completing their intended function at least beyond the first refueling outage. Surveillance and maintenance procedures are being implemented which ensure the thermal age-related degradation will

LICENSEE RESPONSE TO NRC SER

be identified and the necessary action taken to verify the continuing qualified status of the instruments throughout the life of the plant.

APCo is presently completing an evaluation of various makes and models of instruments to determine a suitable replacement if needed. The selection, if required, will be made in a timely manner to support the surveillance and maintenance procedures.

0055029

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

LICENSEE RESPONSE TO NRC SER

00550.30

ITEM 2:

Tie in information between the environmental qualification documentation for the Gems level transmitters and the applicability of this documentation to the Gems level switches will be provided.

RESPONSE:

The environmental qualification documentation for the Gems-DeLaval level transmitters (FIRL Test Report F-C3834, March 1974) is also applicable to the Gems-DeLaval level switches. Applicability of the report to the level switches is documented on Gems-DeLaval drawing LS-36497, June 8, 1975, which has been made a part of the central qualification documentation file.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 18

NOTES: [1888] [1887]

1. FIRL report S-C3834, supplement to F-C3834, consisted of extended steam exposure in accordance with the first 24 hours of the temperature/pressure profile of IEEE 323-74. During successful execution of the 24 hour steam exposure the sensor functioned properly for less than 90 minutes, which is considered to be a failure.

2. The test program did not include thermal aging.

3. No qualified life has been established for this equipment.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

EQUIPMENT ITEM NO. 19
LEVEL SENSOR LOCATED IN THE CONTAINMENT, ELEV. 80'0"
DE LAVAL MODEL XM54854323
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 19
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT): LEVEL INDICATION (Q2G21LT3282A-A, B-3)
SERVICE: CONTAINMENT SUMP
LICENSEE SUBMITTAL: SCEW(S): TMI-7.2 [6, 11, 19]

0055032

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, EQN, 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. 19

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

X 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.

X 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
X 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.

X The Licensee (has/~~has not~~) provided a schedule for the proposed corrective action. (Schedule for accomplishing the corrective action TESTING TO BE COMPLETED BY 3RD QUARTER, 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

0055033

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

0055031

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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 19

LICENSEE RESPONSE TO NRC SER

0055035

As discussed in Chapter 2, the following three types of equipment were installed without complete qualification documentation.

Manufacturer	Generic Name	Model	No of Items	Chapter 2 Reference
Target Rock	Solenoid valve	79AB001	4	Section 2
ASCO	Solenoid valve	HTX8320A22V	4	Section 3
Victoreen	Radiation detector	877-1	2	Section 4
GEMS-Delaval	Level sensor	XM-54854	2	Section 7

The Target Rock solenoid valves and GEMS-Delaval level transmitters are presently undergoing qualification testing, which is expected to be completed during the fourth and third quarter of 1982, respectively. The test report for the Victoreen radiation detectors was recently evaluated. As discussed in Chapter 2, the evaluation of the test report indicates a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. This modification will be completed during the next refueling outage. The ASCO solenoid valves lack adequate qualification documentation and are scheduled to be replaced at the next refueling outage.

Other than the ASCO solenoid valves, all of the above equipment were installed prior to the completion of the qualification test program and the evaluation of the associated test reports. Alabama Power Company installed this equipment in order to provide the state-of-the-art coincident with the implementation dates required by NUREG-0737. Alabama Power Company will continue to monitor the progress of these ongoing qualification test programs. The ASCO solenoid valves will be installed to satisfy NUREG-0588.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

EQUIPMENT ITEM NO. 20
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
DE LAVAL MODEL XM36495
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 20
LICENSEE REFERENCE(S): 1887, 2587
FUNCTION (PLANT ID): POST-ACCIDENT LEVEL MONITOR (Q2E11LT3594A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.2 [6]

0055036

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

R, T, (VI) RT, P, H, (CS) (A) S, (R), (M) I, QM, RPN, EQN, 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. 20

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

0055037

X The Licensee (has/~~has not~~) provided a response to [illegible] a 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.

X The Licensee (ha~~s/s 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.

X 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
X Other (evaluating replacements if needed)

X The Licensee has provided other information for this equipment item that can be construed as a basis for justification for interim operation.

X The Licensee (~~does~~/has not) provided a schedule for the proposed corrective action. (~~Schedule has 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. 10

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)	
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	X
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	

0055038

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 10

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)	
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 Abnormalities (If Any) Satisfied	X
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	
I.a	Equipment Qualification Not Established	
II.b	Equipment Not Qualified	X
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	

0055039

LICENSEE RESPONSE TO NRC SER

B. Make: GEMS Delaval

Model No.: LS-36497/EM-36495

Instruments: Level Switches/Transmitters

Location: Containment and Main Steam Room

Results of Evaluation

Thermal aging was not a requirement in the qualification program for these instruments, which was developed to address IEEE 323-1971. Radiation aging requirements of FSAR Section 3.11, however, have been adequately met by the vendor qualification program. A material list of the equipment and a complete material list of the manufacturer's analogous equipment has been previously evaluated and found to contain thermal age-susceptible materials. A review of the key aging data of the materials in comparison to the Farley environmental requirements has indicated an expected life beyond June 30, 1982 and beyond the next few refueling outages. Furthermore, the operating history of the instruments does not indicate a short-term deleterious thermal aging mechanism. No new test reports or information is available at this time.

APCo Position

A favorable operating history, a successful radiological-aging test, a review of the thermal aging characteristics of the material, and the A/E evaluation supports APCo's opinion that the instruments would be capable of completing their intended function at least beyond the first refueling outage. Surveillance and maintenance procedures are being implemented which ensure the thermal age-related degradation will

8005010

LICENSEE RESPONSE TO NRC SER

be identified and the necessary action taken to verify the continuing qualified status of the instruments throughout the life of the plant.

APCo is presently completing an evaluation of various makes and models of instruments to determine a suitable replacement if needed. The selection, if required, will be made in a timely manner to support the surveillance and maintenance procedures.

8005190441

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 20

NOTES:

[1888] [1887]

1. FIRL report S-C3934 supplement to F-C3434 consists of steam exposure in accordance with the first 24 hours of the temperature/pressure profile of IEEE 323-74. During successful execution of the 24 hour steam exposure, the sensor functioned properly for less than 90 minutes, which is considered to be a failure.

2. The test program did not include thermal aging.

3. No qualified life has been established for this equipment.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 21

EQUIPMENT ITEM NO. 21
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
BARTON MODEL 764 (LOT 2)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 21
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): PRESSURIZER LEVEL (Q2B31LT459, 460, 461)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.5 [6]
FUNCTION (PLANT ID): FEEDWATER CONTROL (Q2C22LT474 TO 476, 484 TO 486, 494 TO 496)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.9 [6]
FUNCTION (PLANT ID): LEVEL INDICATION (Q2N11LT477, 487, 497)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.11 [6]

0055044

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

R, T, (QV), RT, P, H, CS, (A), S, (R), (M), I, QM, RPN, EQN, 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. 24

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

X 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.

X 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 Details)

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

0055044

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	
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	X

Licensee did not provide documentation for review

0055015

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
AGE NO	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
QUALIFICATION TIME	The test program demonstrates that the transmitter will perform its trip function for 5 minutes and post-accident monitoring function for 6 months following the DBE.
	The post accident time used during testing is fifteen (15) days. This time/temperature relationship is a conservative simulation of the four months post-accident operability requirements.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2750 ppm. This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified:

(a) Temperature - The 300°F qualification test condition exceeds the 300°F required temperature by 80°F, thus adequate margin has been demonstrated.

(b) Pressure - The 75 psig qualification test condition provides adequate margin above the maximum calculated Farley Unit 2 containment pressure of 47.5 psig.

(c) Radiation - The Barton transmitter equipment qualification test [illegible] based on a conservative calculation from the Westinghouse generic program which uses TLB-14844 source terms and a 4100 MW_t plant as a basis. This conservative calculation established 5 x 10^7 rad as the qualification basis. The maximum calculated dose for Farley - Unit 2 Barton Transmitters would be substantially reduced.

NRC DEFICIENCY	APCo RESPONSE
MARGIN	from this amount by a ratio of the Farley power rating (2652 MW_t) over the calculational basis, therefore, adequate margin exists.

(d) Operating Time - The Barton transmitter qualification test program utilized a 15 day test period simulating a four (4) month post-DBE environment based on conservative aging procedures referenced in W WCAP-9485. This documented conservative basis ensures that adequate margin exists.

0055046

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. 518	Page 1a

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

EQUIPMENT ITEM NO. 22
FLOW TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 121'0"
BARTON MODEL 764 (LOT 2)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 22
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): FEEDWATER CONTROL (Q2C22FT474, 475, 484, 485, 494, 495)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.10 [6]

0055047

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

R, T, QV, RT, P, H, CS, (A), S, (R), M, I, QM, RPN, EQN, 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. 22

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

X 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.

X 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

0055048

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. 518	Page 2

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	
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	X

License did not provide documentation for review

0055049

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
ACCIDENT	This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment qualification program, modification, replacement).
QUALIFICATION TIME	The test program demonstrates that the transmitter will perform its safety function for 5 minutes and post-accident monitoring function for a minimum [illegible]
	The post accident time used during testing is fifteen (15) days. This time/temperature relationship is a conservative simulation of the four months post-accident operability requirements.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 1750 ppm. This boric acid concentration exceeds the Farley FSAR value of 2600 ppm.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing test parameters. However, the following margins can be identified:
	(a) Temperature - The 380°F qualification test condition exceeds the 340°F calculated temperature by 40°F, thus adequate margin has been demonstrated.
	(b) Pressure - The 75 psig qualification test condition provides adequate margin above the maximum calculated Farley Unit 2 containment pressure of 61.3 psig.
	(c) Radiation - The Barton transmitter equipment qualification tests were based on a conservative calculation from the Westinghouse generic program which used TID-14844 source terms and a 4100 Mr/hr plant as a basis. This conservative calculation established 5 x 10^7 rad as the qualification basis. The maximum calculated dose for Farley - Unit 2 Barton transmitters would be substantially reduced.

NRC DEFICIENCY	APCo RESPONSE
MARGIN	from this amount by a ratio of the Farley power rating (2652 Mwt) over the calculational basis. Therefore, adequate margin exists.
	(d) Operating Time - The Barton transmitter qualification test program utilizes a 15 day test period simulating a four (4) month post-DBA environment based on conservative aging procedures referenced in W WCAP-9885. This documented conservative basis ensures that adequate margin exists.

0055030

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

EQUIPMENT ITEM NO. 23
LIMIT SWITCH LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 23
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2C22ZS0478, 488, 498, 479, 489, 499)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.4 [6]

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	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~~

0055051

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 23

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

X 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.

X 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 Availible

8005050052

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)	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	
II.b	Equipment Not Qualified	
II.c	Equipment Satisfies All Requirements Except Qualified Life or Replacement Schedule Specified	X
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 NO. 26 (EXCLUDING SUBMERGENCE)

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

LICENSEE RESPONSE TO NRC SER

0055054

APCo RESPONSE

All limit switches outside containment, previously identified as requiring replacement have been replaced with fully qualified NAMCO EA-180 models. System master lists and component evaluation worksheets have been revised to document the qualification of these limit switches. This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

All NAMCO EA-180 Limit Switches outside the containment have been qualified for submerged operation. Refer to Bechtel Change Notice 2BE-1049-3.

Although the NAMCO EA-180 Limit Switches are qualified for 2×10^8 Rads gamma, limit switches in this area will only be exposed to normal background radiation outside the containment. They do not see radiation as a result of recirculated sump fluid.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

EQUIPMENT ITEM NO. 24
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'7" 00550[illegible]55
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 24
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N25ZS3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.3 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N23ZS3228A, B, C; 3227A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.4 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N12ZS3234A, B; 3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.3 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N11ZS3369A, B, C; 3370A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.6 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N11ZS3368A, B, C; 3976A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.5 [6]

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

(R) (T) (W) RT, (P) (E) 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. 24

0055056

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

X 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.

X 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. 26

0055057

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)	
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	X
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	

FOR EVALUATION REFER TO ITEM NO. 26

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 24

LICENSEE RESPONSE TO NRC SER

0055058

APCo RESPONSE

All limit switches outside containment, previously identified as requiring replacement have been replaced with fully qualified NAMCO EA-180 models. System master lists and component evaluation worksheets have been revised to document the qualification of these limit switches. This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

All NAMCO EA-180 Limit Switches outside the containment have been qualified for submerged operation. Refer to Bechtel Change Notice 2BE-1049-3.

Although the NAMCO EA-180 Limit Switches are qualified for 2×10^8 Rads gamma, limit switches in this area will only be exposed to normal background radiation outside the containment. They do not see radiation as a result of recirculated sump fluid.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

EQUIPMENT ITEM NO. 25
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 118'0" & ABOVE
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 25
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2B31ZS8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.3 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2E21ZS8871)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.6A [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P13ZS3196, 2866B, 3197, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.5A [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P17S3184, 3443, N2C22ZS0499)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.4 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P15ZS3104, 3103, 3765, 3766, 3179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P15ZS3180A, B, C; 3181A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2E12ZS3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.5 [6]

0055059

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, UM, (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. 25

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECKED ITEMS ARE APPLICABLE: 0055040

X 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 D&E environmental service conditions.

X 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 - SINGLE 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. 35

0055061

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)	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	
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	

FOR EVALUATION REFER TO ITEM 150.26 (EXCLUDING SUBMERGENCE)

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

LICENSEE RESPONSE TO NRC SER

0055062

APCo RESPONSE

This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm boron (Reference: Qualification Test Report for NAMCO EA-180 Limit Switches). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.

For a discussion of the effects of submergence, refer to Appendix 4, Section II.C.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

EQUIPMENT ITEM NO. 26
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 109'0" 0055063
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 26
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2E21ZS8149A, B, C; Q2E21ZS8808AB, BB, CD)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.6 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2G21ZS3396, 7126, N2G21ZS1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.3 [6]

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

R, X, QT, ET, 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. 26

0055064

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 24

0055065

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)	X
Program Established to Identify Aging Degradation	
Criteria Regarding Aging Simulation Satisfied (If Required)	
Criteria Regarding Temperature/Pressure Exposure:	
X o Peak Temperature Adequate	
X o Peak Pressure Adequate	
o Duration Adequate	
X o Required Profile Enveloped Adequately	
X o Steam Exposure (If Required) Adequate	
Criteria Regarding Spray Satisfied	
Criteria Regarding Submergence Satisfied	X
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. 26

LICENSEE RESPONSE TO NRC SER

0055066

APCo RESPONSE

This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm boron (Reference: Qualification Test Report for NAMCO EA-100 Limit Switches). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.

For a discussion of the effects of submergence, refer to Appendix A, Section II.C.

ECUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

LICENSEE RESPONSE TO NRC SER (Continued)

0055067

RAMCO LIMIT SWITCHES

LOCATION AND FUNCTIONAL DESCRIPTION

RAMCO limit switches located in containment are used in air-operated valve dc solenoid control circuits. Under normal operating conditions, the valve solenoids are energized and their associated air-operated isolation valves are open. The solenoids are kept in the energized state or "sealed-in" by means of RAMCO limit switches. Figure II.C-1 shows a typical control circuit for an air-operated valve using a limit switch for "seal-in." The RAMCO limit switches provide position indication for the air operated valves. This indication circuit consists of position indicating lights in the control room. No automatic safety functions are associated with this valve position indication circuit.

It should be noted [illegible] ated limit switches may give an erroneous valve [illegible] s is judged acceptable since the operator can [illegible] ion by verifying that the redundant isolation valv [illegible] e operator is not required to report these valves ? [illegible] or utilize their position indication to establish operating procedures.

FAILURE MODE ANALYSIS

The switches can fail open, grounded, or closed. A failure mode and effects analysis shows that for each failure mode two initial conditions for the associated solenoid must be considered: Solenoid initially energized and solenoid initially de-energized.

With the solenoid initially energized, limit switch failures will affect the solenoid and air-operated valve as follows. If the switch fails open, it will de-energize the solenoid and cause the associated air-operated valve to go to its fail safe position (closed) and need not be considered any further. A failure resulting in a single ground would have no effect on the battery power supply which is ungrounded. Multiple grounds could result in a blown fuse in the circuit that feeds the solenoid. This would cause de-energization of the solenoid resulting in the associated air-operated valve going to its fail safe position (closed) (Refer to Figure II.C.-2).

If the solenoid is initially de-energized it will be due to any of three possible conditions, one including the limit switch failure itself. These

LICENSEE RESPONSE TO NRC SER (Continued)

0055068

FAILURE MODE ANALYSIS (CONT.)

conditions are (1) loss of power, (2) control switch failed open or held continuously in CLOSE position, and (3) containment isolation signal. For the first two conditions, limit switch failure has no effect on the solenoid. For the third condition (containment isolation signal present), the limit switch fail open, there would be no immediate effect. Subsequent to the failure, it would not be possible to re-open the air-operated valve unless the control switch was held continuously in the OPEN position. However, this condition has no effect on the ability of the valve to perform its safety function, i.e., to close.

In the event that containment isolation is called for and the limit switch fails closed, the isolation function will be performed as required. However, when the isolation signal is subsequently reset, the failed limit switch could cause its associated solenoid to be re-energized resulting in a re-opening of the air-operated isolation valve (Refer to Figure II.C.-2).

JUSTIFICATION FOR OPERATION

Protection against a loss of containment isolation is provided by redundant air-operated valves located outside of containment. Because these valves and their control elements are located outside containment they are not subject to the adverse environment resulting from the postulated initiating event.

LICENSEE RESPONSE TO NRC SER (Continued)

0055069

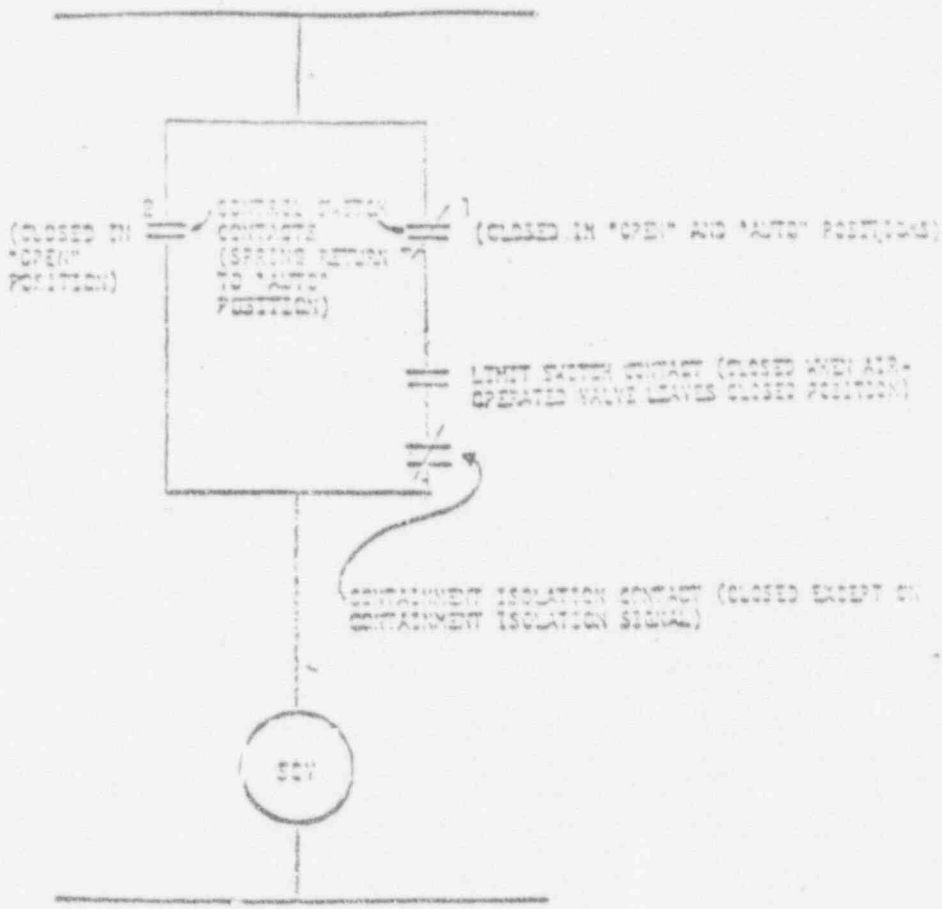


FIGURE 21.6.1-2
TYPICAL LIMIT SWITCH "SEAL-IN" CIRCUIT
FOR AN AIR-OPERATED CONTAINMENT ISOLATION VALVE

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

0055070

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

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

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION Equipment Type	LIMIT SWITCH	LIMIT SWITCH	
Manufacturer's Name (5.2.2/-/-)	NAMCO CONTROLS	NAMCO CONTROLS	
Model Number (5.2.2/-/-)	EA180	EA180-11302, REV. H	
Serial Number	NOT STATED	3999 H 13658	
Features/Mounting (5.2.6/-/-)	ON VALVE	HORIZONTAL IN AUTOCLAVE	
Connections/Interfaces (5.2.6/-/-)	NOT STATED	TEFLON TAPE USED TO SEAL CONDUIT THREADS	
Location/Elevation	CONTAINMENT ELEV. 111'	N/A	
Equipment ID No.		N/A	
QUALIFICATION REPORT (8.0/5.0/5.0) Report ID Number	QTR-105	QTR-105	
Report Date	N/A	AUGUST 28, 1980	
Issued by	N/A	ACME CLEVELAND DEVELOPMENT COMPANY	
Prepared for	N/A	NAMCO CONTROLS	
Referenced Reports	N/A	NOT STATED	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	N/A	SEQUENTIAL TEST	
QUALIFICATION TEST PROGRAM Functional Test Description (5.2.5/2.2.9/2.2.9)	N/A	MAKE/BREAK CONTACT	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	NOT STATED	0.5 AMPS @ 100 VDC	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

0055071

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	NOT STATED	
Number of Specimens	N/A	1	
Test Instruments Calibrated	N/A	YES	
Safety Function (Active/Passive) (-/2.1.3/2.1.3)	NOT STATED	ACTIVE	
Test Duration (5.2.1/-/-)	N/A	30 days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	> 1 day	N/A	
Required Function Time	1 HOUR	N/A	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	INSPECTION/BASE LINE DATA THERMAL AGING/MECHANICAL WEAR AGING/IRRADIATION/ SEISMIC TESTING/LOCA SIMULATION	
Test Sequence (NUREG-0588, Cat. I) (-/2.3.1/-)	N/A		
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) Thermal Aging/Basis	NOT STATED	400 hrs @ 120°C	X NOTE 1
Material Aging Evaluation (7.0/-/-)	NOT STATED	ANALYSIS TO DETERMINE SUSCEPTIBILITY	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)	NOT STATED	THERMAL	
Radiation Aging, Type	GAMMA	GAMMA	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

0055072

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/058[illegible]/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	N/A	204 MEGA RADS *	
Radiation Aging, Dose Rate	N/A	9.1×10^6 RADS/HR	
Radiation Aging, Method	N/A	TEST	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)	NOT STATED	NOT STATED	
Operational Aging (-/4.2/-)	N/A	100,300 ACTUATION CYCLES WHILE UNDER 0.5 AMP @ 100 Vdc LOAD	
Other Age Conditioning (-/4.2/-)	N/A	NOT STATED	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	NOT STATED	5 YEARS @ 55°C	X NOTE 1
Normal Ambient Temperature Normal Ambient Radiation Normal Ambient Humidity	NOT STATED	N/A	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	NOT STATED	EA189-90051	
On-Going Analysis of Failures and Degradation (7.0/-/-)	NOT STATED	N/A	
Margin (General) (6.0/3.0/3.0)	N/A	NOT STATED	
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)	N/A	NOT STATED	

* NORMAL AND ACCIDENT DOSE COMBINED IN SINGLE EXPOSURE PRIOR TO LOCA SIMULATION

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-1/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (Y OR — NOTE NO.)
ACCIDENT CONDITIONS			
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/MSLB	
Radiation Type	GAMMA	GAMMA	
Radiation Dose (rd) (4.1.2/1.4/1.4)	50 MEGARADS	204 MEGARADS*	
Radiation Dose Rate (rd/hr)	NOT STATED	9.1×10^6 RADS/HR	
Radiation Qual. Method (5.3.1/-/-)	N/A	TEST	
Proximity to Concentrated Radiation (4.1.2/1.4.6/1.4.6)	NOT STATED	N/A	
Equipment Susceptible to Beta Radiation (4.1.2/-/-)	NOT STATED	NOT STATED	
Radiation Dose (Normal + Accident) (4.1.2/-/-)	NOT STATED	204 MEGARADS*	
Plateout Dose Considered (-/1.48/1.48)	NOT STATED	N/A	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)	NOT STATED	N/A	

* NORMAL AND ACCIDENT DOSES COMBINED IN A SINGLE EXPOSURE PRIOR TO LOCA SIMULATION

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

0055074

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE * OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	36/21/SEC	11/8/SEC	
Peak: °F/psig/RH/Time	300/47.5/100/1 MIN	340/70/100/3 hrs	
Decrease To: °F/psig/RH/Time	280/25/100/10 MIN	140/-/-/10SEC 340/70/100/3 hrs	
Decrease To: °F/psig/RH/Time	180/12/100/8 HRS	320/40/100/3 hrs	
Decrease To: °F/psig/RH/Time	drop to ambient in 11.57 days	260/25/100/4 days 200/10/100/25 days	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	N/A	N/A	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	N/A	TEST	
Spray Composition (4.1.4/1.3, 2.2.8/ 1.3, 2.2.8)	H_3BO_3/NaOH	$Na_2S_2O_3$/H_3BO_3/NaOH/H_2O	
Spray Density (gpm/ft^2)	NOT STATED	0.15	
Spray Duration	NOT STATED	30 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)	NOT STATED	N/A	X NOTE 2
In-Leakage Considered (5.2.6, 5.3.2/-/-)	NOT STATED	N/A	
Time to Submergence	7714 SEC	N/A	
Dust Environment (-/2.2.11/2.2.11)	N/A	N/A	

* LICENSEE PROFILE ENVELOPED FOR COMPARISON

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 26

0055075

NOTES:

1. ALTHOUGH THE REPORT PROVIDES A MEANS OF ESTABLISHING A QUALIFIED LIFE BASED ON THE AGING SIMULATION, THE LICENSEE HAS NOT STATED THE QUALIFIED LIFE. THIS IS A DEFICIENCY

2. THE LICENSEE HAS PROVIDED JUSTIFICATION FOR INTERIM OPERATION WITH THE FAILURE MODE ANALYSIS (SEE PAGES 3b-3d), BUT HAS NOT PROPOSED ANY CORRECTIVE ACTION OR EVIDENCE OF QUALIFICATION OF THE LIMIT SWITCHES FOR SUBMERGENCE.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

EQUIPMENT ITEM NO. 27
LIMIT SWITCH LOCATED IN THE CONTAINMENT
NAMCO MODEL EA180
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 27
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2B31ZS0445A, 445B)
LICENSEE SUBMITTAL: SCEW(S). TMI-4.5 [6, 11, 19]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2B13ZS2034, 2035, 2036)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [6, 11, 19]

0055076

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, ~~3bp 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~~

Franklin Research Center A Division of The Franklin Institute 20th and Race Streets, Phila., Pa. 19103 (215) 448-1000	NRC Contract No. NRC-05-79-118 FRC Project No. C5257 FRC Assignment No. 13 FRC Task No. 518	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27

0055077

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

X 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.

X 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 RELEVANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW OF LISTED 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. 27

0055078

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)	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	
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	

FOR EVALUATION REFER TO ITEM NO. 26 (EXCLUDING SUBMERGENCE)

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 22

LICENSEE RESPONSE TO NRC SER

0055079

APCo RESPONSE

This equipment has been evaluated to have a conservative qualified life beyond June 30, 1982 based on type testing, material analysis using Arrhenius Methodology, and/or operating experience. APCo will complete an evaluation by January 1, 1982 to extend the qualified life of the equipment and take appropriate actions, if necessary (i.e., justification, alternate equipment, qualification program, modification, replacement).

The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 3000 ppm boron (Reference: Qualification Test Report for NAMCO EA-180 Limit Switches). This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.

For a discussion of the effects of submergence, refer to Appendix 4, Section II.C.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

0055060

EQUIPMENT ITEM NO. 28
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 28
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-7.4 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATON (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-5.3 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-4.4 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-3.4 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-2.3 [6, 11, 19]

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

R, T, QV, 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~~
Maintanance and Replacement Schedule Summary	~~7a, 7b, 7c~~

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

0055081

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 28

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM 0055082

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. 26

LICENSEE RESPONSE TO NRC SER

0055083

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the heat sea susceptible material which analyses determined to be epoxy resin. Using Arrhenius techniques, a temperature dependent life line was established based on reduction in ultimate tensile strength. Thermogravimetric analyses also were run on a DuPont Model 950 thermal analyzer to confirm the elevated temperature tests. These data can be extrapolated to indicate a service life in excess of 150,000 hours (40 years) at the average service temperature of 130°F.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification test program for this component was 8750 ppm (Reference: G. C. Test Report of L. V. Penetration). This boric acid concentration exceeds the Farley FSAR value of 2500 ppm.
QUALIFICATION TIME	The component qualification time is actually 10 days. The listing of 4 hours on the component worksheet was done to indicate that the specification requirement was met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

(a) Temperature - The 340°F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated.

(b) Pressure - The 118 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 42.2 psia.

(c) Radiation - The 1×10^8 Rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 3×10^7 Rads therefore adequate margin exists.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

Criteria: DOR Guidelines X ; NUREG-0588, Cat. I ; NUREG-0588, Cat. II 0055084

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION Equipment Type	Electrical Penetration	Electrical Penetration	
Manufacturer's Name (5.2.2/-/-)	GE	General Electric	
Model Number (5.2.2/-/-)	100 Series	Series 100	
Serial Number	Various	various	
Features/Mounting (5.2.6/-/-)	in Containment Shell	Horizontal in Autoclave	
Connections/Interfaces (5.2.6/-/-)	Pigtail	Crimp with splice sleeve	
Location/Elevation	See p-1A	Not Applicable	
Equipment ID No.	"	Not Applicable	
QUALIFICATION REPORT (5.0/5.0/5.0) Report ID Number	N. I D	100 Series Containment Penetration Jan. 19[illegible]	
Report Date	1/[illegible]/74	March 1974	
Issued by	GE	General Electric	
Prepared for	GE	General Electric	
Referenced Reports	NO	NO74-502-3 San Jose	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)	↓	Sequential Test	
QUALIFICATION TEST PROGRAM Functional Test Description (5.2.5/2.2.9/2.2.9)	↓	Leakage and Insulation Resistance/ Carry Current	
Operating Conditions (-/2.2.10/2.2.10) Load Cycles/Voltage/ Current/Freq.	Various	NO4-95A@460Vac NO10-3A @ 460Vac NO16-1A@125Vac	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

005503

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	$< 10^{-7}$ ccHe/sec @15psig	
Accuracy (5.2.5/-/-)		Not Applicable	
Number of Specimens		6	
Test Instruments Calibrated		Before and After each part of test	
Safety Function (Active/Passive) (-/2.1.3/2.1.3)	active	Not Stated	
Test Duration (5.2.1/-/-)	N/A	7 days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	> 24 hrs	Not Applicable	
Required Function Time	4 hrs	Not Applicable	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	Thermal Cycle Irradiation LOCA Simulation Post LOCA Inspection	
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)			
Thermal Aging/Basis	see p-30	Analysis and tests of Subcomponents	
Material Aging Evaluation (7.0/-/-)	"	Each Material evaluated	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		"O" ring seal Limiting	
Radiation Aging, Type	[illegible]	Gamma	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

0055086

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	See Accident Dose	
Radiation Aging, Dose Rate		See Accident Dose	
Radiation Aging, Method		Test	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		Not Stated	
Operational Aging (-/4.2/-)		Not Applicable	
Other Age Conditioning (-/4.2/-)		Thermal Cycle	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 yrs @ 160	40 Years	
Normal Ambient Temperature	N/A	Not Applicable	
Normal Ambient Radiation		Not Applicable	
Normal Ambient Humidity		Not Applicable	
On-Going Surveillance and Preventive Maintanance (7.0/-/-)	Equip. Program	Not Applicable	
On-Going Analysis of Failures and Degradation (7.0/-/-)	"	Not Applicable	
Margin (General) (6.0/3.0/3.0)	N/A	Not Applicable	
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)		Not Applicable	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

0055087

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (I OR NOTE NO.)
ACCIDENT CONDITIONS			
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	Gamma	Gamma	
Radiation Dose (rd) (4.1.2/1.4/1.4)	5×10^7	5×10^7	
Radiation Dose Rate (rd/hr) Radiation Qual. Method (5.3.1/-/-)	Not Stated	3Mrd/hr 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 Applicable	
Radiation Dose (Normal + Accident) (4.1.2/-/-)		Not Applicable	
Plateout Dose Considered (-/1.48/1.48)		Not Applicable	
Gamma + Beta Dose (rd) (4.1.2/1.4.7/1.4.7)		Not Applicable	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 28

0055088

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase	See page 5-9	Not Stated	
Peak: °F/psig/RH/Time		340/103/100/3hrs	
Decrease To: °F/psig/RH/Time		320/81/100/3hrs	
Decrease To: °F/psig/RH/Time		260/25/100/18hrs	
Decrease To: °F/psig/RH/Time		150/16/100/168hrs	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)		Not Applicable	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH	None	Note 1
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)		None	
Spray Density (gpm/ft^2)	Not Stated	None	
Spray Duration		None	
Submergence Duration (4.1.3/2.2.5/2.2.5)	N/A	None	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		Not Applicable	
Time to Submergence		Not Applicable	
Dust Environment (-/2.2.11/2.2.11)		Not Applicable	

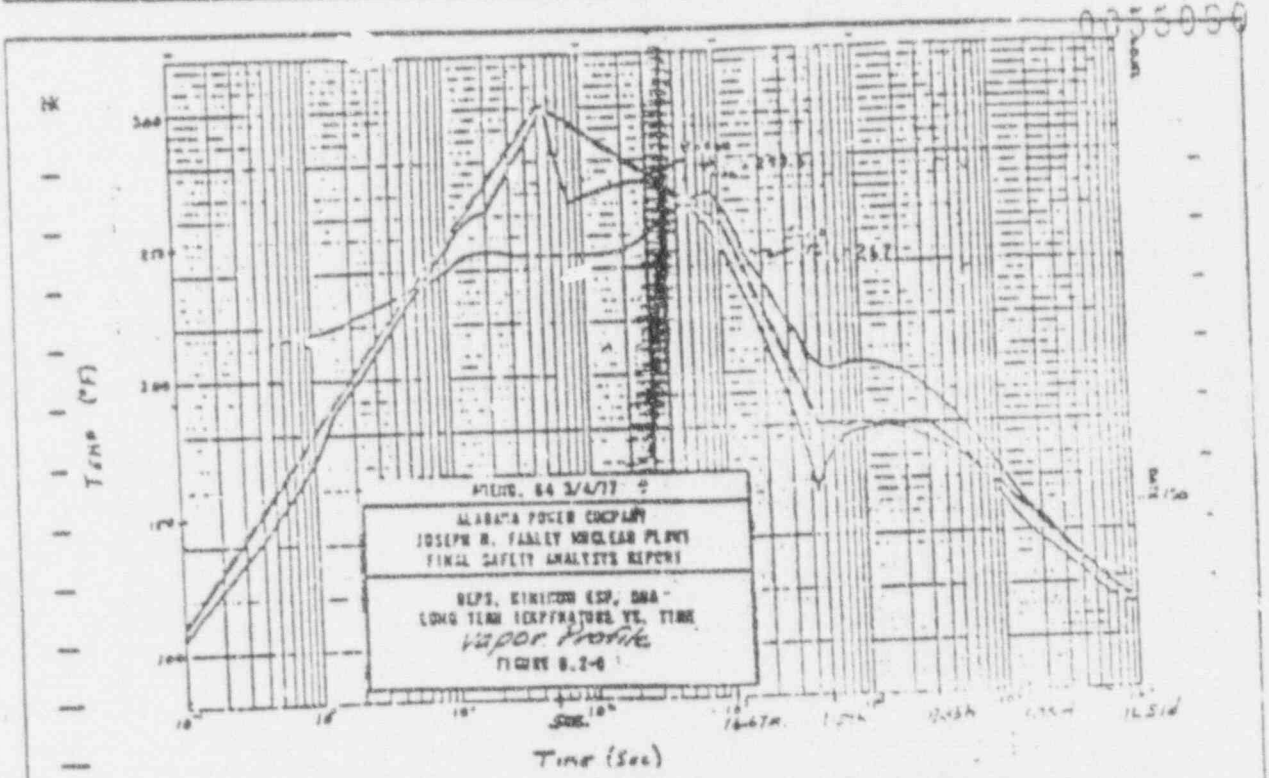
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 25

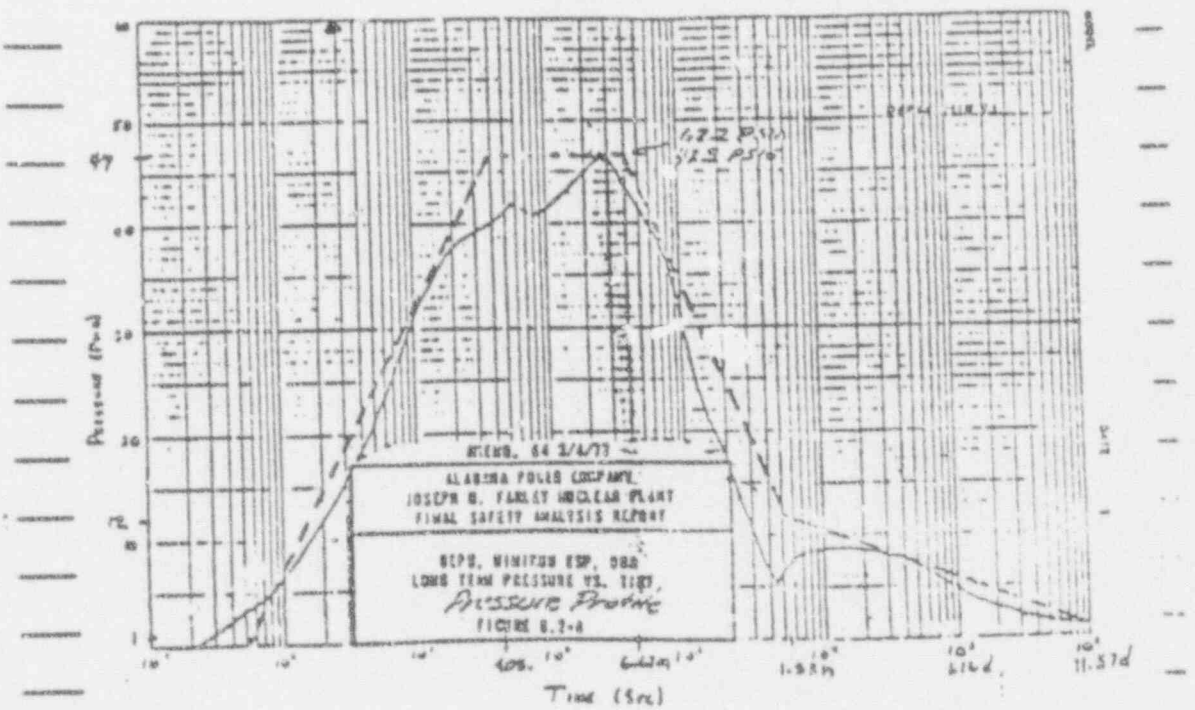
0055089

NOTES:

Note 1. The test report does not include chemical spray per se but does include immersion tests and steam tests where the steam is generated from a boric Acid/ sodium hydroxide solution. It is concluded that the testing is at least as severe as from a fine spray.

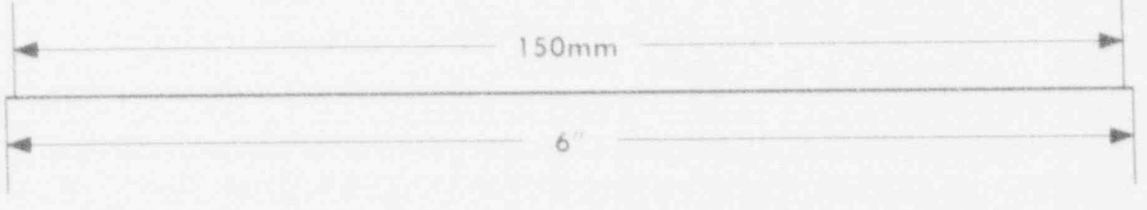
EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 27





2

IMAGE EVALUATION
TEST TARGET (MT-3)



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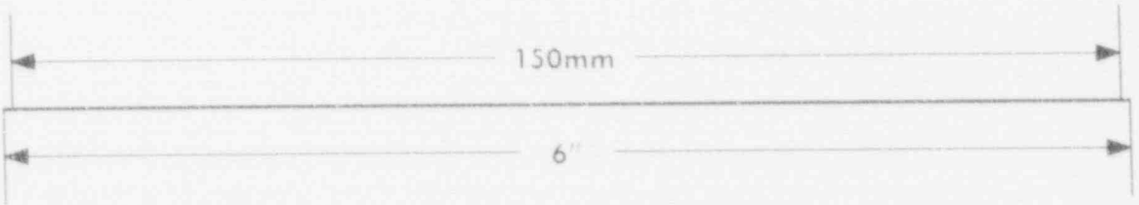
2

IMAGE EVALUATION TEST TARGET (MT-3)



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2

IMAGE EVALUATION
TEST TARGET (MT-3)

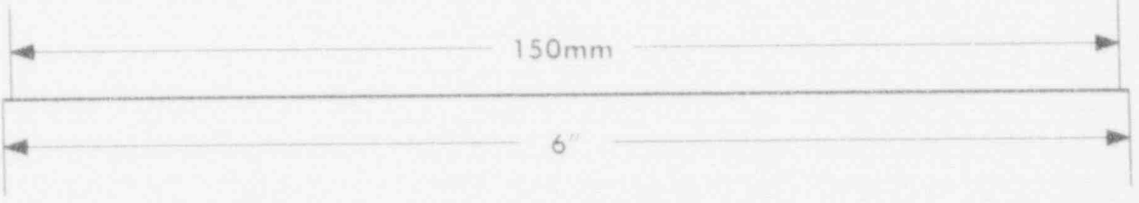

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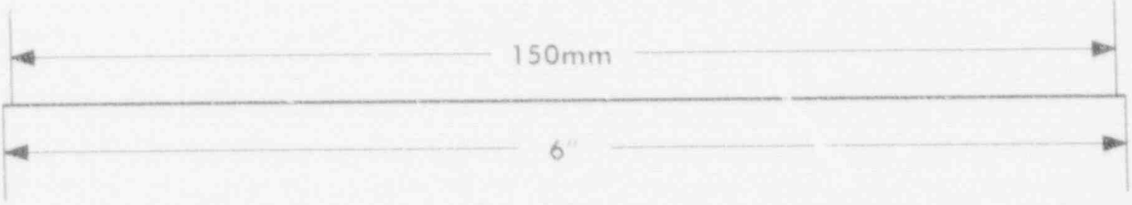
IMAGE EVALUATION TEST TARGET (MT-3)



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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

0055091

EQUIPMENT ITEM NO. 29
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT, ELEV. 143'0"
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 29
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.19.5 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.7 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.12 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.11.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.10.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.9 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.8.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.7.3 [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:

Contents	Checksheet Page No.
Equipment Item	1a1, 1a2
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. 29

0055092

EQUIPMENT ITEM NO. 29 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.9 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.11 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.w [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.3 [5]

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

R, T, QT, RS, P, H, CS, A, S, (R), M, I, QM, EPW, 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

B.3 Franklin Research Center A Division of The Franklin Institute 20th and Race Streets, Phila., Pa. 19103 (215) 448-1000	NRC Contract No. NRC-03-81-118 FRC Project No. C5257 FRC Assignment No. 13 FRC Task No. 518	Page 1b

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

0055093

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

X The Licensee ~~(has/has not)~~ provided a response to the SER concerns.

X The Licensee ~~(has/has not)~~ specifically stated that the equipment is qualified and will function when exposed to the applicable DBE environmental service conditions.

X 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

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. 518

Page 2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

06550943

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 see Item 28

09571 0545

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 29

0055095

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
AC CKD	Type test accelerated aging techniques were used to thermally age the most age susceptible material which analyses determined to be epoxy resin. Using Arrhenius techniques, a temperature expandant life time was established based on 50% reduction in ultimate tensile strength. Thermogravimetric analyses also were run on a DuPont model 950 thermal analyzer to confirm the elevated temperature tests. These data can be extrapolated to indicate a service life in excess of 350,000 hours (40 years) at the maximum service temperature of 140°F.
CHEMICAL SPRAY	The chemical spray concentrations utilized in the equipment qualification testing program for this equipment was 8750 ppm (Reference: G. E. Test Report for L. V. Penetration). This boric acid concentration exceeds the Farley FSAR value of 1900 ppm.
QUALIFICATION TIME	The component qualification time is actually 10 days. The listing of 4 hours on the component worksheet was done to indicate that the specification requirement was met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 360°F qualification test condition exceeds the 320°F required temperature by 40°F thus adequate margin has been demonstrated. (b) Pressure - The 118 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia. (c) Radiation - The 1×10^8 Rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 3×10^7 Rads therefore adequate margin exists.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 30

EQUIPMENT ITEM NO. 30
TERMINAL BLOCK LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 30
LICENSEE REFERENCE(S): 3950, 4577
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2C22SV0478A-A/JB, 488A-A/JB, 498A-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.7 [5]

0055096

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

R, (T), QV, RT, P, H, CS, (A), S, (R), (M), I, QM, RPN, EXN, EN, 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
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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. 30

0053097

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to the applicable IBE environmental service conditions.

X 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. 30

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM 0055098

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 see item 31

LICENSEE RESPONSE TO NRC SER

0055099

COMPONENT: TERMINAL BLOCKS/JUNCTION BOXES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the terminal blocks. Arrhenius Methodology was used to establish a qualified life. The approximate materials were identified and activation energies determined. From the analysis, a qualified life of 40 years was determined for both inside and outside containment for Plant Farley.
TEMPERATURE	The qualification temperature of the terminal blocks is 300°F. It can be seen from Figure C.3.4, the calculated peak temperature of 300°F is reached in 0.27 seconds, where it remains for approximately 1.1 seconds, at which time the temperature drops to atmospheric saturation temperature of 212°F. Because of the thermal lag, the terminal blocks are never exposed to a temperature greater than 212°F. The terminal blocks are therefore qualified to the accident environment with conservative margin.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - Refer to discussion on temperature above. (b) Pressure - The 80 psia qualification test condition provided adequate margin above the maximum calculated Farley, Unit 2 Main Steam Room pressure of 20.5 psia. (c) Radiation - Although the terminal blocks are qualified for 1 x 10^8 rads, radiation qualification is not a requirement for the Main Steam Room. Therefore adequate margin exists.
SUBMERGENCE	A items listed as deficient for submergence are located at an elevation of 135' in Main Steam Room which is above flood level elevation of 130'-5" hence not deficient

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

EQUIPMENT ITEM NO. 31
TERMINAL BLOCK LOCATED IN THE CONTAINMENT E 0055100
STATES MODEL TYPE ZWN
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 31
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2B13GG001-B)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.3 [6, 11, 19]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2B31SV0444BA-B/JB, 2B5AA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.3 [6, 11, 19]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (A2TB007; Q2B13SV2213A-A/JB, 4B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [6, 11, 19]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2B13SV2214A/JB, 3B-B/JB; A2TB025)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [6, 11, 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, ...~~
System Consideration Review	~~4a, 4b, 4c, ...~~
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. 37

0055101

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 31

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM 0055102

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	

Bechtel Power Corporation 0055103

HARD COPY RECORD

CHECK THE TYPE OF RECORD:

- *ILLEGIBLE DOCUMENT ☒
- **ILLEGIBLE PAGE ☐
- STRIP CHART ☐
- PHOTOGRAPH (PHOTO DOCUMENT) ☐
- MATERIAL SAMPLE (PART OF DOCUMENT PACKAGE) ☐
- COMPUTER PRINTOUT ☐
- FLIMSY SOURCE DOCUMENT ☐

Job No. 7597-03/20

Electrical Correspondence

E-91

SCS LETTER of 2-16-83 LSF-NS-1772

ITEM # 31, pages 3a thru 5j

Document No. and/or Description

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GRD 27540 Rev. 4/80

0055104

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the terminal blocks. Arrhenius Methodology was used to establish a qualified life. The age-susceptible materials were identified and activation energies determined. From the analysis, a qualified life of 40 years was established for both inside and outside containment for Plant Farley.
CHEMICAL SPRAY	The chemical spray concentration utilized in the environment qualification testing program for this equipment was 10,000 ppm (reference: Sale Report [illegible]). This boric acid concentration exceeds the Farley FSAR value of 7000 ppm.

The listing of deficiencies for all parameters for the two beams [illegible] and [illegible] appears to be an NRC clerical error, since the same terminal block/terminal beams are used throughout the inside of the containment.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

0055105

The Licensee Stated:

ENVIRONMENTAL QUALIFICATION OF
STATES COMPANY TERMINAL BLOCKS FOR
ALABAMA POWER COMPANY
JOSEPH M. FARLEY NUCLEAR PLANT

I. INTRODUCTION

As a result of a review performed pursuant to NRC Circular 79-01, it was determined that the terminal blocks used in conjunction with certain safety related electrical circuits inside the containment did not have documentation certifying their qualification status.

There is a total of 43 terminal blocks inside the containment which are used to connect electrical solenoid valves to field wiring. These valves are used for the purpose of containment isolation. In addition, there are six wide range Lead/Thot reactor coolant system temperature sensors, two in each loop, which are interconnected to field wiring through terminal blocks. These are provided to enable the required normal functions to be performed, to proceed to an orderly shutdown following a Condition II or Condition III event as noted in FSAR Sections 15.2 and 15.3. The terminal blocks are Type [illegible], Catalog M-[illegible], manufactured by States Company, a division of Multi-Amp Corporation. They are twelve pole, front connected terminal blocks with white barrier strips and are mounted on the inside of NEMA 4 enclosures, where dimensions are 12" x 14" x 5". The solid base of the terminal block is fabricated from general purpose Durez 0791, which is a brand name of Locker Chemical and Plastics Corporation and is basically a two stage, asbestos free phenolic. The barrier strips are fabricated from Allied Chemical Grade FP-1080 polypropylene. Both materials are highly resistant to heat and moisture as well as ionizing radiation.

The enclosures which house the terminal blocks are Raffinan Engineering Company, NEMA Type 4, continuous hinge, clamp cover screws, Catalog M-[illegible]. They are fabricated from 14 gauge steel and finished with gray hammerlite stones inside and out over phosphatized surfaces. To preclude the collapse of the enclosures due to positive pressure, weed holes have been drilled in the bottom, and [illegible] disks installed over the holes.

Although it was demonstrated that the terminal blocks were environmentally qualified for inconstainment applications at Farley, based on an engineering evaluation of published data, and previous test information on constituent parts of the terminal block, it was decided that the blocks should be environmentally qualified by a series of formal, sequential tests at a testing laboratory.

The testing laboratory selected was Wyle Laboratories located in Huntsville, Alabama, and the testing was performed during the period of December 7, 1978 and February 11, 1979.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

0055106

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. 1
REPORT NO. 44254-1

5.0 [illegible]

5.1 Alabama Power Company Purchase Order No. FUP-3-1194.

5.2 Wyle Laboratories Qualification Plan 54[illegible]/[illegible]/[illegible], Revision B, dated October 10, 1978.

6.0 [illegible]

6.1 Test Item Description

6.1.1 Test Item No. 1

A 12-pole Terminal Block, Type [illegible], manufactured by States Company, a Division of Multi-Amp Corporation, and a 6-pole Terminal Block, Type [illegible], manufactured by States Company, are mounted in a steel NEMA 4 Enclosure. The 6-pole terminal block is sealed in RTV. The NEMA 4 Enclosure contains a blow-out plug to prevent differential pressure buildup. The NEMA 4 Enclosure is 15" x 12" x 6". The terminal blocks are wired for AC circuits in accordance with Bechtel Schematic for Test Item No. 1 (Item No. 1) and Drawing B-181606, Sheet 82. The wire leads are approximately 10' long for test connections and exit the NEMA 4 Enclosure through conduit.

6.1.2 Test Item No. 2

A 12-Pole Terminal Block, Type [illegible], manufactured by States Company, a Division of Multi-Amp Corporation, and a 6-Pole Terminal Block, Type [illegible], manufactured by States Company, are mounted in a steel NEMA 4 Enclosure. The 6-pole terminal block is sealed in RTV. The NEMA 4 Enclosure contains a blow-out plug to prevent differential pressure buildup. The NEMA 4 Enclosure is 15" x 12" x 6". The terminal blocks are wired for DC circuits in accordance with Bechtel Schematic for Test Item No. 2 (Item No. 2) and Drawing B-181607, Sheet 15. The wire leads are approximately 10' long for test connections and exit the NEMA 4 Enclosure through conduit.

6.1.3 Test Item No. 3

Fightmen (18) base-shrink splices, manufactured by Raychem Corporation, are mounted in a steel NEMA 4 Enclosure. The NEMA 4 Enclosure is 15" x 12" x 6" and contains a blow-out plug to prevent differential pressure buildup. The splices connect AC and DC circuits in accordance with the schematic for Test Item No. 3 (Item No. 3) and Drawings B-181607 and B-181606, Sheet 88. The wire leads are approximately 10' long for test connections and exit the NEMA 4 Enclosure through conduit.

6.1.4 Test Item No. 4

A 12-Pole Terminal Block, Type [illegible], manufactured by States Company, a Division of Multi-Amp Corporation, is mounted in a steel NEMA 4 Enclosure. The NEMA 4 Enclosure contains no blow-out plug and all conduit outlets are sealed with RTV. The NEMA 4 Enclosure is 15" x 12" x 6". The terminal block is wired for DC circuits in accordance with Bechtel Schematic for Test Item No. 4 (Item No. 4). The wire leads are approximately 10' long for test connections and exit the NEMA 4 Enclosure through the conduit.

0055107

Regarding Aging the Licensee stated:

WYLE LABORATORIES
SCIENTIFIC SERVICES AND SYSTEMS GROUP

PAGE NO. IV-1
REPORT NO. 44254-1

SECTION IV

TEMPERATURE AGING TEST

1.0 [illegible]

The four (4) [illegible] Enclosures shall be [illegible] to an accelerated aging test that will put them into a condition which would be equivalent to a 40-year aged condition.

Each component of the subject equipment was reviewed for function and [illegible] failure mechanisms which could affect its function. This review is contained in the Qualification Plan 545/1025/EN, Revision 1, Section XIII (Qualification Program), Paragraph 3.0 (Aging). (This Qualification Plan is included as Section XIII of this report.)

As described in Paragraph 3.1, "Aging Evaluation", of the Qualification Plan contained in Section XIII, the "weak-link" material is the [illegible] in the terminal blocks in Test Items #1, #2, and #4, the the heat-shrink splicer in Test Item #3.

The aging time and conditions are shown below.

Test Item	Aging Temp.	Aging Time	Aging Atmosphere
Terminal Blocks	[illegible]°C[1]	163 hours	Air, 60% R.H. ± 10%
Heat-Shrink Splicer	[illegible]°C[2]	163 hours	Air, 60% R.H. ± 10%
	[illegible]°C[3]	83 hours	Air, Uncontrolled R.H.

1 - Equivalent to a 40-year life.

2 - Aged with the terminal blocks to produce an equivalent 1.27 year life.

3 - Additional aging to produce aging equivalent to 38.73 years for a total equivalent 40-year life.

2.0 [illegible]

The four (4) [illegible] Enclosures were placed in a temperature chamber. The test items were aged in air at 82 ± 1°C with controlled humidity of 60% ± 10% for 163 hours.

All four test items were removed from the chamber. Test item #3 was placed in another chamber and aged in air at 126°C and uncontrolled ambient humidity for an additional 83 hours and then removed from the chamber.

3.0 [illegible]

The test items were subjected to the temperature aging test as specified above. At the completion of testing, they were visually inspected and no degradation was noted.

Photographs pertaining to this test are contained in Appendix I of this section.

Equipment used for this test is listed in Appendix II of this section.

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. 518

Page 5d

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

Regarding radiation the Licensee provided the Following: 0055108

Page [illegible]
[illegible]

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF NUCLEAR ENGINEERING
ATLANTA, GEORGIA 30332

[illegible]

December 21, 1978

Mr. [illegible]
[illegible]
[illegible]
[illegible], Alabama [illegible]

[illegible]

Pursuant to your instructions for [illegible] enclosures (Job [illegible], [illegible]), were irradiated in our hot cell facility using Cobalt 60 to a total dose of 1.0 X 10[illegible] rads (dose to attached cooling was not determined).

We certify the specific parameters of this irradiation to be:

Irradiation Period:	December 8 thru December 21, 1978 (303.8 hr)
Dose Rate:	3.3 X 10[illegible] rad/hr
Total Dose:	1.0 X 10[illegible] rads
Dosimetry:	Thermoluminescent dosimeters of lithium borate (Parkman [illegible]) calibrated with a Fricke Dosimeter model [illegible].

If you require any further information please contact me.

GEORGIA INSTITUTE OF TECHNOLOGY

[illegible]

[illegible]
Assistant Research Scientist

[illegible]

Regarding LOCA simulation, the Licensee's results are presented on the following pages:

0055109

WYLE LABORATORIES

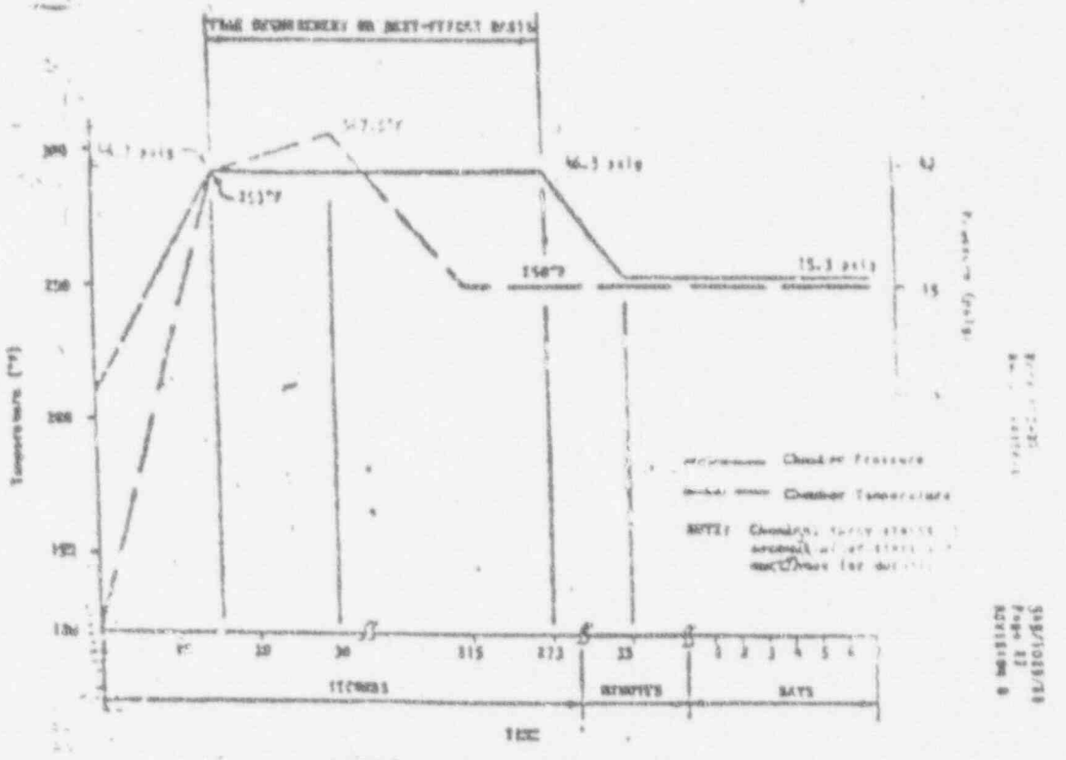
[illegible]

[illegible]

[illegible]

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

0055110



SECTION 2

ACCIDENT TEST (LOCA)
ENVIRONMENTAL CONDITION - CASE II

1. [illegible]

The four (4) [illegible] 4 Enclosures shall be subjected to the environmental condition shown in Figure 9, page 22, Wyle Laboratories Qualification Plan [illegible] Section [illegible] of this report. The following chemical spray solutions shall apply:

- Sodium hydroxide to a pH of 10.5 at room temperature
- Boric acid, 10,000 ppm
- Chemical spray rate approximately 0.7 gpm/ft^2 of test item projected horizontal cross-sectional area

Chemical spray will be required during the Engine Environmental Condition Sheet [illegible].

The [illegible] will be energized with 1.1 x 125 VDC, 1 ampere, for the DC requirements, or 1.1 x 115 VAC, 1 ampere, for the AC requirements.

2. [illegible]

The four (4) [illegible] 4 Enclosures were installed in the [illegible] Chamber. After running the cables through the chamber, the cables were potted with [illegible] Sealing at the chamber interface.

The circuits were energized for the Accident Test as follows:

1.1 x 125 VDC, 1 ampere, for circuits No. 2 (Test Item #2), No. 3 (Test Item #3), and No. 4 (Test Item #4); and 1.1 x 115 VAC, 1 ampere, for circuits No. 1 (Test Item #1) and No. 2A (Test Item #2). The circuit currents and voltages were recorded during the test.

After the chamber was sealed, the circuits were energized and the test items were subjected to the environmental condition (Case II) as shown in Figure 1. An exception to this is contained in Section of Appendix [illegible] 1 (located in Appendix I of this section) which allowed a change to the initial ramp rate for pressure and temperature.

0055112

TYLE LABORATORIES
PRINTING SERVICES AND SYSTEMS GROUP

PAGE NO. [illegible]
REPORT NO. [illegible]

[illegible]

The test items were subjected to the Accident Test as specified above. A chart of the test profile is shown in Appendix [illegible] of this section.

During the test, the following voltage and current fluctuations were observed:

Test Item 1 - Voltage and current readings fluctuated as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	[illegible]	[illegible]
[illegible] min	[illegible]	[illegible]
[illegible] min	[illegible]	[illegible]
[illegible] min	[illegible]	Remained at .006

Test Item 2 - Voltage readings indicated an open circuit by test end and current readings changed as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	137.4 [illegible]	[illegible]
[illegible] min	[illegible]	[illegible]
[illegible] min	.00	[illegible]
[illegible] min	Remained at .00	[illegible]

Test Item 3, Circuit 3 - Voltage and current readings fluctuated as follows:

Time (Elapsed)*	Volts (V)	Current (A)
0 min	[illegible]	[illegible]
[illegible] min	[illegible]	[illegible]
[illegible] min	[illegible]	[illegible]
[illegible] min	[illegible]	[illegible]

Test Item 4 - Voltage readings indicated an open circuit by test end and current readings changed as follows:

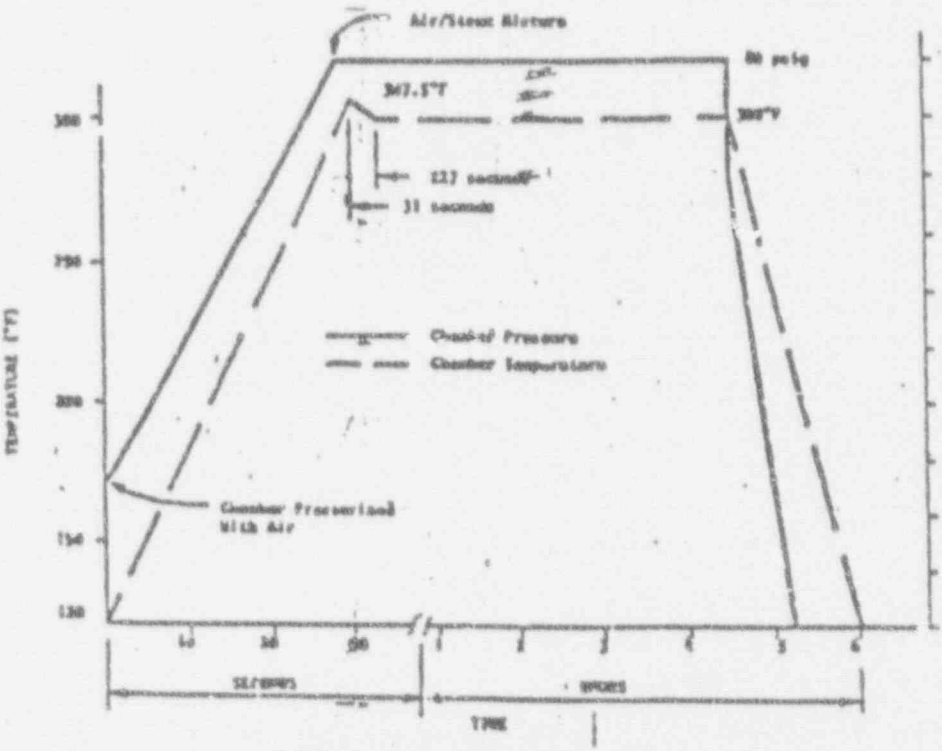
Time (Elapsed)*	Volts (V)	Current (A)
0 min	[illegible]	[illegible]
[illegible] min, [illegible] sec	[illegible]	[illegible]
[illegible] min, [illegible] sec	.13 [illegible]	[illegible]
[illegible] min	.05	[illegible]

(* to nearest minute)

Subsequent to the test it was determined that the anomalies were caused by the testing equipment rather than by the test specimens.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 31

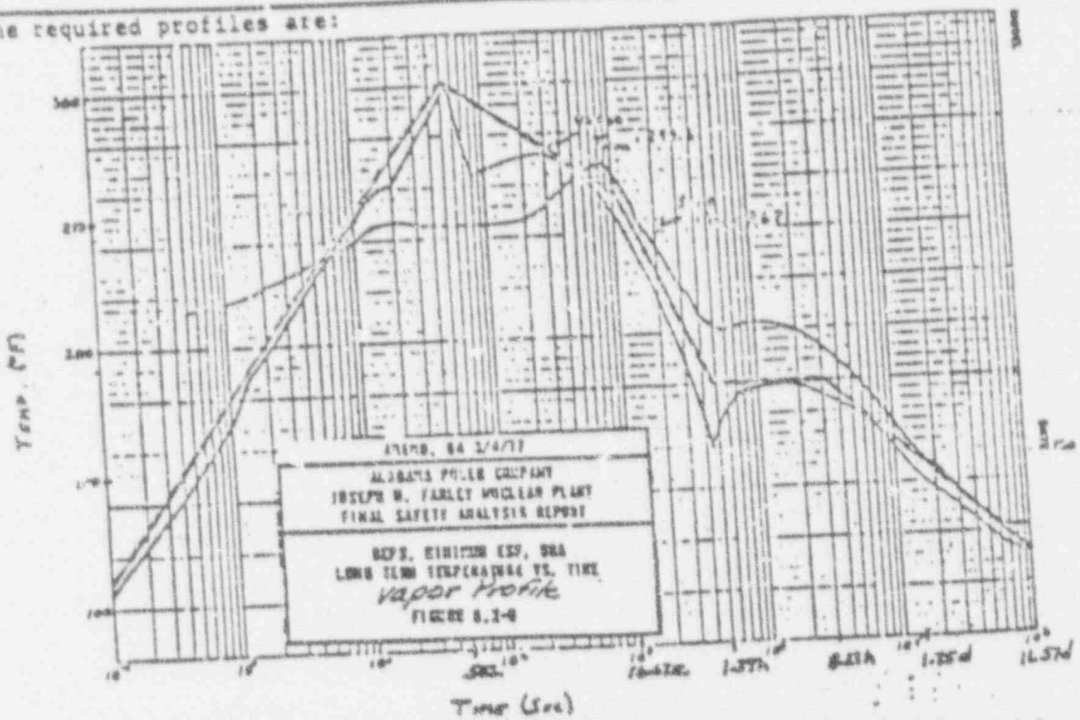
0055113

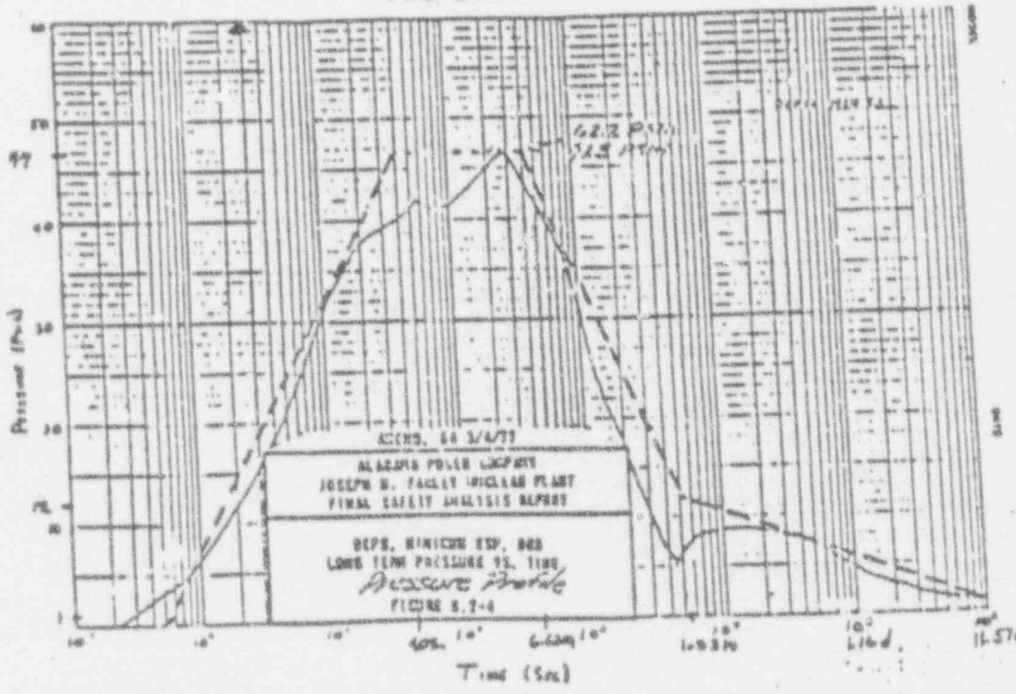


EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0055114

The required profiles are:





It is concluded that the test envelopes the required profiles.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

EQUIPMENT ITEM NO. 32
TERMINAL BLOCK LOCATED IN THE MAIN STEAM ROOM, ELEV. 144'0" 0055115
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 32
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N[redacted]5SV3772A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.17.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2[redacted]3SV3228AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2[redacted]3SV3227AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (A2TB034)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.4 [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, E, CS, (A), S, (B), (M), I, QM, RPN, LAN, 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. 32

EQUIPMENT ITEM NO. 32 (CONTINUED)

0055115

FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N12SV3234A-A/JB, B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N12SV3235A-A/JB, 3235B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3976A-B/JB; 3369AA-A/JB, BA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3976CA-A/JB; 3370AA-B/JB, BA-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3370CA-B/JB; 3368AA-A/JB, BA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3368CA-A/JB; 3976B-B/JB, C-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]

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

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

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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. 37

0055117

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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 Only
III.a Exempt
III.b Not in Scope
IV Documentation Not Available

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

CC55118

EQUIPMENT ENVIRONMENTAL QUALIFICATION SUMMARY FORM

NRC EQUIREMENTS	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 see item 31

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 32

0055110

LICENSEE RESPONSE TO NRC SER

EQUIPMENT: TERMINAL BLOCKS / JUNCTION BOXES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	APCo RESPONSE
AGING	Type tests accelerated aging techniques were used to thermally age the terminal blocks. Arrhenius Methodology was used to establish a qualified life. The age-susceptible materials were identified and activation energies determined. From the analysis, a qualified life of 40 years was established for both Inside and outside containments for Plant Farley.
TEMPERATURE	The qualification temperature of the terminal blocks is 317°F. As can be seen from Figure C.3-6, the calculated peak temperature of 305°F is reached in 0.27 seconds, where it remains for approximately 1.1 seconds, at which time the temperature drops to atmospheric saturation temperature of 212°F. Because of the thermal lag, the terminal blocks are never exposed to a temperature greater than 212°F. The terminal blocks are therefore qualified to the accident environment with conservative margin.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - Refer to discussion on temperature above. (b) Pressure - The 80 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 Main Steam Room pressure of 20.3 psia. (c) Radiation - Although the terminal blocks are qualified for 1×10^8 rads, radiation qualification is not a requirement for the Main Steam Room. Therefore adequate margin exists.
APPLICABILITY	4 items listed as deficient for environments are located at an elevation of 133' in Main Steam Room which is above flood level elevation of 126'-5" hence not deficient

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

EQUIPMENT ITEM NO. 33
TERMINAL BLOCK LOCATED IN THE CONTAINMENT, ELEV. 135'9"
STATES MODEL TYPE ZWH
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 33
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2B31SV8047-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (12TB001, 003, 004; 22TB001, 002, 005)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (12TB001, 002; 22TB003, 004; 32TB001, 002)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2G21SV3376-B/JB, 1003A-A/JB, 7126-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2E21SV8871-A/JB, 8149AA-A/JB, 8149BA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.10 [5]

0055120

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

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

LISTING OF APPLICABLE CHECKSHEETS:

Contents	Checksheet Page No.
Equipment Item	$1a_1$, $1B_1$, $1a_3$
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. 33

EQUIPMENT ITEM NO. 33 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (M2E21SV8149CAA/JB) 0055121
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P13SV2867B-B/JB, 3197-B/JB, 2866B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P13SV3196-B/JB; Q2E12SV3999A-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2E12SV3999B-B/JB; Q2T52B025)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P17SV3184-B/JB, 3443-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.20.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3103A/JB, 3765-A/JB, 3766-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

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

R, T, QV, RT, P, H, CS, A, S, (R), M, I, UK, 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. 33

0055122

EQUIPMENT ITEM NO. 33 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3179A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3180A-A/JB, B-A/JB, C-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3181A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3104-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [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, RPW, 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. 51F

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

SUMMARY OF LICENSEE RESPONSES TO THE NRC SER - ONLY CHECK [illegible]

X The Licensee (has/~~has not~~) provided a response to the SER [illegible].

X 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.

X 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 0055124

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 [illegible] 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 see item 31

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 33

0055125

LICENSEE RESPONSE TO NRC SER

COMPONENT: TERMINAL BLOCKS / JUNCTION BOXES - OUTSIDE CONTAINMENT

NRC DEFICIENCY	AP&L RESPONSE
AGING	Type test accelerated aging techniques were used to thermally age the terminal blocks. Arrhenius methodology was used to establish a qualified life. The age-susceptible materials were identified and activation energies determined. Upon the analysis, a qualified life of 40 years was established for Main Steam and outside containment for Plant Farley.
TEMPERATURE	The qualification temperature of the terminal blocks is 307°F. As can be seen from Figure C.3.6, the calculated peak temperature of 300°F is reached in 0.27 seconds, where it remains for approximately 1.1 seconds, at which time the temperature drops to atmospheric saturation temperature of 212°F. Because of the thermal lag, the terminal blocks are never exposed to a temperature greater than 212°F. The terminal blocks are therefore qualified to the accident environment with conservative margin.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - Refer to discussion on temperature above. (b) Pressure - The 50 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 Main Steam Line pressure of 20.5 psia. (c) Radiation - Although the terminal blocks are qualified for 1 x 10^8 rads, radiation qualification is not a requirement for the Main Steam Room. Therefore adequate margin exists.
SUBMERGENCE	A items listed as deficient for submergence are located at an elevation of 135' in Main Steam Room which is above flood level elevation of 130'-5" hence not deficient

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

EQUIPMENT ITEM NO. 34 0055126
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE MAIN STEAM ROOM, ELEV. 135'0" & ABOVE
BOSTON INSULATED WIRE MODEL 1SS1802
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 34
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VAL5007C, 8C, 9C; 2VAL5013D, 4D, 5D)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VNS[illegible]A, 4A)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.7 [5]

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

R, T, QV, RT, P, B, 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
[illegible] Response to NRC SER	[illegible]
[illegible] Review	[illegible]
Equipment Environmental Qualification Review	4a, 5a, 6a, 7a, 8a, 9a, 10a, 11a, 12a, 13a, 14a, 15a, 16a, 17a, 18a, 19a, 20a, 21a, 22a, 23a, 24a, 25a, 26a, 27a, 28a, 29a, 30a, 31a, 32a, 33a, 34a, 35a, 36a, 37a, 38a, 39a, 40a, 41a, 42a, 43a, 44a, 45a, 46a, 47a, 48a, 49a, 50a, 51a, 52a, 53a, 54a, 55a, 56a, 57a, 58a, 59a, 60a, 61a, 62a, 63a, 64a, 65a, 66a, 67a, 68a, 69a, 70a, 71a, 72a, 73a, 74a, 75a, 76a, 77a, 78a, 79a, 80a, 81a, 82a, 83a, 84a, 85a, 86a, 87a, 88a, 89a, 90a, 91a, 92a, 93a, 94a, 95a, 96a, 97a, 98a, 99a, 100a, 101a, 102a, 103a, 104a, 105a, 106a, 107a, 108a, 109a, 110a, 111a, 112a, 113a, 114a, 115a, 116a, 117a, 118a, 119a, 120a, 121a, 122a, 123a, 124a, 125a, 126a, 127a, 128a, 129a, 130a, 131a, 132a, 133a, 134a, 135a, 136a, 137a, 138a, 139a, 140a, 141a, 142a, 143a, 144a, 145a, 146a, 147a, 148a, 149a, 150a, 151a, 152a, 153a, 154a, 155a, 156a, 157a, 158a, 159a, 160a, 161a, 162a, 163a, 164a, 165a, 166a, 167a, 168a, 169a, 170a, 171a, 172a, 173a, 174a, 175a, 176a, 177a, 178a, 179a, 180a, 181a, 182a, 183a, 184a, 185a, 186a, 187a, 188a, 189a, 190a, 191a, 192a, 193a, 194a, 195a, 196a, 197a, 198a, 199a, 200a, 201a, 202a, 203a, 204a, 205a, 206a, 207a, 208a, 209a, 210a, 211a, 212a, 213a, 214a, 215a, 216a, 217a, 218a, 219a, 220a, 221a, 222a, 223a, 224a, 225a, 226a, 227a, 228a, 229a, 230a, 231a, 232a, 233a, 234a, 235a, 236a, 237a, 238a, 239a, 240a, 241a, 242a, 243a, 244a, 245a, 246a, 247a, 248a, 249a, 250a, 251a, 252a, 253a, 254a, 255a, 256a, 257a, 258a, 259a, 260a, 261a, 262a, 263a, 264a, 265a, 266a, 267a, 268a, 269a, 270a, 271a, 272a, 273a, 274a, 275a, 276a, 277a, 278a, 279a, 280a, 281a, 282a, 283a, 284a, 285a, 286a, 287a, 288a, 289a, 290a, 291a, 292a, 293a, 294a, 295a, 296a, 297a, 298a, 299a, 300a, 301a, 302a, 303a, 304a, 305a, 306a, 307a, 308a, 309a, 310a, 311a, 312a, 313a, 314a, 315a, 316a, 317a, 318a, 319a, 320a, 321a, 322a, 323a, 324a, 325a, 326a, 327a, 328a, 329a, 330a, 331a, 332a, 333a, 334a, 335a, 336a, 337a, 338a, 339a, 340a, 341a, 342a, 343a, 344a, 345a, 346a, 347a, 348a, 349a, 350a, 351a, 352a, 353a, 354a, 355a, 356a, 357a, 358a, 359a, 360a, 361a, 362a, 363a, 364a, 365a, 366a, 367a, 368a, 369a, 370a, 371a, 372a, 373a, 374a, 375a, 376a, 377a, 378a, 379a, 380a, 381a, 382a, 383a, 384a, 385a, 386a, 387a, 388a, 389a, 390a, 391a, 392a, 393a, 394a, 395a, 396a, 397a, 398a, 399a, 400a, 401a, 402a, 403a, 404a, 405a, 406a, 407a, 408a, 409a, 410a, 411a, 412a, 413a, 414a, 415a, 416a, 417a, 418a, 419a, 420a, 421a, 422a, 423a, 424a, 425a, 426a, 427a, 428a, 429a, 430a, 431a, 432a, 433a, 434a, 435a, 436a, 437a, 438a, 439a, 440a, 441a, 442a, 443a, 444a, 445a, 446a, 447a, 448a, 449a, 450a, 451a, 452a, 453a, 454a, 455a, 456a, 457a, 458a, 459a, 460a, 461a, 462a, 463a, 464a, 465a, 466a, 467a, 468a, 469a, 470a, 471a, 472a, 473a, 474a, 475a, 476a, 477a, 478a, 479a, 480a, 481a, 482a, 483a, 484a, 485a, 486a, 487a, 488a, 489a, 490a, 491a, 492a, 493a, 494a, 495a, 496a, 497a, 498a, 499a, 500a, 501a, 502a, 503a, 504a, 505a, 506a, 507a, 508a, 509a, 510a, 511a, 512a, 513a, 514a, 515a, 516a, 517a, 518a, 519a, 520a, 521a, 522a, 523a, 524a, 525a, 526a, 527a, 528a, 529a, 530a, 531a, 532a, 533a, 534a, 535a, 536a, 537a, 538a, 539a, 540a, 541a, 542a, 543a, 544a, 545a, 546a, 547a, 548a, 549a, 550a, 551a, 552a, 553a, 554a, 555a, 556a, 557a, 558a, 559a, 560a, 561a, 562a, 563a, 564a, 565a, 566a, 567a, 568a, 569a, 570a, 571a, 572a, 573a, 574a, 575a, 576a, 577a, 578a, 579a, 580a, 581a, 582a, 583a, 584a, 585a, 586a, 587a, 588a, 589a, 590a, 591a, 592a, 593a, 594a, 595a, 596a, 597a, 598a, 599a, 600a, 601a, 602a, 603a, 604a, 605a, 606a, 607a, 608a, 609a, 610a, 611a, 612a, 613a, 614a, 615a, 616a, 617a, 618a, 619a, 620a, 621a, 622a, 623a, 624a, 625a, 626a, 627a, 628a, 629a, 630a, 631a, 632a, 633a, 634a, 635a, 636a, 637a, 638a, 639a, 640a, 641a, 642a, 643a, 644a, 645a, 646a, 647a, 648a, 649a, 650a, 651a, 652a, 653a, 654a, 655a, 656a, 657a, 658a, 659a, 660a, 661a, 662a, 663a, 664a, 665a, 666a, 667a, 668a, 669a, 670a, 671a, 672a, 673a, 674a, 675a, 676a, 677a, 678a, 679a, 680a, 681a, 682a, 683a, 684a, 685a, 686a, 687a, 688a, 689a, 690a, 691a, 692a, 693a, 694a, 695a, 696a, 697a, 698a, 699a, 700a, 701a, 702a, 703a, 704a, 705a, 706a, 707a, 708a, 709a, 710a, 711a, 712a, 713a, 714a, 715a, 716a, 717a, 718a, 719a, 720a, 721a, 722a, 723a, 724a, 725a, 726a, 727a, 728a, 729a, 730a, 731a, 732a, 733a, 734a, 735a, 736a, 737a, 738a, 739a, 740a, 741a, 742a, 743a, 744a, 745a, 746a, 747a, 748a, 749a, 750a, 751a, 752a, 753a, 754a, 755a, 756a, 757a, 758a, 759a, 760a, 761a, 762a, 763a, 764a, 765a, 766a, 767a, 768a, 769a, 770a, 771a, 772a, 773a, 774a, 775a, 776a, 777a, 778a, 779a, 780a, 781a, 782a, 783a, 784a, 785a, 786a, 787a, 788a, 789a, 790a, 791a, 792a, 793a, 794a, 795a, 796a, 797a, 798a, 799a, 800a, 801a, 802a, 803a, 804a, 805a, 806a, 807a, 808a, 809a, 810a, 811a, 812a, 813a, 814a, 815a, 816a, 817a, 818a, 819a, 820a, 821a, 822a, 823a, 824a, 825a, 826a, 827a, 828a, 829a, 830a, 831a, 832a, 833a, 834a, 835a, 836a, 837a, 838a, 839a, 840a, 841a, 842a, 843a, 844a, 845a, 846a, 847a, 848a, 849a, 850a, 851a, 852a, 853a, 854a, 855a, 856a, 857a, 858a, 859a, 860a, 861a, 862a, 863a, 864a, 865a, 866a, 867a, 868a, 869a, 870a, 871a, 872a, 873a, 874a, 875a, 876a, 877a, 878a, 879a, 880a, 881a, 882a, 883a, 884a, 885a, 886a, 887a, 888a, 889a, 890a, 891a, 892a, 893a, 894a, 895a, 896a, 897a, 898a, 899a, 900a, 901a, 902a, 903a, 904a, 905a, 906a, 907a, 908a, 909a, 910a, 911a, 912a, 913a, 914a, 915a, 916a, 917a, 918a, 919a, 920a, 921a, 922a, 923a, 924a, 925a, 926a, 927a, 928a, 929a, 930a, 931a, 932a, 933a, 934a, 935a, 936a, 937a, 938a, 939a, 940a, 941a, 942a, 943a, 944a, 945a, 946a, 947a, 948a, 949a, 950a, 951a, 952a, 953a, 954a, 955a, 956a, 957a, 958a, 959a, 960a, 961a, 962a, 963a, 964a, 965a, 966a, 967a, 968a, 969a, 970a, 971a, 972a, 973a, 974a, 975a, 976a, 977a, 978a, 979a, 980a, 981a, 982a, 983a, 984a, 985a, 986a, 987a, 988a, 989a, 990a, 991a, 992a, 993a, 994a, 995a, 996a, 997a, 998a, 999a, 1000a
Installed TMI Lessons Learned Implementation Equipment Summary	60, 61
Maintenance and Replacement Schedule Summary	1a, 2a, 3c

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

0055127

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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
___ 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 [illegible] - 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 Ext.
III.a Exempt
III.b Not in Scope
IV Documentation Not Available

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. 13 519 FRC Task No. _____	Page 2

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 34

0055123

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	X

The licensee has referenced a B&W Report No. 73E062 as evidence of qualification. The report was not made available for review.

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging methods were used to thermally age instrumentation cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Ref. BIW Report 73E062). This boric acid concentration meets the Farley FSAR value of 7000 ppm.
QUALIFICATION TIME	The qualification time for these cables is actually 3 days. The Component Evaluation Work Sheets indicates 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 340° F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated. (b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.1 psia. (c) Radiation - The 1×10^8 Rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 5×10^7 Rads. Therefore, adequate margin exists.
REQUIRED TIME	Deficiency shown on one cable 2VYK50668 appears to be clerical error by the NRC. Operating time and qualification both have been shown on component evaluation sheet.
SUBMERGENCE	Cables 2VHRC003A and B are listed as deficient for submergence. They are located at an elevation of 135' and above in the Main Steam Room which is above the flood level of 130'9"; hence not deficient.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

EQUIPMENT ITEM NO. 35
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE MAIN STEAM, ELEV. 116'0" 0055130
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 35
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VXV5013L, 14E, 14J)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.13 [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, d, (CS), (A), S, (R), (M), I, UM, 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 3e 3f~~
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

0055131

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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 BY CONSULTANT NRC QUALIFICATION EVALUATION CATEGORY BASED ON REVIEW - CIRCLED ITEM(S): (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. 35

0055132

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	X

The licensee has referenced a BIN report No 73 E062 as evidence of qualification. The report was not made available for review.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 35

LICENSEE RESPONSE TO NRC SER

0055133

NRC DEFICIENCY	APPA RESPONSE
AGING	Type test accelerated aging methods were used on thermally age inverse-generation cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm [illegible] Acid Recovery [illegible]. This boric acid concentration meets the Farley [illegible]
QUALIFICATION TIME	The qualification time for these cables is Saturday 7 days. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 340° F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated. (b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 1 containment pressure of 62.2 psia. (c) Radiation - The 1 x 10^8 Rads qualification test condition provides adequate margin above the specified Farley, Unit 1 containment level of 3 x 10^7 Rads. Therefore, adequate margin exists.
REINTRAD TIME	Deficiency shown on one cable ZVNR5004A appears to be clerical error by the NRC. Operating time and qualification both have been shown on component evaluation sheet.
SUBMERGENCE	Cables ZVNR5003A and B are listed as deficient for submergence. They are located at an elevation of 135' and above to the Main Steam Room which is above the flood level of 130'9"; hence not deficient.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0055134

EQUIPMENT ITEM NO. 36
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, ELEV. 121'0"
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 36
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002L, M, N; 2V2V5002L, M, N;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V3V5002H, J, K, L, M, N;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V4V5002A, B, C)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [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, UM, 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. 36

0055135

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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
III.c Qualified With Deficiency
III.a Exempt
III.b Not in Scope
IV Documentation Not Available

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0055136

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	X

The licensee has referenced a B&W report No 73 E062 as evidence of qualification. The report was not made available for review.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0055137

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCs RESPONSE
AGING	Type test accelerated aging methods were used to thermally age instrumentation cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Ref. BIW Report 73LU62). This boric acid concentration meets the Farley FSAR value of 2000 ppm.
QUALIFICATION TIME	The qualification time for these cables is actually 7 days. The Component Evaluation Work Sheets indicated 6 hours only to show that the specified operating time of 6 hours has been met.
MARGIN	TEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 340° F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated. (b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia. (c) Radiation - The 1 x 10^8 Rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 5 x 10^7 Rads. Therefore, adequate margin exists.
REQUIRED TIME	Deficiency shown on one cable 2YYR5046B appears to be clerical error by the NRC. Operating time and qualification both have been shown on component evaluation sheet.
SUBMERGENCE	Cables 7YMRC003A and B are listed as deficient for submergence. They are located at an elevation of 135' and above to the Main Steam Room which is above the flood level of 130'9"; hence not deficient.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

0055138

EQUIPMENT ITEM NO. 37
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, ELEV. 122'9"
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 37
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VY5031D; 2V25002T, U)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002U; 2V3V5002T, U)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VY5031E; 2VY5033B;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.6 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002E, F, G; 2V2V5002E, F, G)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.6 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002B, D; 2V2V5002B, B)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.5 [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:

Contents	Checksheet Page No.
Equipment Item	$1a_1$, $1a_2$
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. 37

EQUIPMENT ITEM NO. 37 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V3V5002B, D) 0055139
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VYR5066G)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VXQ5009B, D, F; 2VYQ5017B, D, F)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.7.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VYR5066B)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.12 [5]

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

R, T, QT, RE, P, H, CS, A, S, (R), M, I, QM, EFN, 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, 3[illegible]
System Considerations Review	4a, 4b, 4c, 4[illegible]
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. 518

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 37

0055130

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X The Licensee (has/~~has not~~) specifically stated that the equipment is qualified and/or will function when exposed to 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 actions _____.)

___ 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 ANSWERS - 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. 57

0055141

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 Readily Available	X

The licensee has referenced a B&W Report No 73E062 as evidence of qualification. The report was not made available for review.

LICENSEE RESPONSE TO NRC SER

NRC DEFICIENCY	APCs RESPONSE
AGING	Two test accel[illegible] aging methods were used to thermally age [illegible] cable. [illegible] technique[illegible] were used to determine [illegible] qualified life. The age-susceptible materials were identified and [illegible] was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 2000 ppm (Ref. [illegible]). This [illegible] acid concentration meets the Farley PSAR value of 2000 ppm.
QUALIFICATION TIME	The qualification time for these cables is actually 7 days. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 340° F qualification test condition exceeds the 300°F required temperature by 40°F thus adequate margin has been demonstrated. (b) Pressure - The 119.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia. (c) Radiation - The 1 x 10^8 Rads qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 3 x 10^7 Rads. Therefore, adequate margin exists.
REQUIRED TIME	Deficiency shown on due cable ZVYR50660 appears to be clerical error by the NRC. Operating time and qualification work have been shown on component evaluation sheet.
SUBMERGENCE	Cables ZVHR5003A and B are listed as deficient for submergence. They are located at an elevation of 135' and above in the Main Steam Room which is above the flood level of 130'9"; hence not deficient.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

0055143

EQUIPMENT ITEM NO. 38
ELECTRICAL CABLE, CONTROL LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 38
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCFW(S): C.2.4.8 [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, SEH, 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, ~~3by 3cy 3d~~
System Consideration Review	~~4ay 4by 4cy 4dy 4ey 4f~~
Equipment Environmental Qualification Review	~~5a 5by 5cy 5dy 5ey 5fy 5gy 5hy 5iy 5j~~
Installed TMI Lessons Learned Implementation Equipment Summary	~~6ay 6b~~
Maintenance and Replacement Schedule Summary	~~7ay 7by 7c~~

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

0055144

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 38

0055145

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)	
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	

For evaluation, refer to item 42

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 38

0055146

LICENSEE RESPONSE TO NRC SER

COMPONENT: POWER and CONTROL CABLES

NRC DEFICIENCY	APS's RESPONSE
AGING	Type test accelerated aging methods were used to thermally age cable. Arrhenius techniques were used to determine a qualified life. The non-nonmetallic materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this environment was 10,000 ppm (ref: Phoenix Report 141.) This boric acid concentration exceeds the Farley FSAR value of 2800 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 190 days post DBE. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 324° F qualification test condition exceeds the 300° F required temperature by 24° F thus adequate margin has been demonstrated. (b) Pressure - The 94.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.1 psia. (c) Radiation - The 2×10^8 Rads, qualification test condition provides adequate margin above the specified Farley, Unit 2 maximum level of 1×10^7 Rads. Therefore, adequate margin exists.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

0055147

EQUIPMENT ITEM NO. 39
ELECTRICAL CABLE, CONTROL LOCATED IN THE MAIN STEAM ROOM, ELEV. 135'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 39
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.17.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.16.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.15.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.6 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.13.10 [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, RPM, 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. 39

0055148

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 39

0055149

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)	
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
..a	Equipment Qualified	
I.b	Equipment Qualification Pending Modification	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 Qualification Review	
IV	Documentation Not Made Available	

For evaluation, refer to item 40

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 39

0055150

LICENSEE RESPONSE TO NRC SER

COMPONENT: POWER and CONTROL CABLES

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging methods were used to thermally [illegible]. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 18,000 ppm (see [illegible] report 141.) This boric acid concentration exceeds the Farley [illegible] value of 2000 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 100 days post DBE. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified:

(a) Temperature - The 224° F qualification test condition exceeds the 200° F required temperature by 24° F [illegible] has been demonstrated.

(b) Pressure - The 94.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia.

(c) Radiation - The 2 x 10^{8} Rads. qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 5 x 10^{7} Rads.

Therefore, adequate margin exists.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

0055151

EQUIPMENT ITEM NO. 40
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 40
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-7.3 [6, 11, 19]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.2 [6, 11, 19]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.[illegible] [6, 11, 19]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.4 [6, 11, 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, E, CS, A, S, (R), M, I, QM, EPN, EQN, 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, 4g, 4h, 4i, 4j~~
Equipment Environmental Qualification Review	5a, 5b, 5c, 5d, ~~5e, 5f, 5g~~, 5h, 5i, ~~5j, 5k, 5l, 5m~~
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

0055152

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. (Schedules 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. 40

0055153

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)	
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	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 Qualification Review	
IV	Documentation Not Made Available	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

0055154

LICENSEE RESPONSE TO NRC SER

COMPONENT: POWER and CONTROL CABLES

NRC DEFICIENCY	APCo RESPONSE
AGING	Type test accelerated aging methods were used to thermally age cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 18,000 ppm (ref: Chemtic Report 141.) This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 100 days post DBE. The Component Evaluation Work Sheets indicated 6 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 334° F qualification test condition exceeds the 305° F required temperature by 34° F thus adequate margin has been demonstrated. (b) Pressure - The 98.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia. (c) Radiation - The 2×10^8 Rads, qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 3×10^7 Rads. Therefore, adequate margin exists.

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90

0055155

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW

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

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
EQUIPMENT DESCRIPTION Equipment Type	Electrical Cable	Electrical Cable	
Manufacturer's Name (5.2.2/-/-)	Okonite	Okonite Company	
Model Number (5.2.2/-/-)	Not stated	See page 5f (Note A)	X Note 1
Serial Number	Not stated	Not Applicable	
Features/Mounting (5.2.6/-/-)	↓	Not Applicable	
Connections/Interfaces (5.2.6/-/-)		Cable Splice (Note A)	
Location/Elevation	Containment	Not Applicable	
Equipment ID No.	N/A	Not Applicable	
QUALIFICATION REPORT (8.0/5.0/5.0) Report ID Number	ER-141 N-1	E.R.141	
Report Date		February 29,1972	
Issued by	Okonite	Okonite	
Prepared for	Okonite	Okonite	
Referenced Reports	NA	F-C3094/F-C3171	
Qualification Method (5.1, 5.3/2.1, 2.4/2.1, 2.4)		Test	
QUALIFICATION TEST PROGRAM Functional Test Description (5.2.5/2.2.9/2.2.9)		Maintain electrical Loading @ rated Voltage, Insulation Resistance & Hypot	
Operating Conditions (-/2.2.10/2.2.10) Load/Cycles/Voltage/ Current/Freq.	↓	Not Applicable	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

0055156

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (Y OR NOTE NO.)
Acceptance Criteria (5.2.5/2.2.1/2.2.1)	N/A	Not Stated	
Accuracy (5.2.5/-/-)		Not Applicable	
Number of Specimens		6	
Test Instruments Calibrated		Yes	
Safety Function (Active/ Passive) (-/2.1.3/2.1.3)	N/A Stated	Not Applicable	
Test Duration (5.2.1/-/-)	N/A	100+ days	
Accident Duration (Envir. Above Normal) (5.2.1/-/-)	N/A hrs	Not Applicable	
Required Function Time	N/A Long Term	Not Applicable	
Test Sequence (General) (5.2.3/2.3.1/2.3.1)	N/A	Thermal Aging Irradiation LOCA (PWR Conditions) LOCA (BWR Conditions)	
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-OBE Exposure 10. Inspection		Not Applicable	
Aging (5.2.4, 7.0/4.0/4.0) Thermal Aging/Basis	Arrenius	168 hrs @ 121°C Basis Not Stated	
Material Aging Evaluation (7.0/-/-)		Not Stated	
Materials Susceptible (Thermal) (5.2.4, 7.0/-/-)		Not Stated	
Radiation Aging, Type	Gamma	Gamma	

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NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 517

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

0055157

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
Radiation Aging, Dose (rd)	Not Stated	See Accident Dose	
Radiation Aging, Dose Rate		See Accident Dose	
Radiation Aging, Method		Test	
Materials Susceptible (Radiation) (5.2.4, 7.0/-/-)		Not Stated	
Operational Aging (-/4.2/-)		Not Applicable	
Other Age Conditioning (-/4.2/-)		Not Stated	
Qualified Life Claimed/ Established (5.2.4/4.10/-)	40 years	Not Stated	
Normal Ambient Temperature	Not stated	Not Applicable	
Normal Ambient Radiation		Not Applicable	
Normal Ambient Humidity		Not Applicable	
On-Going Surveillance and Preventive Maintenance (7.0/-/-)	Farley Program	Not Applicable	
On-Going Analysis of Failures and Degradation (7.0/-/-)		Not Applicable	
Margin (General) (6.0/3.0/3.0)	24°F 32.5 psi 1.5 [illegible] rd.	Not Applicable	
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)	N/A	Not Applicable	

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 36

0055158

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE NO.)
ACCIDENT CONDITIONS			
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)	5×10^7	2×10^8	
Radiation Dose Rate (rd/hr)	Not Stated	300,000 rd/hr	
Radiation Qual. Method (5.3.1/-/-)		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 Applicable	
Plateout Dose Considered (-/1.48/1.48)		Not Applicable	
Gamma + Beta Dose (rd) (4.1.2/1.4 7/1.4.7)		Not Applicable	

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NRC Contract No. NRC-03-78-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 4[illegible]

0055159

NRC REQUIREMENTS WITH SECTION REFERENCE (DOR/0588-I/0588-II)	LICENSEE SUBMITTAL	QUALIFICATION DOCUMENTATION	DEFICIENCY (X OR NOTE No.)
ENVIRONMENTAL PROFILE OF ACCIDENT CONDITIONS			
Rate of Temp./Press. Increase		25°F, 8Psi/ second	
Peak: °F/psig/RH/Time	See profile p 5	324/80/100/3.3 hrs 252/16/100/7 days	
Decrease To: °F/psig/RH/Time		345/104/100/4 hrs 320/75/100/4.5 hrs	
Decrease To: °F/psig/RH/Time		256/15/100/20 hrs 272/25/100/3.5 hrs	
Decrease To: °F/psig/RH/Time		212/0/100/100 days	
Equipment Surface Temperature (MSLB) (-/1.2.5.C, 2.2.6/1.2.5.C, 2.2.6)	N/A	Not Stated	
Spray Qualification Method (5.3.2/1.3, 2.2.8/1.3, 2.2.8)	N/A	Test	
Spray Composition (4.1.4/1.3, 2.2.8/1.3, 2.2.8)	H_3BO_3 + NaOH	10000 ppm Boric Acid buffered with NaOH to a pH of 10.5	
Spray Density (gpm/ft^2)	Not Stated	0.15	
Spray Duration		7 days	
Submergence Duration (4.1.3/2.2.5/2.2.5)		Not Stated	
In-Leakage Considered (5.2.6, 5.3.2/-/-)		Not Applicable	
Time to Submergence		Not Applicable	
Dust Environment (-/2.2.11/2.2.11)		Not Applicable	

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 40

NOTES: 4.

CABLE SAMPLES TESTED:

One sample of each of the following types of cable and splice was tested. The samples were designated as shown in Table I.

Table I

Sample No.	Cable Designation
A-4	1/C #14 0.030" Okonite, 0.015" Okoprene
D-4	4/C #14 0.030" Okonite, 0.015" Okoprene, 0.045" Okoprene
E-4	7/C #14 0.030" Okonite, 0.015" Okoprene, 0.045" Okoprene
B-4	1/C 4/0 0.055" Okonite, 0.045" Okoprene
F-4	4/C #12 0.047" Okonite, 0.015" Okolon, 0.045" Okolon
C-4	1/C 4/0 0.140" Okoguard, 0.065" Okolon with T-95 splice and T-35 jacketing tape

Note 1 The cables tested in ER 141 as described above, the cables tested in N-1 are

Test Specimens

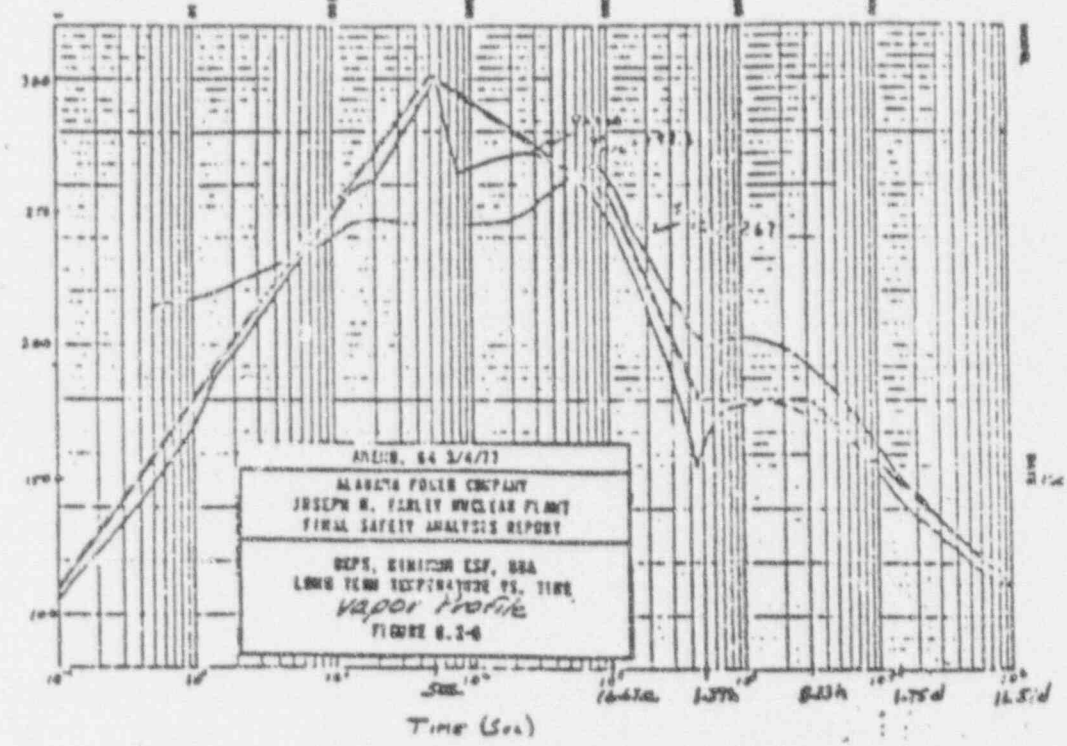
1/C #12 7x coated copper, .030" Okonite insulation
1/C #6 7x coated copper, .055" Okonite insulation, .030" Okolon jacket

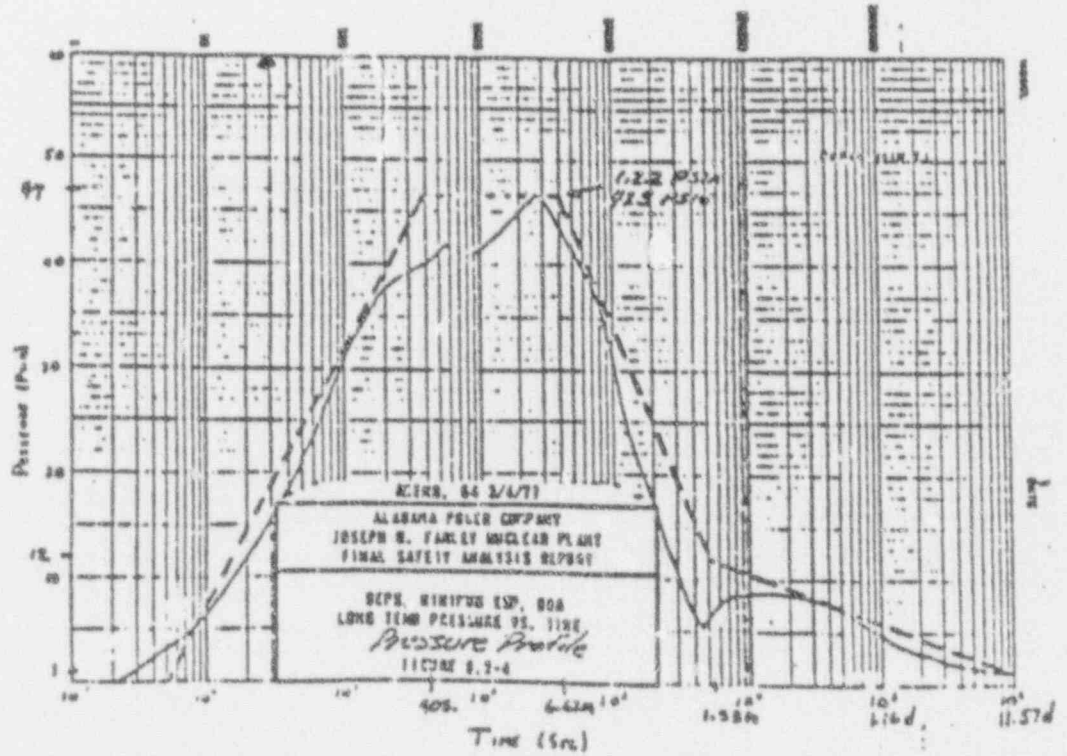
The licensee has not provided sufficient information to establish that the Equipment described on the SCEW sheet is the same as the Equipment described in the referenced report.

00551160

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 90.

0055161





0055162

Bechtel Power Corporation

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EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

EQUIPMENT ITEM NO. 41
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT, ELEV. 118'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 41
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.20.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.19.6 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.18.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.3.9 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.12.7 [5]

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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	Checksheet Page No.
Equipment Item	1a, 1b
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

0055164

EQUIPMENT ITEM NO. 41 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.11.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.10.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.11 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.8.4 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.7.4 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.5.4 [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:

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

0055165

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

X The Licensee (has/~~has not~~) provided a response to the SER concerns.

X 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.

X 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. 41

0055166

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)	
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	

For evaluation, refer to item 40

EQUIPMENT ENVIRONMENTAL QUALIFICATION REVIEW OF EQUIPMENT ITEM NO. 41

LICENSEE RESPONSE TO NRC SER

0055167

COMPONENT: POWER and CONTROL CABLES

SER DEFICIENCY	LICENSEE RESPONSE
AGING	Type test accelerated aging methods were used to thermally age cable. Arrhenius techniques were used to determine a qualified life. The age-susceptible materials were identified and an evaluation was made of their aging characteristics. Based on this methodology a qualified life of 40 years was determined for inside and outside containment.
CHEMICAL SPRAY	The chemical spray concentration utilized in the equipment qualification testing program for this equipment was 10,000 ppm (Ref: Chemile Report 141.) This boric acid concentration exceeds the Farley FSAR value of 2000 ppm.
QUALIFICATION TIME	The qualification time for these cables is 30 days plus 100 days post LOCA. The Component Evaluation Work Sheets indicated 4 hours only to show that the specified operating time of 4 hours had been met.
MARGIN	IEEE 323-1971 did not require that any specific margin be included in establishing the test parameters. However, the following margins can be identified: (a) Temperature - The 338° F qualification test condition exceeds the 300° F required temperature by 38° F thus adequate margin has been demonstrated. (b) Pressure - The 94.7 psia qualification test condition provides adequate margin above the maximum calculated Farley, Unit 2 containment pressure of 62.2 psia. (c) Radiation - The 2×10^8 Rads, qualification test condition provides adequate margin above the specified Farley, Unit 2 containment level of 5×10^7 Rads. Therefore, adequate margin exists.

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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).

Although 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, it is appropriate to highlight for the Licensee and the NRC certain conclusions and concerns reached as a result of the review which require special attention. These concerns are summarized below.

Equipment Item Nos. 18 and 20 have been assigned to NRC Category II.b. These Gems flood level detectors exhibited severe anomalies during testing, and failure occurred approximately 90 minutes into the test.

On June 23, 1982, the Licensee provided the following response concerning TMI Action Plan equipment [20]:

> "Alabama Power Company has performed a review of the location of all TMI Action Plan equipment and has identified the equipment requiring environmental qualification. The accompanying Master Lists and System Component Evaluation Work Sheets to this chapter identify this equipment and verify its qualified status. Below is a discussion of each of the sections provided in this chapter.
>
> Inadequate Core Cooling; NUREG-0737, II.F.2
>
> Instrumentation and equipment associated with inadequate core cooling is addressed by R.G. 1.97. In accordance with letter dated November 16, 1981, Alabama Power Company committed to respond to the Regulatory Guide upon the promulation of the associated draft licensing documents that

would affect the design (e.g., NUREG-0801, -0799, -0814, -0835). Following the preparation and implementation of a design for an integrated system to satisfy the various licensing requirements in this regard, Master Lists and SCEWS will be prepared.

Reactor Coolant System (Head Vent); NUREG-0737, II.B.1

Four (4) solenoid valves, Target Rock Model 79A8001, are undergoing qualification testing and, upon completion of the test and subsequent evaluation, the associated SCEWS will be updated. All other equipment located in a possible harsh environment have adequate documentation to demonstrate their capability to function in the most limiting post-accident environment postulated for Farley Nuclear Plant - Unit 2.

Pressurizer Safety and Relief Valve; NUREG-0737, II.D.1

Master lists and SCEWS are provided, herein, to verify the status of qualification of all equipment located in a possible harsh environment. Four (4) solenoid valves, ASCO model HTX8302A22V, lack adequate qualification documentation. The solenoids are scheduled to be replaced at the next outage of sufficient duration to complete the planned modification. All other equipment located in a possible harsh environment have adequate documentation to demonstrate their capability to function in the most limiting post-accident environment postulated for Farley Nuclear Plant - Unit 2.

Pressurizer Safety Valve Position Indication; NUREG-0737, II.D.3

Master lists and SCEWS are provided, herein, to verify the full qualification of all equipment located in a possible harsh environment.

High Range Containment Radiation; NUREG-0737, II.F.1.3

A test report regarding the Victoreen Radiation Detectors was recently completed and evaluated by Alabama Power Company subsequent to their installation. The review of the test report indicates the installation of a water-tight fitting is necessary to protect the cable connection and to establish similarity with the test specimen. The design of the water-tight fitting has been initiated and will be implemented at the next outage of sufficient duration to complete the modifications. All other equipment located in a possible harsh environment have adequate documentation to demonstrate their capability to function in the most limiting post-accident environment postulated for Farley Nuclear Plant - Unit 2.

Hydrogen Recombiner System; NUREG-0737, II.E.4.1

As stated in Alabama Power Company letter dated January 14, 1981, Farley Nuclear Plant does not utilize external hydrogen recombiners. Dedicated hydrogen penetrations are therefore not applicable to Farley Nuclear

Plant. The qualified status of equipment associated with the hydrogen recombiner system located in the containment or Farley Nuclear Plant is verified in a previous NUREG-0588 response, Section C.2.7, dated July 1, 1981.

Containment Water Level; NUREG-0737, II.F.1.5

Master Lists and SCEWS are provided, herein, to verify the status of qualification of all equipment located in a possible harsh environment. Two (2) level transmitters, GEMS-Delaval model XM54854-323, are undergoing qualification testing, and upon completion of the test and subsequent evaluation, the associated SCEWS will be revised. All other equipment located in a possible harsh environment have documentation to demonstrate their capability to function in the most limiting post- accident environment postulated for Farley Nuclear Plant - Unit 2.

Auxiliary Feedwater System; NUREG-0737, II.E.1.2

The status of qualification for equipment associated with the auxiliary feedwater system is verified in a previous NUREG-0588 response, Section C.2.16, dated July 1, 1981.

Containment Isolation Dependability; NUREG-0737, II.E.4.2

The qualified status of equipment associated with containment isolation is verified in previous NUREG-0588 responses, dated July 1 and December 28, 1981, Sections C.2.3, C.2.4, C.2.6, C.2.9, and C.2.11 through C.2.20. Chapter 3 of the December 28, 1981 response identified two (2) solenoids located in the containment that lack adequate qualification documents and are scheduled for replacement during the first refueling outage. The solenoids are utilized to provide isolation of a cooling duct that is wholly enclosed within the containments and does not penetrate the containment boundary. The solenoids are not necessary to provide containment isolation or to satisfy the requirements of NUREG-0737, and are not considered an outstanding item in this regard.

Automatic PORV Isolation System; NUREG-0737, II.K.3.1

As stated in Alabama Power Company letter dated May 26, 1981, Alabama Power Company letter dated May 26, 1981, Alabama Power Company has reviewed the Westinghouse Owners Group report regarding this issue and has determined that an automatic PORV isolation system would not appreciably enhance protection against a PORV LOCA and no modifications are necessary. Consequently, no environmental qualification documentation is necessary.

Automatic Trip of RCP's; NUREG-0737, II.K.3.5

As stated in letter dated January 14, 1981, it is the opinion of Alabama Power Company that resolution of this issue will be achieved without any

design modifications. The Westinghouse Owners Group has provided the NRC Staff the results of model analyses regarding this issue. In the event that an automatic system to trip the reactor coolant pumps is required after the NRC determination of model acceptability, environmental qualification of associated electrical equipment will be prepared upon system installation, as necessary.

The SCEWS provided for TMI Action Plan equipment reflect the most recent peak containment temperature and pressure postulated to result for a LOCA or HELB. The analyses of the pressure/temperature response were performed in association with Technical Specification 3.6.2.3, Contain- ment Cooling System. The Safety Evaluation Report in Alabama Power Company's letter dated August 17, 1982 provides the basis that environ- mental qualification of Unit 2 containment equipment is not invalidated as a result of this analysis, and this matter is not an unreviewed safety question. The most recent containment temperature and pressure responses are attached as Figures 1 and 2. SCEWS of containment equipment addressed in previous NUREG-0588 submittals will not be revised."

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FARLEY LOCA
FIGURE 1

DEPSG MIN ESF 1 AC
P/T ANALYSIS

CONTAINMENT PRESSURE

PRESSURE (PSIG)

0.00 8.00 16.00 24.00 32.00 40.00 48.00 56.00

TIME (SECONDS)

FIGURE SUPPLIED
BY THE LICENSEE

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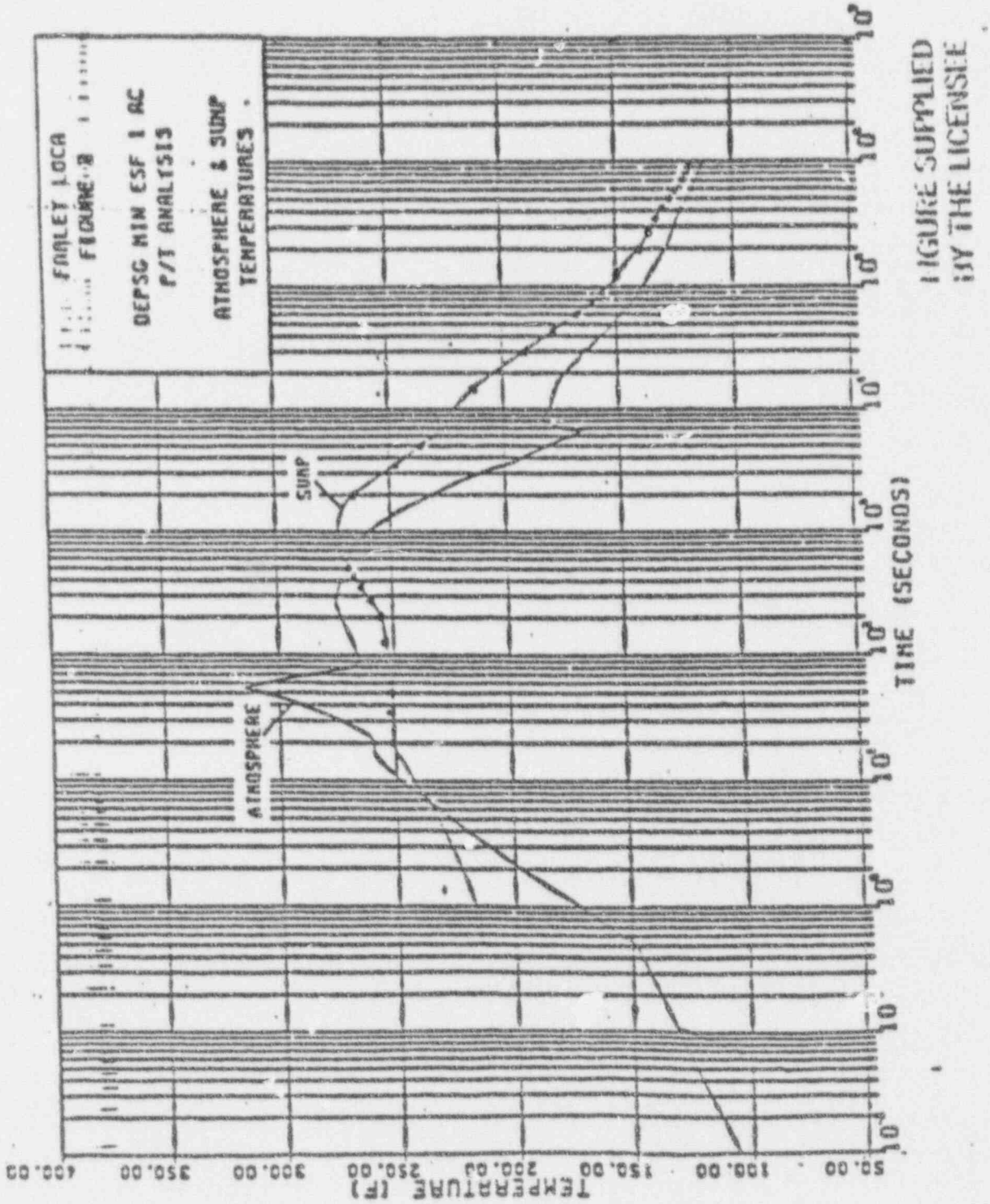

FIGURE SUPPLIED BY THE LICENSEE

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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.

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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].

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, reproduced from the Final Safety Analysis Report Update for Joseph M. Farley Nuclear Plant Units 1 and 2:

Figure A-1. DESPC MIN ESF 1 AC, Pressure vs. Time (Licensee Figure 6.2-1)

Figure A-2. Pressure Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-6)

Figure A-3. Temperature Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-7)

Figure A-4. Pressure Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-8)

Figure A-5. Temperature Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-9)

Figure A-6. Pressure Versus Time, Steam Line 0.6 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-10)

Figure A-7. Temperature Versus Time, Steam Line 0.6 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-11)

Figure A-8. Pressure Versus Time (Steam Line 0.645 ft^2 Split, 102% Power (Licensee Figure 6.2-12)

Figure A-9. Temperature Versus Time, Steam Line 0.645 ft^2 Split, 102% Power (Licensee Figure 6.2-13)

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Figure A-10. DEPSG MIN ESF 1 AC P/T Analysis, Long Term Containment Pressure vs. Time (Licensee Figure 6.2-39)

Figure A-11. DEPS MIN ESF DBA, Pressure vs. Time (Licensee Figure 6.2-40)

Figure A-12. DEPSG MIN DBA Short Term Containment Temperature (Licensee Figure 6.2-41).

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 design of this plant satisfies these criteria. The Licensee has stated that equipment qualified for a LOCA environment can be considered qualified for a MSLB accident environment.

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 Reference 5 as follows.

The Licensee provided the following response with respect to temperature margins applied to the primary containment accident profile:

> "The containment pressure/temperature analysis and calculations of the equipment surface temperature in the harsh environment are performed using the Bechtel COPATTA computer program. COPATTA was derived from the COMTEMPT program written for the Loss-of-Fluid Test (LOFT) program. A detailed description of COPATTA is contained in Bechtel Topical Report BN-TOP-3, Revision 4, 'Performance and Sizing of Dry Pressure Containments.' This report has been reviewed and approved by the NRC.
>
> The following discussion outlines the procedures used to model the temperature response of safety-related electrical equipment following a postulated main steam line break (MSLB). The methodology which is used to calculate the heat transfer rates to the surface of a component is taken from the NRC Interim Evaluation Model for Equipment Qualification,

NUREG 0588. An outline of this methodology, which is programmed into the containment analysis code COPATTA, is given in section II.B.1. In section II.B.2 the modeling of a solenoid valve typical of those used in the Farley containment is shown to demonstrate the specific modeling techniques used.

II.B.1 METHODOLOGY FOR SAFETY RELATED COMPONENT THERMAL ANALYSIS IN SUPERHEATED CONTAINMENTS

Component thermal analyses may be performed to justify environmental qualification test conditions less than those calculated during the containment environmental response calculation. The thermal analysis should be performed for the potential points of component failure such as thin cross-sections and temperature-sensitive parts where thermal stressing, temperature-related degradation, steam or chemical interaction at elevated temperatures, or other thermal effects could result in failure of the components electrically or mechanically. The heat transfer rate to components is calculated as follows:

a. Condensing heat transfer rate

$$q/A = h_{cd} \cdot (T_s - T_w)$$

where q/A = component surface heat flux

h_{cd} = the larger of 4x Tagami Correlation or 4x Uchida Correlation

T_s = saturation temperature (dew point)

T_w = component surface temperature.

Both the Uchida and Tagami Correlations are empirical condensing heat transfer relationships. The Uchida Correlation is based on the ratio of steam to air masses. The Tagami Correlation is based on the free containment volume and the ratio of instantaneous to maximum energy release rates.

b. Convective heat transfer

A convective heat transfer coefficient should be used when the condensing heat flux is calculated to be less than the convective heat flux. During the blowdown period, a forced convection heat transfer correlation is used. For example:

$$Nu = C\,(Re)^n$$

where Nu = Nusselt No.
Re = Reynolds No.
C,n = empirical constants dependent on geometry and Reynolds No.

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The velocity used in the evaluation of Reynolds Number is determined as follows:

$$V = 25 \frac{M_{BD}}{V_{CONT}}$$

where V = velocity in ft/sec
M_{BD} = the blowdown rate in lbm/hr
V_{CONT} = containment volume in ft^3

After the blowdown has ceased or reduced to a negligibly low value, a natural convection heat transfer correlation is acceptable. However, use of a natural convection heat transfer coefficient must be fully justified whenever used ($h_{convection} = 2.0$).

II.B.2 COMPONENT MODELING

As an example of the modeling techniques used, the model of a three-way direct-acting solenoid valve manufactured by the Automatic Switch Company is presented in this section. This solenoid valve is typical of those in the Farley containment. Figure 1 [Figure 4-1 of this TER] shows several scaled views of the component including its internal construction. The critical region to be analyzed here is the upper housing, a four inch diameter circular cylinder, which contains the core assembly and coil used to energize the valve.

An implicit finite difference solution of the one-dimensional multi-region transient heat conduction equation is employed to determine the component's thermal response.

Mesh points, which define the length of nodes, are placed so that they lie on the external boundaries of the component, at the interface between materials, and at equal intervals between the interfaces and boundaries. The COPATTA computer code used for this analysis allows up to 20 material regions and 101 mesh points per component. The component is modeled, as appropriate, in a rectangular, a cylindrical, or a spherical geometry.

Figure 2 [Figure 4-2 of this TER] is a diagram of the valve, modeled as a cylinder with the center line on the left and the cylinder surface on the right. The material regions from left to right correspond to the steel core assembly with 15 nodes, the copper coil with 10 nodes, the steel coil housing with 10 nodes, the air gap separating the coil and housing with 40 nodes, and the painted steel upper housing with 15 nodes in the steel and 5 nodes in the paint.

Typical thermal conductivities and volumetric heat capacities for each material are also given in Figure 2. The valves characteristic length of 2.75 inches, the height of the solenoid valve, is used in the calculation of the time dependent convective heat transfer coefficient described in section II.b. As the component is symmetrical, left side centerline

boundary condition is insulated (no heat transfer). The right side surface is exposed to the containment MSLB atmosphere.

The component's temperature distribution is hence calculated by the COPATTA computer code for limiting MSLB transients. From this, the maximum surface temperature of the component can be identified and used to determined if a component is qualified for the MSLB environment.

Temperatures reported as qualification temperatures were in all cases the measured ambient temperature. However, analysis shows that for the qualification test steam envrionment, the equipment surface temperature and ambient temperature are essentially identical. Using the calculation methodology previously described the surface temperature was calculated as a function of autoclave temperature and time. For this analysis only 1x Uchida is used to conservatively calculate the heat transport to the modelled components.

The component's surface temperature approaches within 3°F of the ambient temperature in no more than about 200 seconds in a saturated steam environment. This is true of all the components types modelled. Since the qualification test procedure for all components maintained the temperature above the qualification temperature for a period of at least 20 to 240 minutes, we judge the components to be qualified.

Component Evaluation Worksheets will not be updated to reflect higher equipment surface temperature expected due to the MSLB event. These higher temperatures have been reported in Table B.1-1."

With regard to submergence inside containment, the Licensee stated:

"Of the 51 safety related electrical components previously identified as having a potential for becoming submerged after a postulated event, all but 13 have been relocated above the flood level. These thirteen components are located in the containment, and include motor operated valves, solenoid valves and limit switches. In all cases, they will have performed their safety function before becoming submerged. Refer to Table II.C-1 for a comparison of operating time vs. submergence time. A failure mode and effects analysis for the three types of component is also provided.

To assure that those components potentially exposed to submergence will have completed their safety related function prior to being submerged, the rate of containment flooding was calculated. Then, based on the equipment elevation, the time to submergence was determined. The results are presented below:

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Table II.C-1

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TABLE II.C-1

Item	Component	El.	Time to Function	Time to Submergence
a	Q2E21ZS8149A	111'	30 sec.	1260 sec.
a	Q2E21ZS8149B	111'	30 sec.	1260 sec.
a	Q2E21ZS8149C	111'	30 sec.	1260 sec.
a	Q2E21V038A (MOV8808A)	111'-6"	30 sec.	1390 sec.
a	Q2E21V038B (MOV8808B)	112'-6"	30 sec.	1660 sec.
a	Q2E21V038C (MOV8808C)	113'-6"	30 sec.	1950 sec.
	N2G21SV1003B	110'	30 sec.	983 sec.
	N2G21ZS1003B	110'	30 sec.	983 sec.
	N2G21ZS1376	109'	30 sec.	714 sec.
	N2G21SV1376	109'	30 sec.	714 sec.
	Q2E21SV8149AB	111'	30 sec.	1260 sec.
	Q2E21SV8149BB	111'	30 sec.	1260 sec.
	Q2E21SV8149CB	111'	30 sec.	1260 sec."

With regard to chemical spray, the Licensee stated [5]:

"In all cases the chemical spray portion of the equipment qualification tests utilized a boric acid solution concentration that meets or exceeds the Farley FSAR value of 2000 ppm boric acid. These concentrations are further delineated in Section III of this appendix."

With respect to radiation values inside primary containment, the Licensee stated:

"The range of required values outside the containment used to specify limiting radiation levels within the auxiliary building has been provided previously in Section C.4 of the NUREG 0588 submittal. The source term methodology associated with post-LOCA recirculation fluid lines was used to establish dose rates and integrated doses for each affected component. The radiation qualification level of each component was then compared to the calculated dose."

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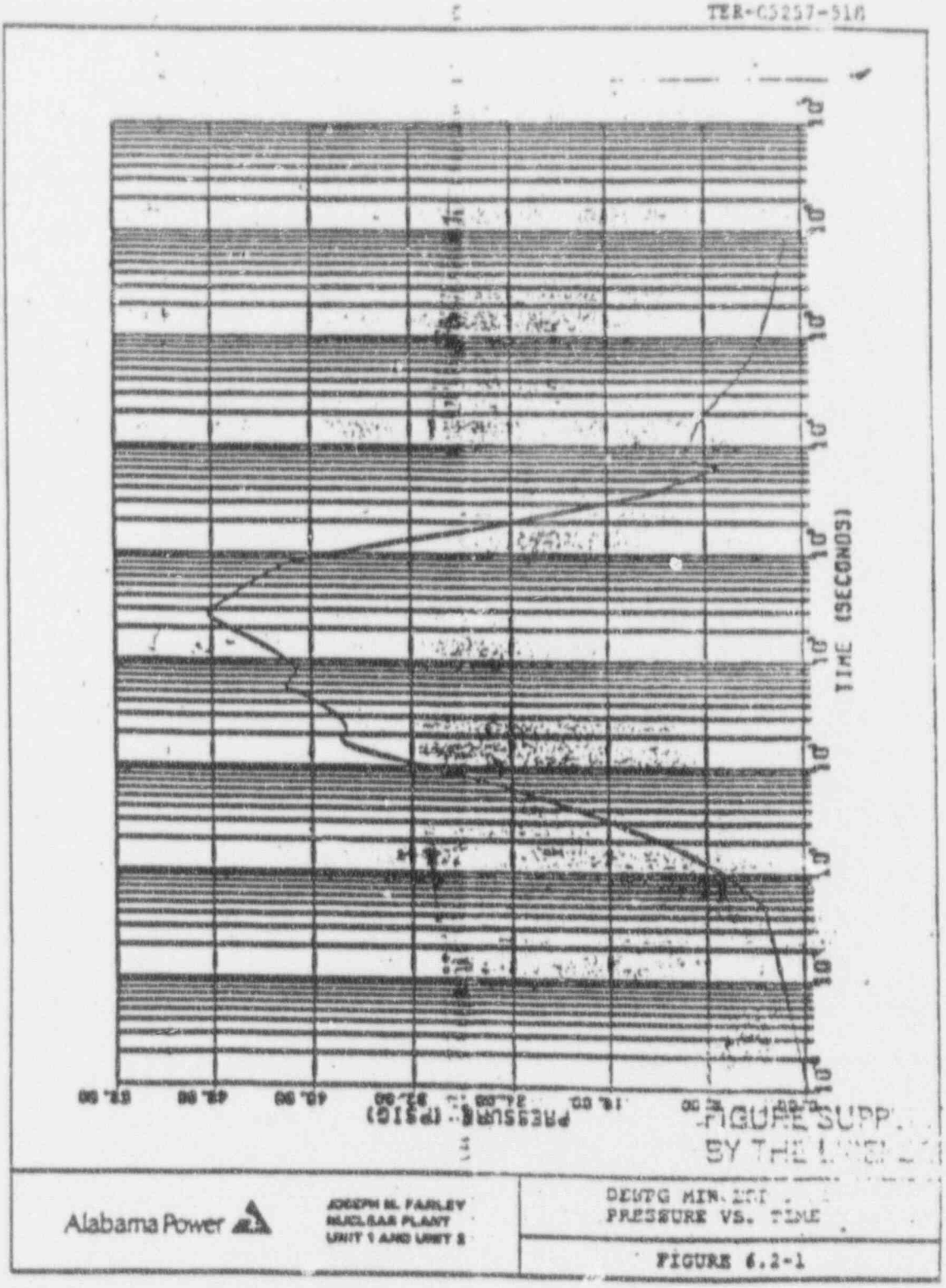

Alabama Power	JOSEPH M. FARLEY NUCLEAR PLANT UNIT 1 AND UNIT 2	DESPG MIN. ESF PRESSURE VS. TIME
		FIGURE 6.2-1

Figure A-1. DESPG MIN ESF 1 AC, Pressure vs. Time (Licensee Figure 6.2-1)

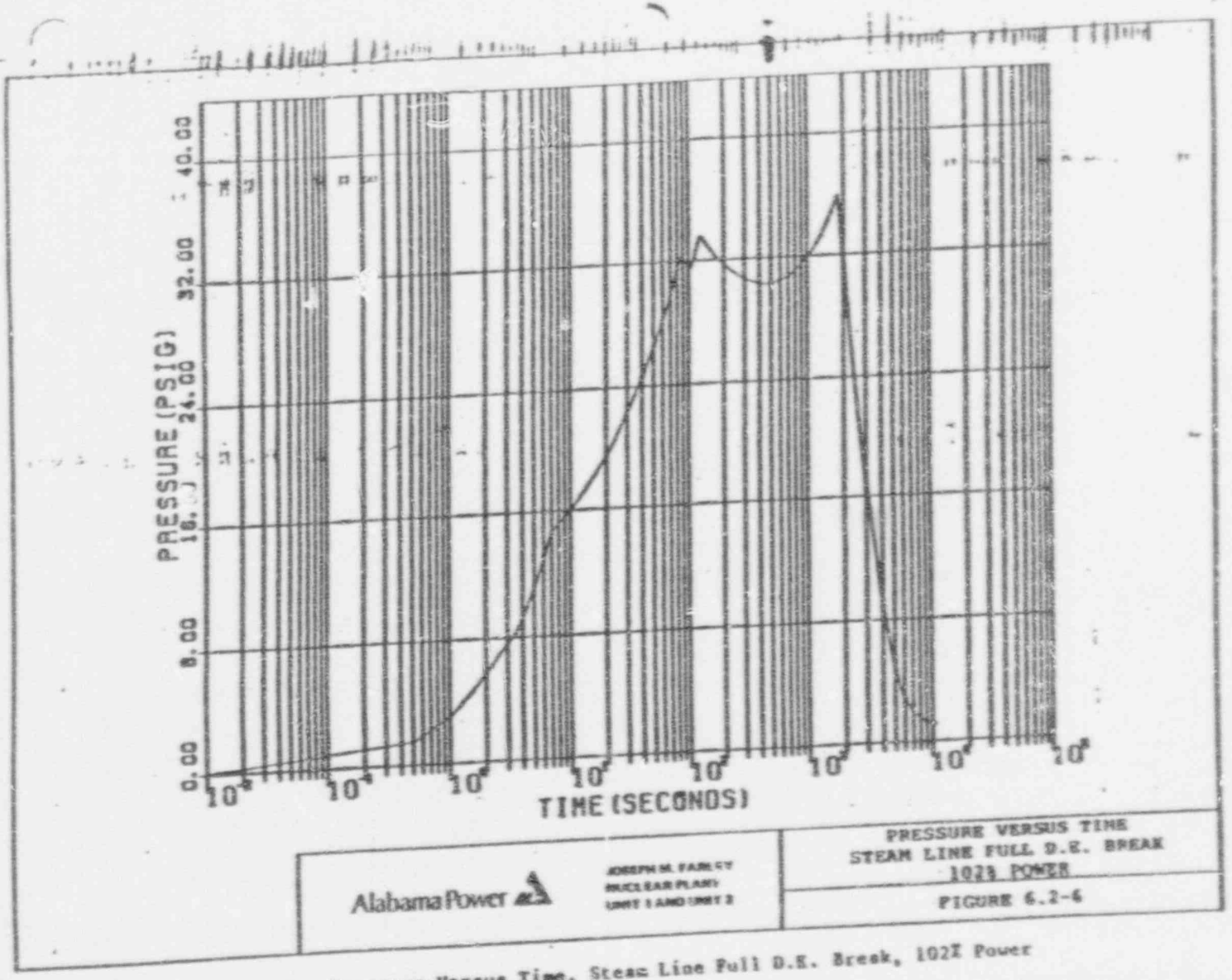

Figure A-2. Pressure Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-6)

FIGURE SUPPLIED BY THE LICENSEE

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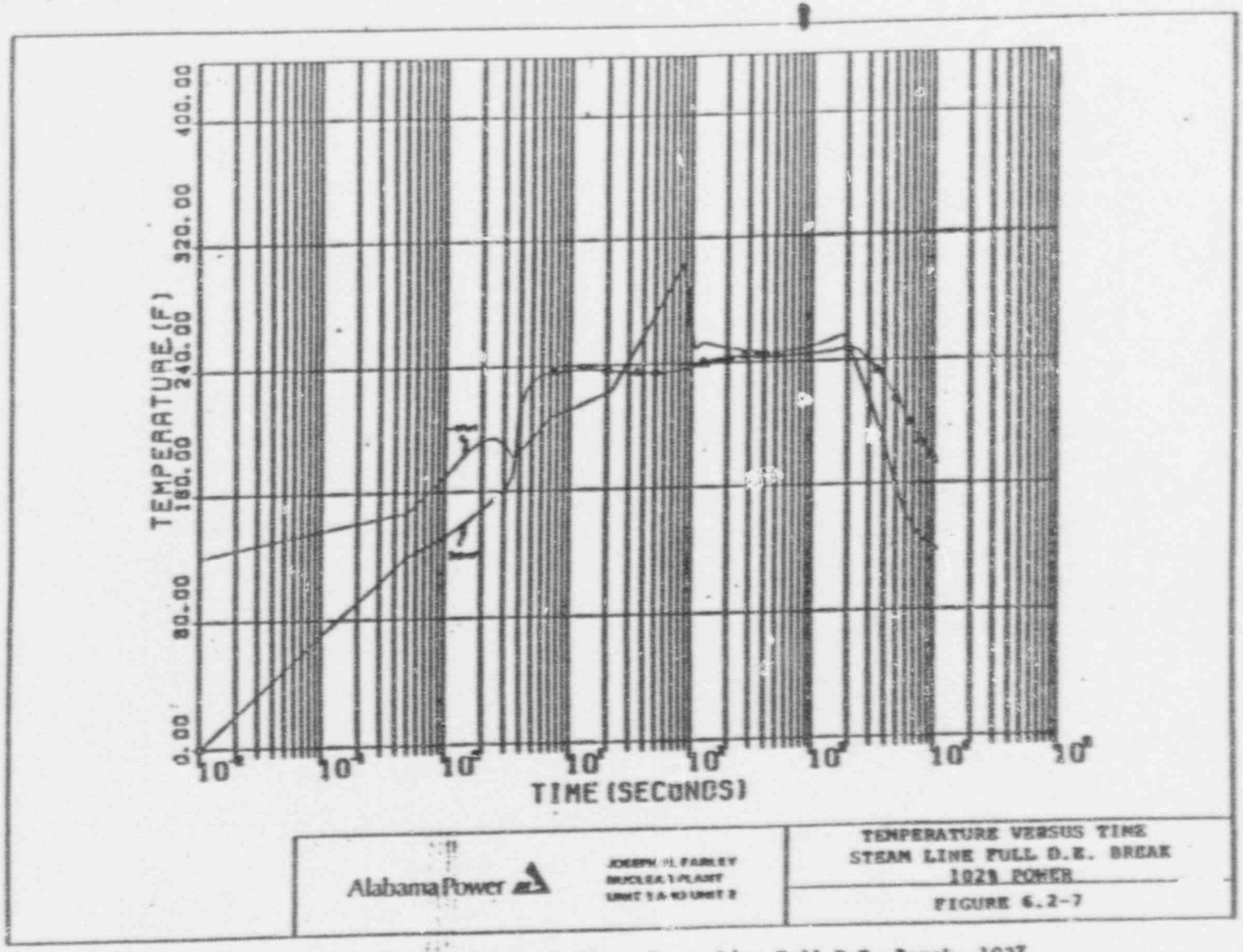

Figure A-3. Temperature Versus Time, Steam Line Full D.E. Break, 102% Power (Licensee Figure 6.2-7)

FIGURE SUPPLIED BY THE LICENSEE

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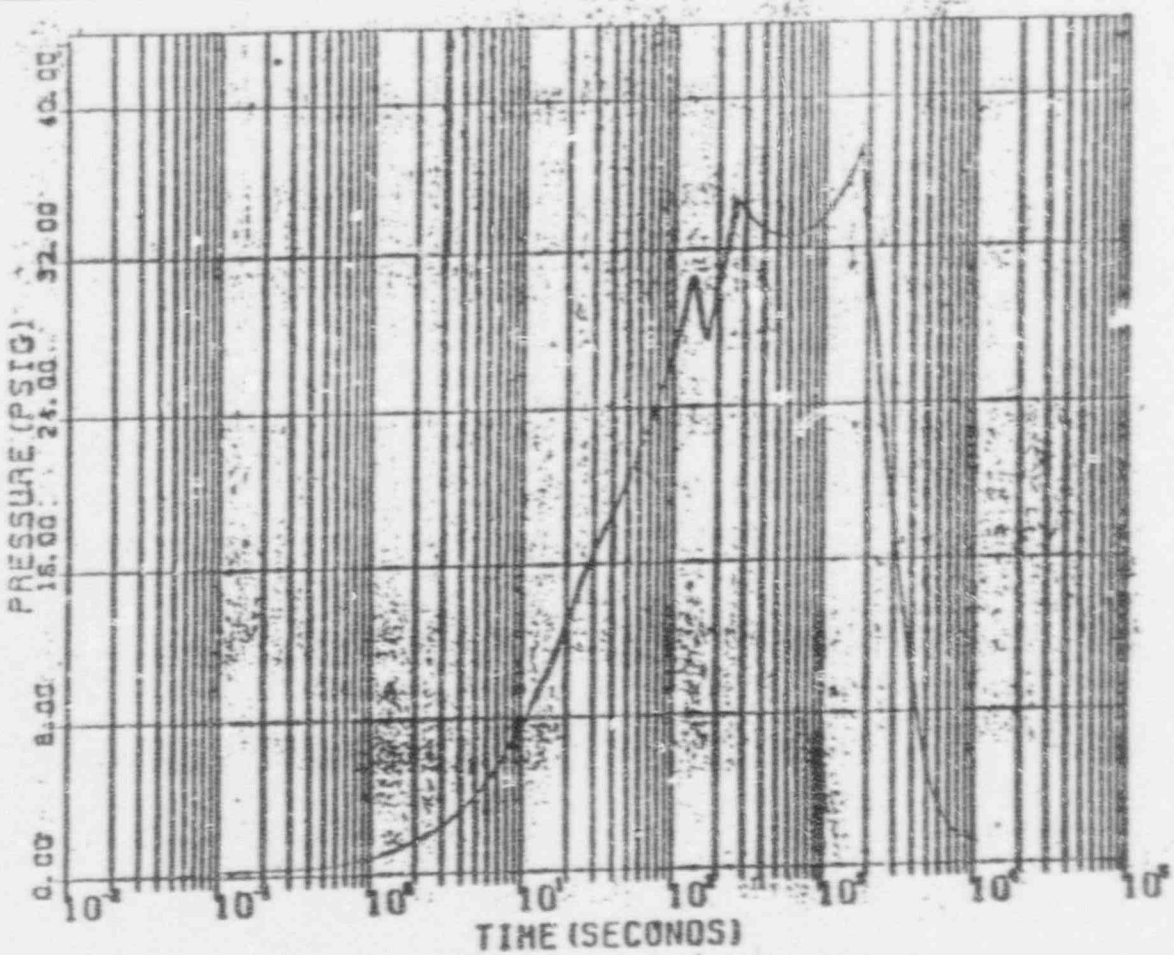

Alabama Power	JOSEPH M. FARLEY NUCLEAR PLANT UNIT 1 AND UNIT 2	PRESSURE VERSUS TIME STEAM LINE 0.7 ft^2 D.E. BREAK 102% POWER FIGURE 6.2-8

Figure A-4. Pressure Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-8)

FIGURE SUPPLIED BY THE LICENSEE

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0 9 5 7 1 0 0

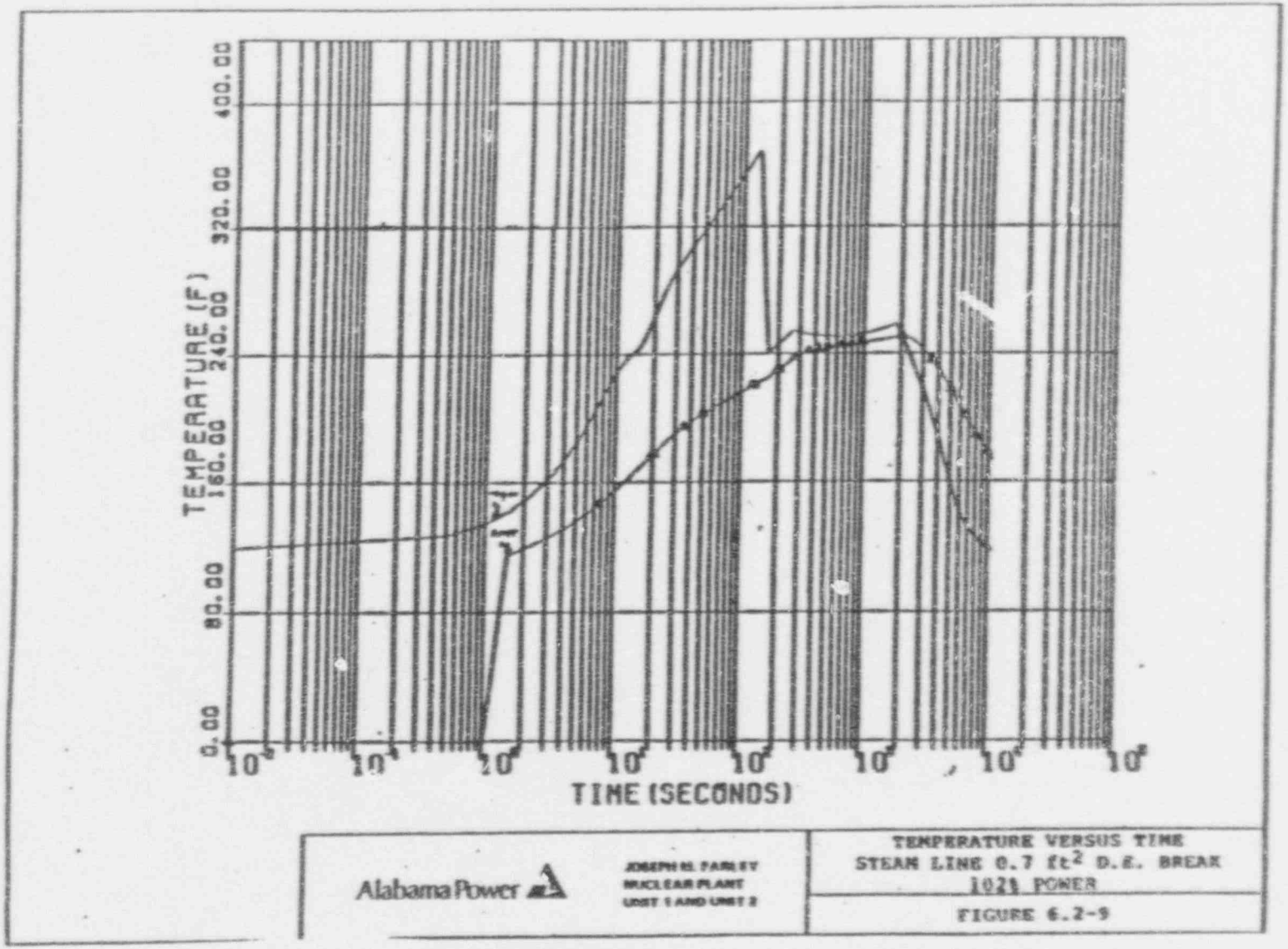

Figure A-5. Temperature Versus Time, Steam Line 0.7 ft^2 D.E. Break, 102% Power (Licensee Figure 6.2-9)

FIGURE SUPPLIED BY THE LICENSEE

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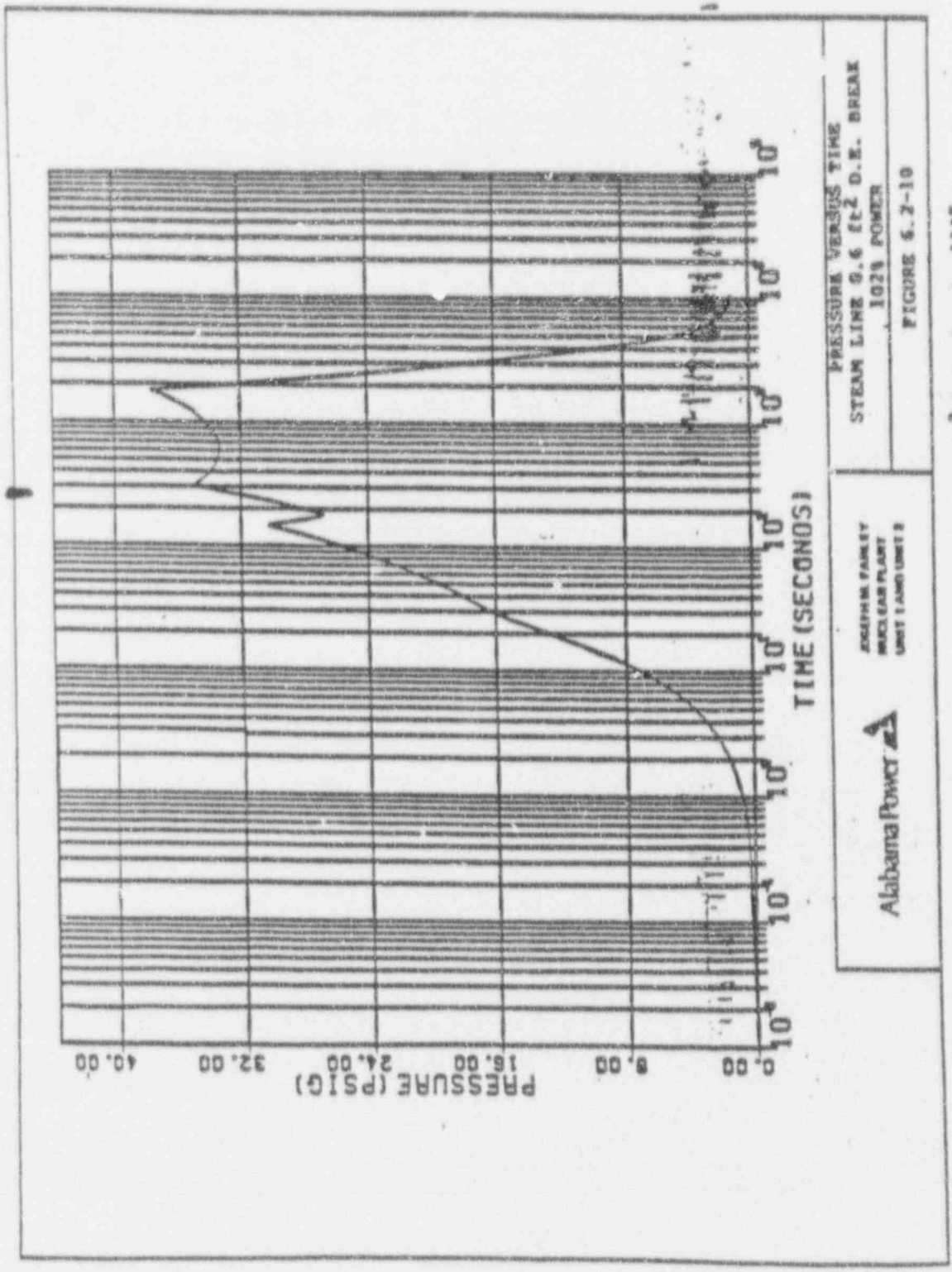

FIGURE SUPPLIED BY THE LICENSEE

Figure A-6. Pressure Versus Time, Steam Line 0.6 ft² D.E. Break, 102% Power (Licensee Figure 6.2-10)

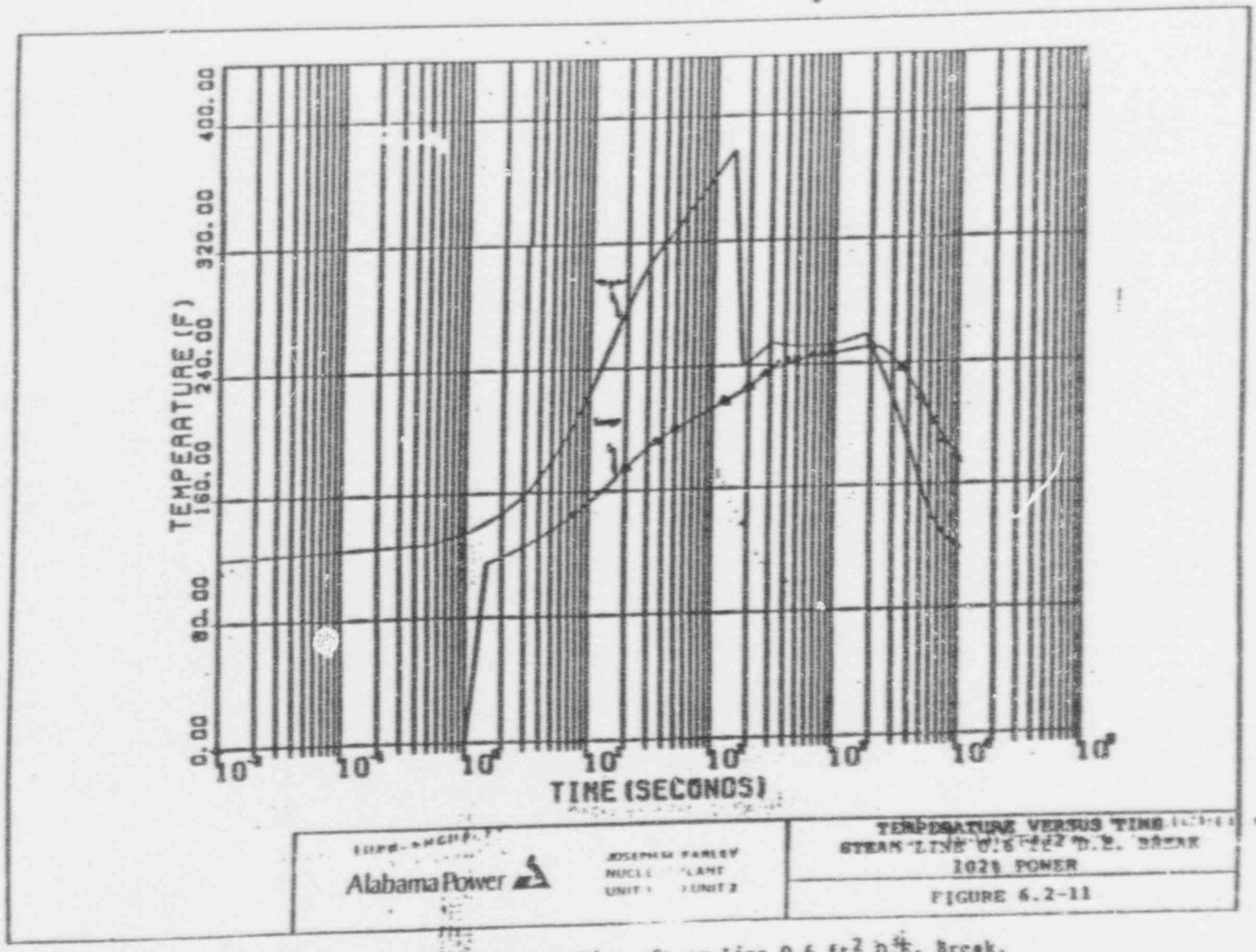

Figure A-7. Temperature Versus Time, Steam Line 0.6 ft² D.E. Break, 102% Power (Licensee Figure 6.2-11)

FIGURE SUPPLIED BY THE LICENSEE

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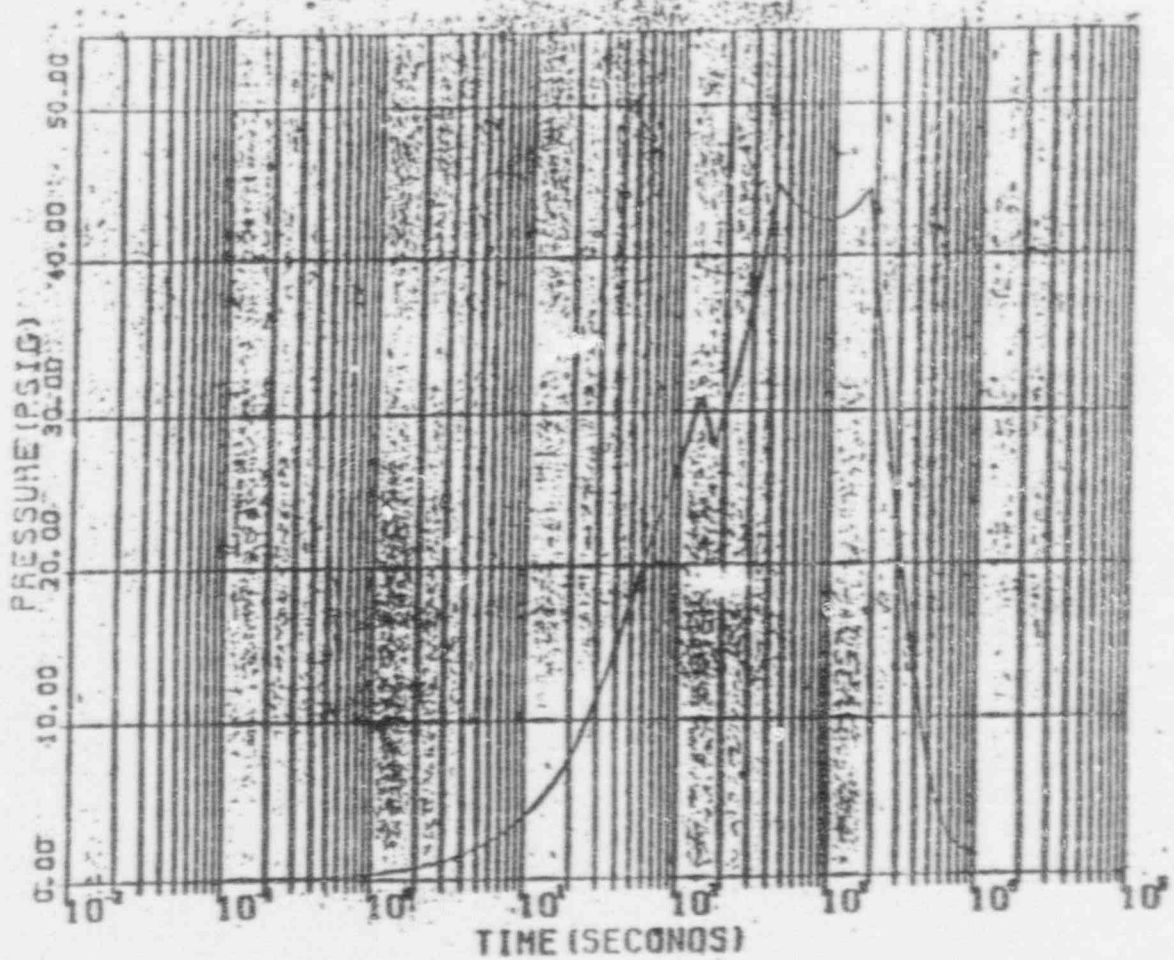
0 9 5 7 1 0 0 5 3



Alabama Power	JOSEPH M. FARLEY NUCLEAR PLANT UNIT 1 AND UNIT 2	PRESSURE VERSUS TIME STEAM LINE 0.645 ft^2 SPLIT 102% POWER FIGURE 6.2-12

Figure A-8. Pressure Versus Time (Steam Line 0.645 ft^2 Split, 102% Power (Licensee Figure 6.2-12)

FIGURE SUPPLIED BY THE LICENSEE

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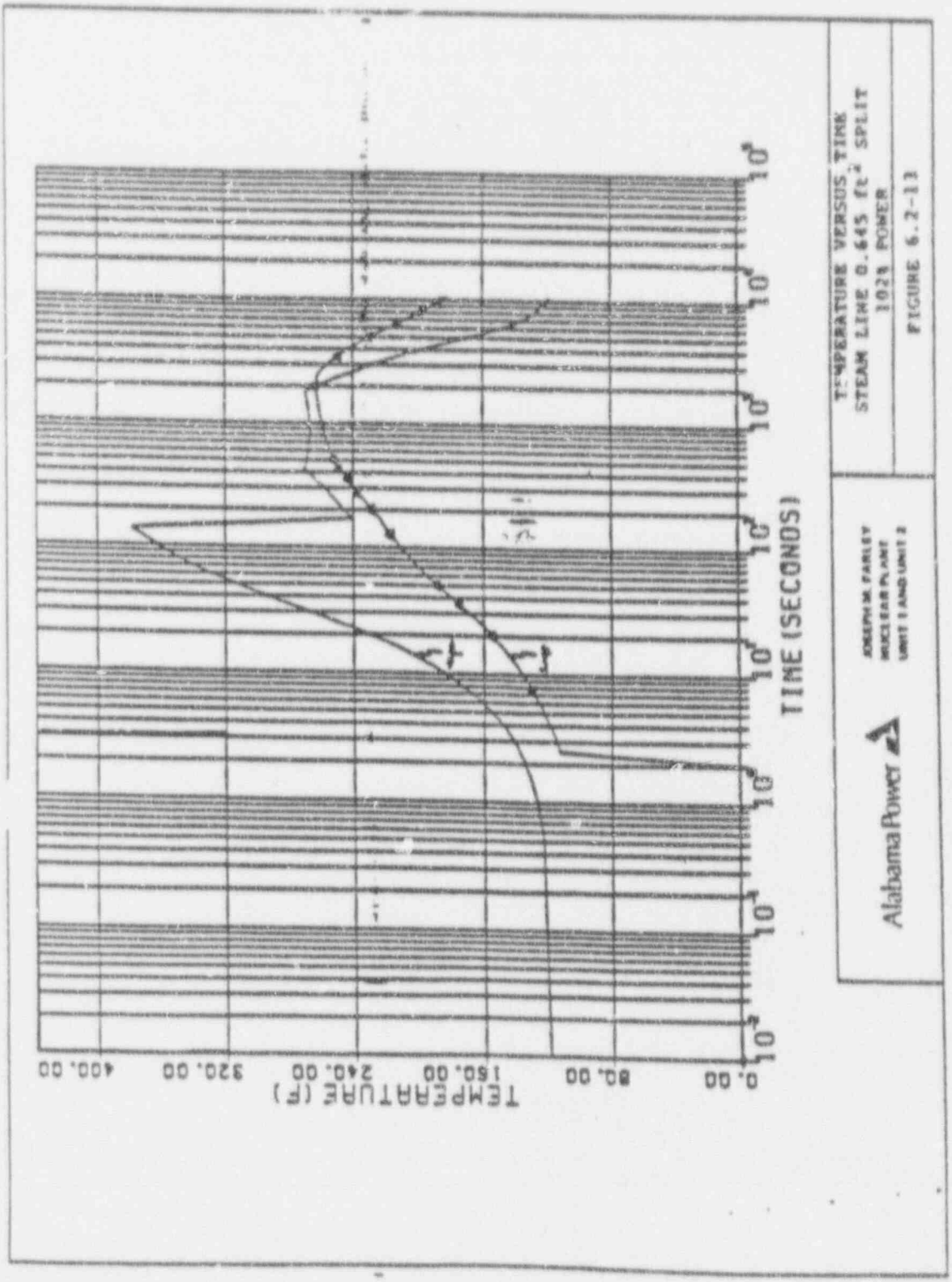

Figure A-9. Temperature Versus Time, Steam Line 0.645 ft² Split, 102% Power (Licensee Figure 6.2-13)

FIGURE SUPPLIED BY THE LICENSEE

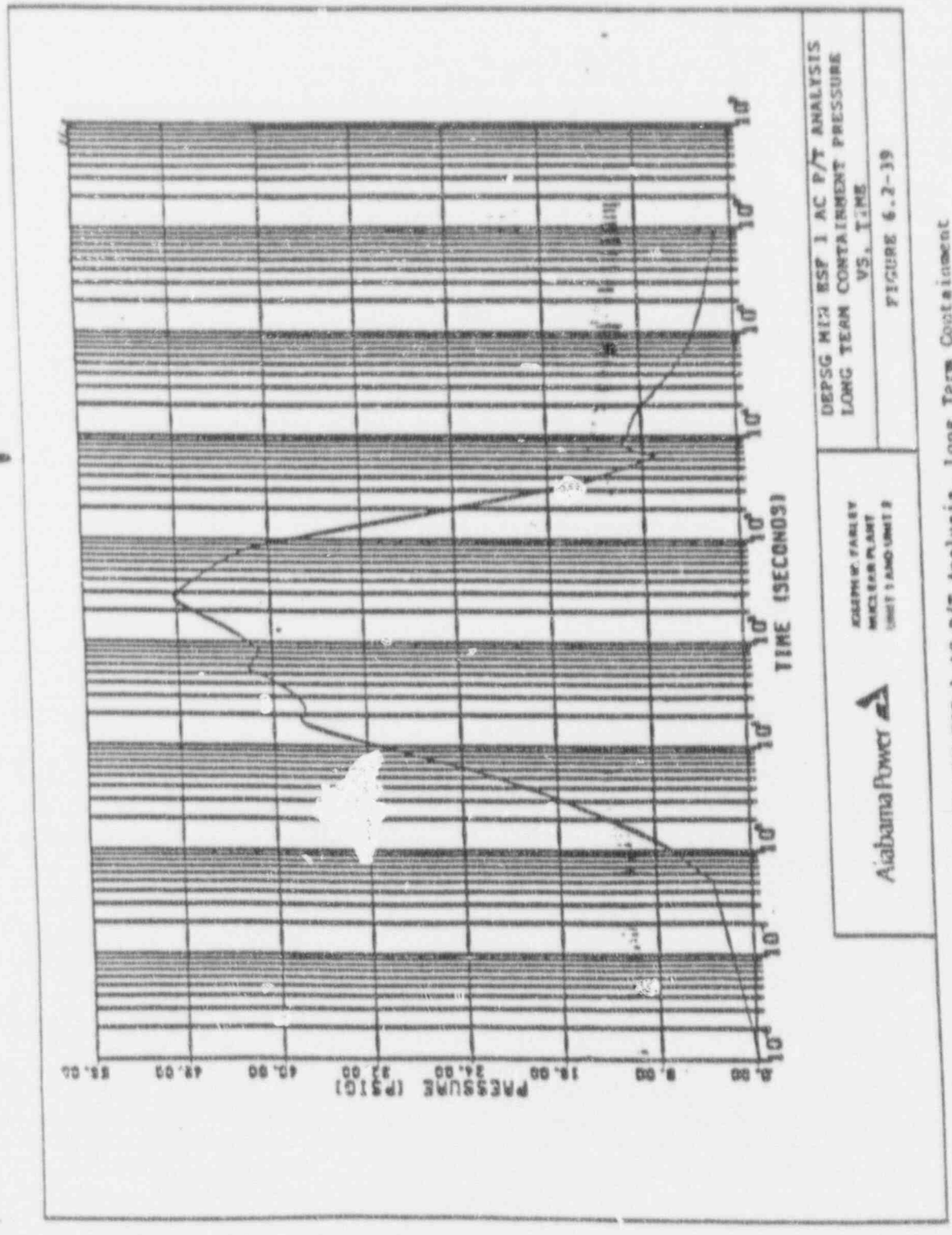

Figure A-10. DEPSG MIN ESF 1 AC P/T Analysis, Long Term Containment Pressure vs. Time (Licensee Figure 6.2-39)

FIGURE SUPPLIED BY THE LICENSEE

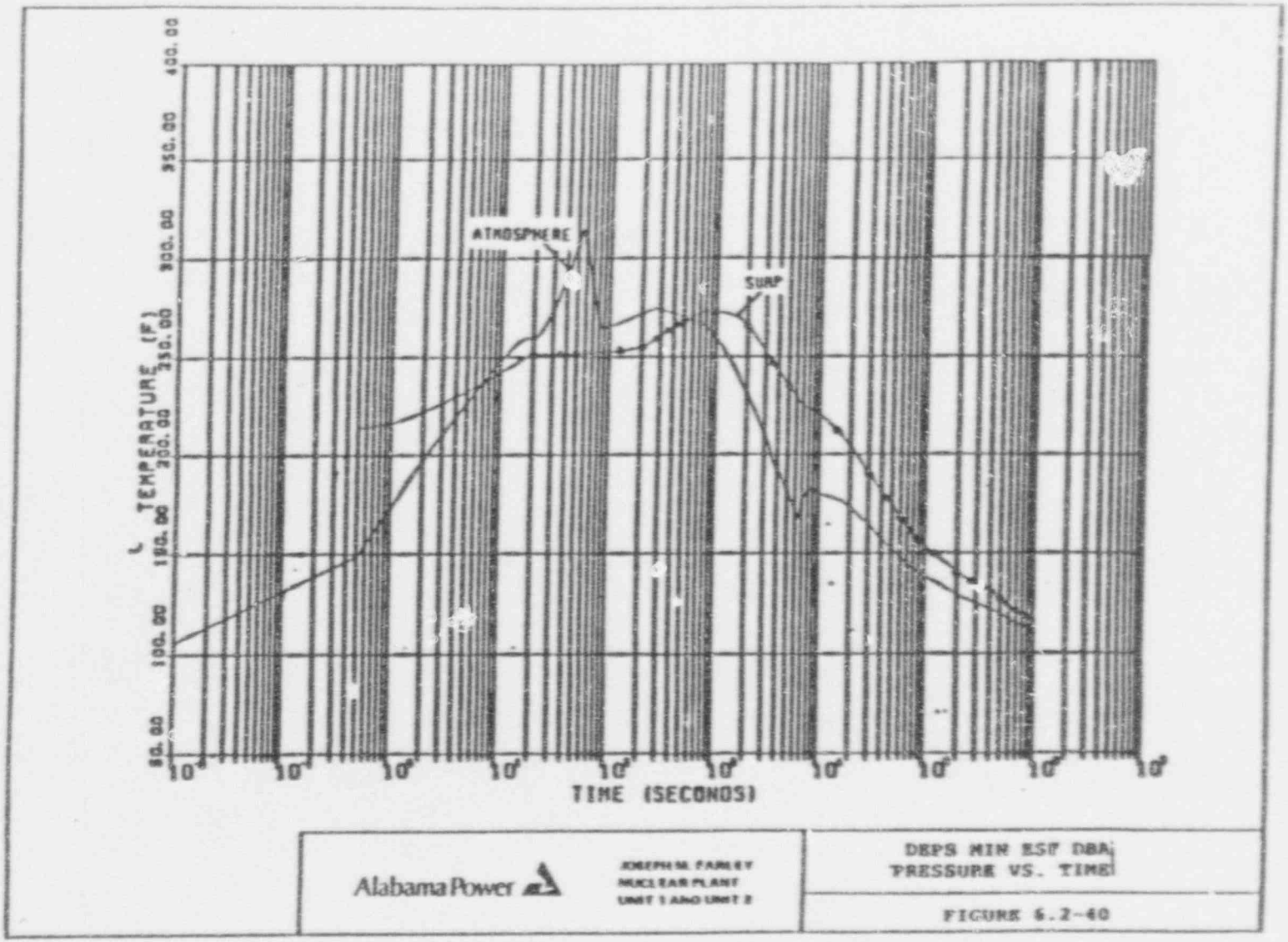

Figure A-11. DEPS MIN ESF DBA, Pressure vs. Time (Licencee Figure 6.2-40)

FIGURE SUPPLIED
BY THE LICENSEE

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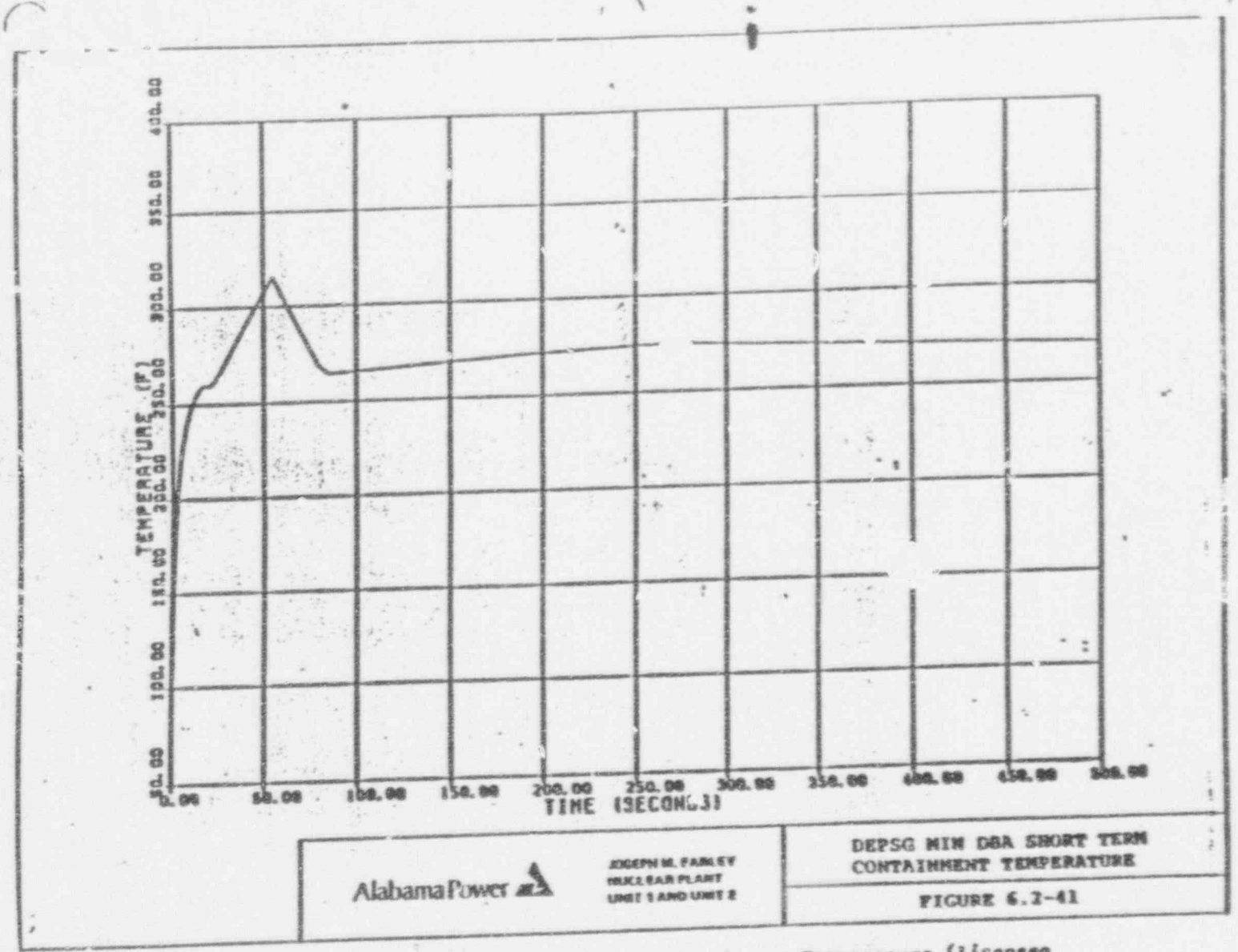

Figure A-12. DEPSG MIN DBA Short Term Containment Temperacure (Licensee Figure 6.2-41)

FIGURE SUPPLIED BY THE LICENSEE

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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 Farley Nuclear Plant Unit 2. 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 [5, 6].

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.

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EQUIPMENT ITEM NO. 1
MOTORIZED VALVE ACTUATOR LOCATED IN THE MAIN STEAM ROOM, ELEV. 137'5"
LIMITORQUE MODEL SMB; SIZES 1, 4T
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 1
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3232A, B, C; (Q2N21V001A-B, B-B, C-B))
SERVICE: FEEDWATER SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.2 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3350A, B, C; (Q2N23V001A, B, C))
SERVICE: AUXILIARY FEEDWATER
LICENSEE SUBMITTAL: SCEW(S): C.2.16.3 [5]

EQUIPMENT ITEM NO. 2
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 111'6"
LIMITORQUE MODEL SMB4
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 2
LICENSEE REFERENCE(S): 695, 1590
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV8088A, B, C; (Q2E21V038A B, C))
SERVICE: CVCS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.4 [5]

EQUIPMENT ITEM NO. 3
MOTORIZED VALVE ACTUATOR LOCATED IN THE CONTAINMENT, ELEV. 126'6"
LIMITORQUE MODEL SMB; SIZES 00, 000
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 3
LICENSEE REFERENCE(S): 706
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3660, MOV3318B; (Q2E14V002 004))
SERVICE: CONTAINMENT COOLING
LICENSEE SUBMITTAL: SCEW(S): C.2.6.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV8112 (Q2E21V249A))
SERVICE: CVCS/SAFETY INJECTION
LICENSEE SUBMITTAL: SCEW(S): C.2.9.7 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3872A, B (Q2E22V001A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3536 (Q2E23V021))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3530 (Q2E23V003))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.4 [5]

EQUIPMENT ITEM NO. 3 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3528A, B, C, D (Q2E23V022A, B, C, D))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3835A, B (Q2E23V025A, B))
SERVICE: COMBUSTIBLE GAS CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.11.5 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3441A, B, C, D (Q2P16V207A, B, C, D))
SERVICE: WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.19.3 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3131 (Q2P16V081))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.20.4 [5]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (MOV3046 (Q2P17V097))
SERVICE: COOLING WATER
LICENSEE SUBMITTAL: SCEW(S): C.2.20.2 [5]

EQUIPMENT ITEM NO. 4
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 110'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 4
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2E21SV8149AB, BB, CB)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.8 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (N2021SV10038)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.4 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (~~Q2021SV3376~~)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.3 [6]

EQUIPMENT ITEM NO. 5
SOLENOID VALVE LOCATED IN THE MAIN STEAM ROOM, ELEV. 135'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 10 MINUTES
TER CHECKSHEET NO. 5
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N25SV[illegible]A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.2 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N[illegible] BA, C A; 3227AA, BA, CA)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.5 [6]
FUNCTION (PLANT ID): ACTIVATE AIR OPERATED VALVE FOR ISOLATION (Q2N12SV3225A, B)
LICENSEE SUBMITTAL: SCEW(S): C.3.14.4 [6]

EQUIPMENT ITEM NO. 5 (CONTINUED)
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N12SV3234A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.2 [5]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N11SV3369AC, BC, C C; 3370AC, BC, CC)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.8 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2N11SV3368AA, BA, C A; 3976A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.7 [6]

EQUIPMENT ITEM NO. 6
SOLENOID VALVE LOCATED IN THE CONTAINMENT
TARGET ROCK MODEL 79A8001
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 6
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): REACTOR VESSEL HEAD VENTILATION (62B13SV2213A, B; 2214A, B)
LICENSEE SUBMITTAL: SCEW(S): T.I-2.2 [6, 11, 19]

EQUIPMENT ITEM NO. 7
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 89'4"
AUTOMATIC VALVE MODEL C5439
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 7
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2E12SV3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.7 [6]

EQUIPMENT ITEM NO. 8
SOLENOID VALVE LOCATED IN THE CONTAINMENT, ELEV. 129'0"
ASCO MODEL NP SERIES
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 8
LICENSEE REFERENCE(S): 49
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2B31SV8047)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.2 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2G21SV7126)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.5 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2E21SV8871, 8149AB, BB, CB)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.5 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P13ZS2867B, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.6 [6]

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EQUIPMENT ITEM NO. 8 (CONTINUED)
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P17SV3443)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.5 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P17SV3184)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.3 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P15SV3103, 3766, 3 179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [6]
FUNCTION (PLANT ID): ACTUATE AIR OPERATED VALVE FOR ISOLATION (Q2P15SV3180A, B, C; 3 181A, B, C; 3104; 3765)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.4 [6]

EQUIPMENT ITEM NO. 9
SOLENOID VALVE LOCATED IN THE CONTAINMENT
ASCO MODEL HTX8320A22V
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 9
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): PILOT FOR AIR OPERATED VALVE (N2B21SV0444BA, BB; 445AA, AB)
SERVICE: PORV
LICENSEE SUBMITTAL: SCEW(S): TMI-3.2 [6, 11, 19]

EQUIPMENT ITEM NO. 10
SOLENOID VALVE LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
ASCO MODEL HV20638140
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 10
LICENSEE REFERENCE(S): 649
FUNCTION (PLANT ID): ACTIVATE AIR OPERATED VALVE FOR ISOLATION (N2C22SV0479A, B; 489A, B; 499A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.6 [6]
FUNCTION (PLANT ID): ACTIVATE AIR OPERATED VALVE FOR ISOLATION (N2C22SV0478A, B; 488A, B; 498A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.5 [6]

EQUIPMENT ITEM NO. 11
HYDROGEN RECOMBINER LOCATED IN THE CONTAINMENT, ELEV. 155'0"
WESTINGHOUSE MODEL TYPE A
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 11
LICENSEE REFERENCE(S): 1571, 1572, 1573, 1574, 1575
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (K001A, B (Q2E17G001A, B))
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.7.2 [5]

EQUIPMENT ITEM NO. 12
ELECTRIC MOTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
JOY MANUFACTURING MODEL TYPE P
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 12
LICENSEE REFERENCE(S): 1803
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (Q2E22M001A, B) B
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.10.2 [5]
FUNCTION (PLANT ID): HYDROGEN CONCENTRATION REDUCTION (Q2E19M001A, B, C, D)
SERVICE: POST LOCA H2 CONTROL
LICENSEE SUBMITTAL: SCEW(S): C.2.8.2 [5]
FUNCTION (PLANT ID): NOT STATED (Q2E12M001, B, C, D)
SERVICE: CONTAINMENT HEAT REMOVAL
LICENSEE SUBMITTAL: SCEW(S): C.2.6.8 [5]

EQUIPMENT ITEM NO. 13
RTD LOCATED IN THE CONTAINMENT, ELEV. 122'9"
ROSEMOUNT MODEL 176KS
REQUIRED OPERATING TIME: 14 DAYS W
TER CHECKSHEET NO. 13
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID): REACTOR TRIP (N2B21TE410, 413, 420, 423, 430, 433)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.3 [6]

EQUIPMENT ITEM NO. 14
RTD LOCATED IN THE CONTAINMENT, ELEV. 124'0"
ROSEMOUNT MODEL 176KF W
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 14
LICENSEE REFERENCE(S): 687
FUNCTION (PLANT ID): REACTOR TRIP (N2B13TE412B, D; 422B, D; 432B, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.2 [6]

EQUIPMENT ITEM NO. 15
RADIATION DETECTOR LOCATED IN THE CONTAINMENT, ELEV. 155'0"
VICTOREEN MODEL 8771 B
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 15
LICENSEE REFERENCE(S): 2883
FUNCTION (PLANT ID): RADIATION MONITOR (Q2D21RE0027A-A, B-B)
SERVICE: POST ACCIDENT MONITOR
LICENSEE SUBMITTAL: SCEW(S): TMI-5.2 [6, 11, 19]

EQUIPMENT ITEM NO. 16
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
BARTON MODEL 763 (LOT 2)
REQUIRED OPERATING TIME: 30 DAYS
TER CHECKSHEET NO. 16
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): POST-ACCIDENT MONITOR (N2B21PT402, 403)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.2[5]

EQUIPMENT ITEM NO. 17
PRESSURE TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
BARTON MODEL 764 (LOT 2)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 17
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): REACTOR TRIP (Q2B31PT455, 456, 457)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.6 [6]

EQUIPMENT ITEM NO. 18
LEVEL SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 133'5"
DE LAVAL MODEL LS36497
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 18
LICENSEE REFERENCE(S): 2587
FUNCTION (PLANT ID): MAIN FEED PUMP TRIP (Q2N21LSH2828A, B, C; 2829A, B, C)
SERVICE: FLOOD LEVEL SENSOR
LICENSEE SUBMITTAL: SCEW(S): C.2.15.3 [6]

EQUIPMENT ITEM NO. 19
LEVEL SENSOR LOCATED IN THE CONTAINMENT, ELEV. 80'0"
DE LAVAL MODEL XM54854323
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 19
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): LEVEL INDICATION (Q2G21LT3282A-A, B-B)
SERVICE: CONTAINMENT SUMP
LICENSEE SUBMITTAL: SCEW(S): TMI-7.2 [6, 11, 19]

EQUIPMENT ITEM NO. 20
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
DE LAVAL MODEL XM36495
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 20
LICENSEE REFERENCE(S): 1887, 2587
FUNCTION (PLANT ID): POST-ACCIDENT LEVEL MONITOR (Q2E11LT3594A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.2 [6]

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EQUIPMENT ITEM NO. 21
LEVEL TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 116'0"
BARTON MODEL 764 (LOT 2)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 21
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): PRESSURIZER LEVEL (Q2B31LT459, 460, 461)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.5 [6]
FUNCTION (PLANT ID): FEEDWATER CONTROL (Q2C22LT474 TO 476, 484 TO 486, 494 TO 496)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.9 [6]
FUNCTION (PLANT ID): LEVEL INDICATION (Q2N11LT477, 487, 497)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.11 [6]

EQUIPMENT ITEM NO. 22
FLOW TRANSMITTER LOCATED IN THE CONTAINMENT, ELEV. 121'0"
BARTON MODEL 764 (LOT 2)
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 22
LICENSEE REFERENCE(S): 5378
FUNCTION (PLANT ID): FEEDWATER CONTROL (Q2C22FT474, 475, 484, 485, 494, 495)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.10 [6]

EQUIPMENT ITEM NO. 23
LIMIT SWITCH LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 23
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2C22ZS0478, 488, 498, 479, 489, 499)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.4 [6]

EQUIPMENT ITEM NO. 24
LIMIT SWITCH LOCATED IN THE MAIN STEAM ROOM, ELEV. 131'7"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 24
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N25ZS3772A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.17.3 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N23ZS3228A, B, C; 3227A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.16.4 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N12ZS3234A, B; 3235A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.14.3 [6]

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EQUIPMENT ITEM NO. 24 (CONTINUED)
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N11ZS3369A, B, C; 3370A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.6 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2N11ZS3368A, B, C; 3976A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.5 [6]

EQUIPMENT ITEM NO. 25
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 118'0" & ABOVE
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 25
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2B31 [illegible]0747) B
LICENSEE SUBMITTAL: SCEW(S): C.2.3.3 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2E21ZS8871)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.6A [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P13ZS3196, 2867B, 3197, 2866B)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.5A [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P17S3184, 3443, N2C22ZS0499)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.4 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P15ZS3104, 3103, 3765, 3766, 3179A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2P15ZS3180A, B, C; 3181A, B, C)
LICENSEE SUBMITTAL: SCEW(S): C.2.18.5 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2E12ZS3999A, B)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.5 [6]

EQUIPMENT ITEM NO. 26
LIMIT SWITCH LOCATED IN THE CONTAINMENT, ELEV. 109'0"
NAMCO MODEL EA180
REQUIRED OPERATING TIME: 1 HOUR B
TER CHECKSHEET NO. 26
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2E21ZS8149A, B, C; Q2E21ZS8808AB, BB, CD)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.6 [6]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2G21ZS3396, 7126; N2G21ZS1003B)
LICENSEE SUBMITTAL: SCEW(S): C.2.12.3 [6]

EQUIPMENT ITEM NO. 27
LIMIT SWITCH LOCATED IN THE CONTAINMENT
NAMCO MODEL EA180
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 27
LICENSEE REFERENCE(S): 3293
FUNCTION (PLANT ID): VALVE POSITION INDICATION (N2B31ZS0445A, 4448)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [6, 11, 19]
FUNCTION (PLANT ID): VALVE POSITION INDICATION (Q2B13ZS2034, 2035, 2036)
LICENSEE SUBMITTAL: SCEW(S): TMI-4.5 [6, 11, 19]

EQUIPMENT ITEM NO. 28
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 28
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-7.4 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-5.3 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-4.4 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-3.4 [6, 11, 19]
FUNCTION (PLANT ID): CONTAINMENT ISOLATION (VARIOUS)
SERVICE: ELECTRICAL PENETRATION
LICENSEE SUBMITTAL: SCEW(S): TMI-2.3 [6, 11, 19]

EQUIPMENT ITEM NO. 29
ELECTRICAL PENETRATION LOCATED IN THE CONTAINMENT, ELEV. 143'0"
GENERAL ELECTRIC MODEL 100 SERIES
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 29
LICENSEE REFERENCE(S): 1789, 1790
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.20.5 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.28.7 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.12 [5]

EQUIPMENT ITEM NO. 29 (CONTINUED)
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.11.6 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.10.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.9.9 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.8.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.7.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.6.9 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.5.3 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.11 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.3.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.2.4 [5]
FUNCTION (PLANT ID): CONTAINMENT BOUNDARY ELECTRICAL PENETRATION (VARIOUS)
LICENSEE SUBMITTAL: SCEW(S): C.2.1.3 [5]

EQUIPMENT ITEM NO. 30
TERMINAL BLOCK LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 30
LICENSEE REFERENCE(S): 3950, 4577
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2C22SV0478A-A/JB, 488A-A/JB, 498A-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.4.7 [5]

EQUIPMENT ITEM NO. 31
TERMINAL BLOCK LOCATED IN THE CONTAINMENT
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 31
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2B13GG001-B)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.3 [6, 11, 19]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2B31SV0444BA-B/JB, 445AA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.3 [6, 11, 19]

EQUIPMENT ITEM NO. 31 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (A2TB007; Q2B13SV2213A-A/JB, 4B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [6, 11, 19]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2B13SV2214A/JB, 3B-B/JB; A2TB025)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.5 [6, 11, 19]

EQUIPMENT ITEM NO. 32
TERMINAL BLOCK LOCATED IN THE MAIN STEAM ROOM, ELEV. 144'0"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 32
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N25SV3772A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.17.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N23SV3228AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N23SV3227AA-A/JB, BA-A/JB, CA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (A2TB034)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.15.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N12SV3234A-A/JB, B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N12SV3235A-A/JB, 3235B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.14.. [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3976A-B/JB; 3369AA-A/JB, BA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3976CA-A/JB; 3370AA-B/JB, BA-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3370CA-B/JB; 3368AA-A/JB, BA-A/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2N11SV3368CA-A/JB; 3976B-B/JB, C-B/JB)
LICENSEE SUBMITTAL: SCEW(S): C.2.13.9 [5]

EQUIPMENT ITEM NO. 33
TERMINAL BLOCK LOCATED IN THE CONTAINMENT, ELEV. 135'9"
STATES MODEL TYPE ZWM
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 33
LICENSEE REFERENCE(S): 3950
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2B31SV8047-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (12TB001, 003, 004; 22TB001, 002, 005)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.5 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (12TB001, 002; 22TB003, 004; 32TB001, 002)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.4 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2G21SV3376-B/JB, 1003A-A/JB, 7126-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2E21SV8871-A/JB, 8149AA-A/JB, 8149BA-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (N2E21SV8149CAA/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.9.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P13SV2867B-B/JB, 3197-B/JB, 2866B-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P13SV3196-B/JB; Q2E12SV3999A-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2E12SV3999B-B/JB; Q2T52B025)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.10 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P17SV3184-B/JB, 3443-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.20.7 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3103A/JB, 3765-A/JB, 3766-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

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EQUIPMENT ITEM NO. 33 (CONTINUED)
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3179A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3180A-A/JB, B-A/JB, C-B/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3181A-A/JB, B-A/JB, C-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]
FUNCTION (PLANT ID): CONDUCTOR TERMINATION (Q2P15SV3104-A/JB)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.18.6 [5]

EQUIPMENT ITEM NO. 34
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE MAIN STEAM ROOM, ELEV. 135'0" & ABOVE
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 34
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VAL5007C, 8C, 9C; 2VAL5013D, 4D, 5D)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.16.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VNR5003A, B)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.7 [5]

EQUIPMENT ITEM NO. 35
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE MAIN STEAM, ELEV. 116'0"
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 35
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VXV5013L, 14H, 14J)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.13 [5]

EQUIPMENT ITEM NO. 36
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, ELEV. 121'0"
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 36
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002L, M, N; 2V2V5002L, M, N;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V3V5002H, J, K, L, M, N;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V4V5002A, B, C)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.4.12 [5]

EQUIPMENT ITEM NO. 37
ELECTRICAL CABLE, INSTRUMENT LOCATED IN THE CONTAINMENT, ELEV. 122'9"
BOSTON INSULATED WIRE MODEL LSS1802
REQUIRED OPERATING TIME: NOT STATED
TER CHECKSHEET NO. 37
LICENSEE REFERENCE(S): NOT CITED
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VY5031D; 2V25002T, U)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002U; 2V3V5002T, U)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.3.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VY5031B; 2VYV5033B;)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.6 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002E, F, G; 2V2V5002E, F, G)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.2.6 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V1V5002B, D; 2V2V5002B, B)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2V3V5002B, D)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.1.5 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VYR5066G)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.12.8 [5]
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VXQ5009B, D, F; 2VYQ5017B, D, F)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.7.5 [5]

EQUIPMENT ITEM NO. 37 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL INSTRUMENTATION (2VYR5066B)
SERVICE: ELECTRICAL SAFETY SYSTEM
LICENSEE SUBMITTAL: SCEW(S): C.2.6.12 [5]

EQUIPMENT ITEM NO. 38
ELECTRICAL CABLE, CONTROL LOCATED IN THE AUXILIARY BUILDING, ELEV. 121'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 38
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS) B
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.4.8 [5]

EQUIPMENT ITEM NO. 39
ELECTRICAL CABLE, CONTROL LOCATED IN THE MAIN STEAM ROOM, ELEV. 135'0"
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 1 HOUR
TER CHECKSHEET NO. 39
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS) B
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.17.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.16.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.15.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.14.6 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.13.10 [5]

EQUIPMENT ITEM NO. 40
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT
OKONITE, MODEL NOT STATED
REQUIRED OPERATING TIME: NOT STATED B
TER CHECKSHEET NO. 40
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-7.3 [6, 11, 19]

EQUIPMENT ITEM NO. 40 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-4.2 [6, 11, 19]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-3.5 [6, 11, 19]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SAFETY SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): TMI-2.4 [6, 11, 19]

EQUIPMENT ITEM NO. 41
ELECTRICAL CABLE, CONTROL LOCATED IN THE CONTAINMENT, ELEV. 118'0"
ONSITE, MODEL NOT STATED
REQUIRED OPERATING TIME: 4 HOURS
TER CHECKSHEET NO. 41
LICENSEE REFERENCE(S): 2103, 4577
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.20.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.19.6 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.18.8 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.3.9 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.12.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.11.7 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.10.5 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.9.11 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.8.4 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.7.4 [5]

EQUIPMENT ITEM NO. 41 (CONTINUED)
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.6.11 [5]
FUNCTION (PLANT ID): ELECTRICAL POWER AND CONTROL (VARIOUS)
SERVICE: ELECTRICAL SYSTEMS
LICENSEE SUBMITTAL: SCEW(S): C.2.5.4 [5]

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 required to monitor overall plant performance as well as to monitor the performance of systems on the list.

Based upon information in the Licensee's submittal, the equipment location references, and in some cases conversations with the Licensee, the NRC staff verified that the systems included in the Licensee's submittal were those 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 surrounding environment. With the exception of items deferred for later review (cold-shutdown equipment and TMI Lessons-Learned modifications), the staff concluded that the systems identified by the Licensee were acceptable. The list of systems identified by the Licensee and accepted by the NRC staff is as follows:

Function	System[1]
Emergency Reactor Shutdown	Reactor Protection
	Engineered Safeguards Actuation
	Reactor Coolant
	Chemical and Volume Control
Containment Isolation	Main Feedwater and Condensate
	Auxiliary Feedwater
	Main and Auxiliary Steam
	Residual Heat Removal
	Chemical Injection
	Chemical and Volume Control
	Liquid Waste Disposal
	Component Cooling Water
	Service Water
	Containment Spray
	Sampling
	Containment Cooling and Purge
Reactor Core Cooling	Chemical and Volume Control/Safety Injection
	Safeguards System, RHR/LHSI

1. The NRC 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.

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Function	System
Containment Heat Removal	Containment Spray
	Containment Cooling and Purge
	Residual Heat Removal
Core Residual Heat Removal	Auxiliary Feedwater
	Main Feedwater and Condensate
	Main Steam
	Residual Heat Removal[2]
	Component Cooling Water
	Service Water
	Chemical and Volume Control
Prevention of Significant Release of Radioactive Material to Environment	Containment Spray (Iodine Removal)
	Containment Post-LOCA Air Mixing
	Reactor Cavity Post-LOCA Dilution
	Hyrdogen Recombiner
	Radiation Monitoring
	Sampling
Supporting Systems	Emergency Power
	Control Room Habitability
	Safety Equipment Area Ventilation

2. Only equipment required to achieve hot shutdown following an accident is included in the master list submitted by the Licensee. Cold shutdown equipment is to be addressed later.

C.2 SAFETY-RELATED INSTRUMENTATION

In Section 3.1 of the NRC SER dated May 21, 1981 [7], 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 8, the Licensee provided the following response:

> "In accordance with the requirements of IEB 79-01B Alabama Power Company has conducted a review of the Emergency Operating Procedures to verify that equipment utilized by the operator for accident mitigation and that could be subjected to the accident environment is adequately qualified to perform its function. This review has determined that the subject instruments are adequately qualified to perform their intended function. Component work sheets have been completed for required instrumentation in the harsh environment.
>
> With reference to instruments which are not fully qualified for the environment resulting from a HELB inside containment, these were included in the EOP's solely as a source of additional information for the operator. These instruments could be deleted from the EOP's if qualification for HELB inside containment was the sole determining factor for incorporation. These instruments, should they fail, would not mislead the operator because operators are trained to take actions based on a combination of plant parameters rather than indication from a single instrument. In addition, as part of the human factors review conducted by the NRC in the licensing of Farley 2, the EOP's were reviewed and approved by the NRC, taking into account the fact that in some cases non-qualified instrumentation was listed. Since the EOP's for Unit 1 are identical to those of Unit 2, this review also applies to Unit 1. A listing of these instruments with appropriate justification is provided in the following attachment [see Table C-1 of this TER]."

Evaluation

The justifications stated by the Licensee in the Table C-1 provide a technical basis for exclusion of the identified instruments. This item is considered resolved.

Table C-1. EOP Instrumentation Not Fully Qualified for Harsh Environment [8]

EOP INSTRUMENTATION NOT FULLY QUALIFIED FOR HARSH ENVIRONMENT

EQUIPMENT ITEM TPNS #	PRIMARY ELEMENT LOCATION	INSTRUMENT DESCRIPTION	INSTRUMENTATION EXCLUDED FROM ENVIRONMENTAL QUALIFICATION REPORT BECAUSE:
N1D21R10002A	RE 0002A CTMT. 155' elev.	CTMT. Area Rad. Monitor	High-range CTMT. rad. monitors have been installed and are environmentally qualified. These monitors provide adequate post-accident indication.
N1D21R10007A	RE 0007A CTMT. 129' elev.	Seal Table Area Rad. Monitor	Not required for accident monitoring or mitigation. High-range CTMT. rad. monitors have been installed and are environmentally qualified. These monitors provide adequate post-accident indication.
N1C55N10041A 42A 43A 44A NR0045	NE 0041B, 42B, 43B, 44B CTMT.	Excore Power Instrumentation	IEB 79-01B - Supplement 2 - Item 32 states that nuclear instrumentation and its associated components do not have to be environmentally qualified for a LOCA or a HELB.
N1B13T1411A 421A 431A	TE 411, 421, 431 CTMT. 105' elev.	Narrow Range RCS Temp. Indication	Wide Range RCS Temp. Indication is environmentally qualified. This instrumentation spans the narrow range indication.
N1B31T1463	TE 463 CTMT. 129' Elev.	PZR. PORV Downstream Temp. Indication	Qualified limit switches have been installed on the PORV's for reliable valve position indication. Temperature indication is for backup only.

11.A-2

FIGURE SUPPLIED BY THE LICENSEE

TER-C5257-518

0055227

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Table C-1 (Cont.)

EOP INSTRUMENTATION NOT FULLY QUALIFIED FOR HARSH ENVIRONMENT

EQUIPMENT ITEM TPNS #	PRIMARY ELEMENT LOCATION	INSTRUMENT DESCRIPTION	INSTRUMENTATION EXCLUDED FROM ENVIRONMENTAL QUALIFICATION REPORT BECAUSE:
MIB31TE465 467 469	TE 465, 467, 469 CTMT. 129' Elev.	PZR. Safety Downstream Temp. Indication	Qualified limit switches have been installed on the Safety Valves for reliable valve position indication. Temperature indication is for backup only.
MIB31LT920 PT471 PT472	LT470, PT471, PT472 CTMT. 103' Elev.	PZR. Relief Tank Level, [illegible] and Pressure Indication	Instrumentation is backup for PORV and Safety Valve position indication.
MIB23LT920, 922 924, 926 928, 930	LT920, 922, 924, 926, 928, 930 CTMT. 129' Elev.	Accum. Tank Level Indication	Instrumentation provided for Tech. Spec. purposes only. Qualified pressure instrumentation gives indication of accum. status.
MITE2TE3188	TE3188 CTMT. 103' Elev.	CTMT. Air Temperature	Instrumentation provided for Tech. Spec. purposes only. CTMT. heat removal indication provided by CTMT. cooler instrumentation.
MIB21FT414 415 416	FT414, 415, 416 CTMT. 103' Elev.	RCS Flow Indication	For design bases accidents indication would not be available due to lack of forced flow. Natural circulation verified by core differential temperature to ensure decay heat removal.

FIGURE SUPPLIED BY THE LICENSEE

11.A-3

TER-C5257-512

0055228

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Table C-1 (Cont.)

EOP INSTRUMENTATION NOT FULLY QUALIFIED FOR HARSH ENVIRONMENT

EQUIPMENT ITEM TPNS #	PRIMARY ELEMENT LOCATION	INSTRUMENT DESCRIPTION	INSTRUMENTATION ENCLOSED FROM ENVIRONMENTAL QUALIFICATION REPORT BECAUSE:
N1C56C001 ↓ C052	C001 - C052 CTMT. 155' Elev.	Incore Thermocouples	Instrumentation provided for backup purposes only. Wide Range RTD's, which are qualified serve as primary indication of RCS temperature.

II.A-4

FIGURE SUPPLIED BY THE LICENSEE

0055229

TER-C5257-518

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0055230

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 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:
>
> - 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.

- 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

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* 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: Alabama Power
Plant Name: Joseph M. Farley Nuclear Plant Unit 2
NRC Docket No. 50-364
NRC TAC No. 42534
NRC Contract No. NRC-03-79-118
FRC Project No. C5257
FRC Assignment No. 13
FRC Task No. 518

References:

a. F. L. Clayton
Letter to B. J. Youngblood, NRC. Subject: Joseph M. Farley Nuclear Plant Unit 2, NPF-8 License Condition 2.C.(18)(b)
Alabama Power, 1-July-81

b. F. L. Clayton
Letter to S. A. Varga, NRC. Subject: Joseph M. Farley Nuclear Plant - Unit 2, Environmental Qualification of Safety Related Electrical Equipment
Alabama Power, 28-Dec-81

c. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Joseph M. Farley Nuclear Plant Unit 2 Environmental Qualification of Safety-Related Electrical Equipment
NRC, 19-March-81

The Licensee has submitted technical information in References a and b in response to the NRC SER [c] on environmental qualification. FRC has reviewed these documents [a, b, c]. 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 as a basis for justification for continued plant operation; 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:

Equipment Item	Equipment Description/ Function	SCEW Sheet No.	Status Code	Basis for Deficiency

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."

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 Licensees. 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

Alabama Power Company
Joseph M. Farley Nuclear Plant Unit 2

NRC Docket No. 50-364

NRC TAC No. 42534

December 30, 1981

Rev. 1, January 19, 1982
Rev. 2, April 8, 1982
Rev. 3, May 18, 1982
Rev. 4, July 7, 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 from the Licensee dated September 12, 1980 [1] and July 1, 1981 [2].*

In a letter dated December 28, 1981 [5], Alabama Power submitted Revision 5 to their September 12, 1980 [1] submittal. The information submitted contained a Summary of Aging Evaluation and revised SCEW sheets reflecting the results of that evaluation.(1)**

Alabama Power Company (APC) has provided a response to the RAI in a letter dated March 2, 1982 [6]. APC states that:(2)

> "Certain vendors have stated that their qualification information is proprietary and expressed concern to the possible unfair trade advantage and conflict of interest regarding the review by Franklin Research Center. Specifically, Westinghouse has requested (Attachment) that Alabama Power Company not submit their proprietary information to Franklin Research Center. Pursuant to an agreement reached between Westinghouse and E. C. Shomaker of the NRC Office of the Executive Legal Director, who has discussed this matter with Mr. Z. Rosztoczy of the Equipment Qualification Branch, Westinghouse will ensure that the requested information is, or has been, submitted to the NRC on a timely basis. Therefore, the information other than proprietary Westinghouse qualification documents has been retrieved from our auditable central file and is forwarded directly to your office to ensure the proprietary

*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.

understandings between Alabama Power Company and the vendors have not been disregarded or neglected.

Alabama Power Company requests that the entire submittal be reviewed by your office and only information which is not proprietary, as designated below, be submitted to Franklin Research Center. Additionally, no part of this submittal should be released for public disclosure or reproduced, and the entire submittal must be returned to Alabama Power Company upon completion of the review."(2)

In addition, APC has stated that item A.1.e has been superseded by a revision dated September 5, 1978, which was submitted to the NRC in a Farley Unit 1 letter dated February 19, 1982 [7]. Documents sent to NRC via the Unit 1 letter were not submitted to NRC with Reference 6. The Licensee also stated that items A.1.h, A.1.i, and A.1.l are not applicable to Farley Unit 2. For items A.1.i and A.1.l, the applicable document, Joy Manufacturing Company Test Report X-604, was submitted to the NRC. Item A.1.h (Wyle Qualification Plan No. 545/0859/ES - DeLaval GEMS Level Sensors dated 10/6/78) has been deleted by the Licensee. APC has also noted that item A.1.p was incorrectly referenced as WCAP-9985. It should have been WCAP-9885, which is item A.1.m.(2)

By letter dated April 23, 1982 [8], Alabama Power Company has committed to address the qualification of TMI Action Plan equipment by submitting qualification information for all Units 1 and 2 TMI Action Plan equipment requiring environmental qualification. The Licensee has committed to a submittal date of June 23, 1982, by letter [8] and by telecon [9].(3)

By letter dated June 23, 1982 [10], the Licensee submitted the information regarding TMI-Action Plan equipment [11] committed to by Reference 8.(4)

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 [2] 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. General Electric Company Report, Low Voltage Electrical Containment Penetration Qualification Test Report	Received 1/74 and 3/74 reports for Assignment 13(3)
b. Wyle Labs. NEQ Test Report 44354-1 dated 3-8-79	Received 3/11/82 for Task 505(3)
c. Boston Insulated Wire and Cable Co. Test Report 73E062 dated 9-7-73	
d. Boston Insulated Wire and Cable Co. Test Report 74A023 dated 1-24-74	
e. NAMCO Test Report dated September 5, 1978(2)	Received for Assignment 13(3)
f. The Okonite Co. Engineering Report 143 dated 3-20-72(1)	
g. Bechtel/GEMS Telecon of 4-3-80	
h. Deleted (Stated by Licensee to be not applicable(2)	
i. Joy Manufacturing Company Report X-604(2)	Received for Assignment 13(3)
j. WCAP 7820, Supplements 1-4	
k. WCAP 7709-L, Supplements 1-4	1-Jan-82(3)
l. Deleted (Incorporated into Item A.1.i)(2)	
m. WCAP 9885	
n. NAMCO Test Report QTR-105 dated August 28, 1980	Received 2/8/82 for Task 502/503(2)

***This column will be completed by FRC as requested information is received.

DATE RECEIVED BY FRC***

o. Okonite Co. Engineering Report No. N-1 dated July 3, 1978 — Received for Assignment 13(3)

p. Deleted (Same as Item A.1.m)(2)

B. FRC REVIEW OF INSTALLED TMI ACTION PLAN ITEMS

INFORMATION REQUESTED — DATE RECEIVED BY FRC***

1. References 1 and 2(2) do not provide adequate detail with respect to identification of TMI Action Plan equipment installed as of 1/1/81.

a. Identification of all TMI Action Plan equipment installed as of 1/1/81 is requested. — 6/30/82 [10](4)

b. Identification of TMI Action Plan equipment installed with implementation dates after 1/1/81 is requested. — 6/30/82 [10](4)

c. The correlation of these equipment items with the specific sections of NUREG-0737 [4] presented below (as applicable) is requested. — 6/30/82 [10](4)

IIE1.2, IIE4.2, IIE3.1, IIG1, IIF2, IID3, IIK3.12(Wx), IIK3.9(Wx), IIK2.10(B&W), 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. — 6/30/82 [10](4)

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. — 6/30/82 [10](4)

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.]

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.

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:

   - complete package directly to the NRC project manager

     or

   - copy of cover letter to NRC project manager and complete package to FRC.

REFERENCES

1. F. L. Clayton
Letter to A. Schwencer, NRC. Subject: Joseph M. Farley Nuclear Plant Unit 2, Environmental Qualification of Class 1E Electrical Equipment-NUREG 0588
Alabama Power, 12-Sept-80

2. F. L. Clayton
Letter to S. J. Youngblood, NRC. Subject: Joseph M. Farley Nuclear Plant Unit 2, NPF-8 License Condition 2.C.(18)(b)
Alabama Power, 1-July-81

3. Office of Nuclear Reactor Regulation
Safety Evaluation Report for Joseph M. Farley Nuclear Plant Unit 2
Environmental Qualification of Safety-Related Electrical Equipment
NRC, 19-March-81

4. NUREG-0737, "Clarification of TMI Action Plan Requirements"
NRC, November 1980

5. F. L. Clayton
Letter to S. A. Varga, NRC. Subject: Joseph M. [illegible] Nuclear Plant - Unit 2, Environmental Qualificati[illegible] of Safety Related Electrical Equipment
Alabama Power, 28-Dec-81(1)

6. F. L. Clayton, Jr.
Letter to S. A. Varga, NRC. Subject: Joseph M. Farley Nuclear Plant - Unit 2; Environmental Qualification
Alabama Power Co., 02-Mar-82(2)

7. F. L. Clayton, Jr.
Letter to S. A. Varga, NRC. Subject: Joseph M. Farley Nuclear Plant - Unit 1; Environmental Qualification
Alabama Power Co., 19-Feb-82(2)

8. F. L. Clayton, Jr.
Letter to S. A. Varga, NRC. Subject: Joseph M. Farley Nuclear Plant Units 1 and 2 Environmental Qualification
Alabama Power Company, 23-Apr-82(3)

9. D. J. Schmitz (FRC)
Telephone Memorandum. Conversation with M. Lawlor (APCo). Subject: Farley 1 and 2 TMI Action Plan supplement
11-May-82(3)

10. O. D. Kingsley, Jr.
Letter to C. J. Crane, FRC. Subject: Joseph M. Farley Nuclear Plant Units 1 and 2; Environmental Qualification of TMI Action Plan Electrical Equipment
25-Jun-82
NT-82-0775(3)

11. F. L. Clayton, Jr.
Letter to S. A. Varga, NRC. Subject: Joseph M. Farley Nuclear Plant Unit 2; Environmental Qualification of Safety Related Electrical Equipment
Alabama Power Co., 23-Jun-82(3)

Franklin Research Center
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IEB 79-01B

F37

0057 APCo Exhibit 20

F L Clayton Jr

Alabama Power

February 29, 1984

Docket Nos. 50-348
50-364

Director, Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. S. A. Varga

Joseph M. Farley Nuclear Plant - Units 1 and 2
Environmental Qualification

Gentlemen:

On February 4, 1983, Alabama Power Company (APCo) received the Safety Evaluation Reports (SERs) regarding the environmental qualification of safety-related electrical equipment at Farley Nuclear Plant (FNP), Units 1 and 2 defined by IEB 79-01B and NUREG-0588 respectively. The SERs each contained a Technical Evaluation Report (TER) which noted deficiencies concerning the documentation of qualification for several safety-related items at FNP. On January 11, 1984, a meeting was held with members of the NRC Staff to discuss APCo's responses that resolved each identified deficiency. In addition to the TER items, APCo discussed with the NRC Staff clarifications related to (1) specific NRC Staff questions identified at the meeting concerning generic environmental qualification issues and (2) the scope, environmental qualification criteria, and schedule provisions of 10CFR50.49(b)(3). This letter documents the discussions held at the January 11, 1984 meeting.

Attachment 1 of this letter summarizes each identified TER deficiency as discussed with the staff. The only outstanding action item is a review of the qualification report for the Target Rock solenoid valves used on the reactor head vent system. The qualification report is currently under development by Westinghouse with a scheduled completion in 1984. APCo has reviewed the draft qualification report and determined that these solenoids are qualified for use in the FNP containment. APCo will review the final report when issued to ensure the qualification is maintained. These solenoid valves, however, are not within the scope of IEB 79-01B and NUREG-0588 since, as stated in APCo letters dated June 23, 1982 and May 20, 1983, such equipment is addressed by the TMI Action Plan and is not essential to achieve a safe shutdown condition. The schedule for the full environmental qualification of the solenoid valves, therefore, does not impair the safe shutdown capability of FNP.

In the January 11, 1984 meeting, the NRC Staff requested that this letter include additional clarifications regarding specific NRC Staff comments, identified during the meeting, on generic environmental qualification issues. APCo's responses to these specific comments are included as Attachment 2.

Documentation of the discussion related to the scope, environmental qualification criteria, and schedule provisions of 10CFR50.49(b)(3), applicable to the FNP, was provided in Attachment 3 to the APCo letter dated February 22, 1984 addressing R.G. 1.97 equipment within the scope of 10CFR50.49(b)(3).

As stated in letters dated March 14, 1983 and May 20, 19[illegible], it is the judgement of Alabama Power Company that all equipment required to achieve a safe shutdown condition at FNP is environmentally qualified and Justifications for Continued Operation (JCO) are not necessary.

As discussed in the January 11, 1984 meeting, it is requested that supplemental SERs be issued to indicate that the APCo Environmental Qualification Program meets the requirements of 10CFR50.49(b)(1) and (b)(2) and that all deficiencies noted in the SERs dated February 4, 1983 are resolved.

It is noted that information provided in Supplements 1, 2, 3 and 4 to Attachment 1 include data which is proprietary to Westinghouse. Enclosed as Attachment 3 to this letter is a signed affidavit from Westinghouse requesting that this information be withheld from public disclosure. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations. Correspondence with respect to the proprietary aspects of this application for withholding or the supporting Westinghouse affidavit should be addressed to R. A. Wiesemann, Manager, Regulatory and Legislature Affairs, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania 15230.

If there are any questions, please advise.

Very truly yours,

F. L. Clayton, Jr.

FLCJr/DHJ:grs-D7

cc: Mr. R. A. Thomas
Mr. J. P. O'Reilly
Mr. E. A. Reeves
Mr. W. H. Bradford
Mr. T. Conlon

Mr. O. D. Kingsley, Jr.
Mr. W. G. Hairston, III
Mr. J. W. McGowan
Mr. C. D. Nesbitt
Mr. R. G. Berryhill
Mr. D. E. Mansfield
Mr. J. A. Ripple
Mr. W. G. Ware
Mr. L. B. Long
Mr. B. J. George
Mr. J. R. Crane
Mr. K. C. Gandhi
Reference Listing

0057625

0057626

ATACHMENT 1

SUMMARY OF EACH DEFICIENCY
IDENTIFIED IN THE TERs
FOR UNITS 1 AND 2

UNIT 1

0057627

1. OPERATORS FOR MOTOR OPERATED VALVES (MOVs)

UNIT ONE

TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
1,3	Containment Isolation (MOV3350A,B,C) (MOV3232A,B,C) (MOV3536) (MOV3530) (MOV3528A,B,C,D) (MOV3535A,B) (MOV3872A,B) (MOV8112) (MOV3660) (MOV3318B) (MOV3046) (MOV3441 A,B,C,D) (MOV3131)	II.a.	Adequate Similarity Between Equipment and Test Specimen Established Aging Degradation Evaluated Adequately Qualified Life or Replacement Schedule Established (If Required)	Limitorque letter dated October 13, 1980 documented similarity. Limitorque Test Report "Nuclear Qualification" Section 3.1 establishes qualification in excess of 40 years.
2	Containment Isolation (MOV8808A,B,C)	III.a	Exempt	None Required.

0057629

II. SOLENOID VALVES

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	4,8,9	Actuate Air Operated Valve for Isolation	II.a	Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Submergence Satisfied	A qualified life of 8 years has been established for ASCO solenoid valves inside containment. These solenoids are located above the flood level or will perform their intended function prior to becoming submerged and will not mislead the operators
	5,10,13, 14,15	Actuate Air Operated Valve for Isolation	I.b	Pending Modification	These valves were replaced with qualified ASCO NP or 206 series solenoid valves that have a qualified life of 8 years inside containment and 18 years outside containment.
	7	Reactor Head Vent System	I.b	Pending Modification	APCo will review the Target Rock solenoid valve test report when issued by Westinghouse for applicability to FNP. The test report is currently scheduled to be issued during the second quarter of 1984.
	6,11,12	Actuate Air Operated Valve for Isolation	II.c	Qualified Life or Replacement Schedule Established (If Required)	A qualified life of 18 years has been established for ASCO solenoid valves outside containment, and a qualified life of 8 years has been established for ASCO solenoid valves inside containment.

0057G30

III. HYDROGEN RECOMBINERS

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	16	Hydrogen Concentration Reduction (KOO1A,B)	I.a	None	None Required

0057631

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	17	Hydrogen Concentration Reduction and Containment Cooling	II.a	Adequate Similarity Between Equipment and Test Specimen Established	American Air Filter letter dated March 22, 1983 documented Joy Manufacturing Company's Report X-504 dated April 6, 1977 is applicable to the fan motors for the FNP Unit 1 containment coolers. The motor data for motors used in the Post-LOCA Hydrogen Control system indicates that these motors are generically the same as the motors tested in Joy's Test Report X-604, and hence are fully qualified for use inside the FNP containment.

0057632

V. TEMPERATURE MEASURING DEVICES

UNIT ONE	TEK ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	18, 19	Reactor Trip	1.b	Aging Degradation Concern Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Spray Criteria Regarding Functional Testing Criteria Regarding Instrument Accuracy	See Supplement 1

0057333

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	20	Radiation Monitor	I.b	Adequate Similarity Between Equipment and Test Specimens Established	Victoreen Qualification Test Report No. 950.301 dated June 19, 1981, fully supports the qualification of the detector (Model 877-1) and the cable (Model 878-1) installed at FNP. Duplication of the sealing procedure followed in the Victoreen Test Report No. 950.301 was implemented on the detectors installed at FNP and, therefore, maintained qualification.

0057634

VII. PRESSURE AND LEVEL TRANSMITTERS

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	21 26,45	Post Accident Monitor Level Indication	I.b	Aging Degradation Concern Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Submergence Criteria Regarding Instrument Accuracy	See Supplement 2
	22	Reactor Trip	I.b	Aging Degradation Concern Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Radiation Criteria Regarding Test Sequence	See Supplement 3
	23 25	Main Feed Pump Trip Post Accident Level Monitor	II.b	Adequate Similarity Between Equipment and Test Specimens Established Aging Degradation Concern Criteria Regarding Test Failure or Severe Anomalies (If Any)	See Supplement 4

VII. PRESSURE AND LEVEL TRANSMITTERS (Cont'd)

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	24	Level Indication	1.b	Documented Evidence of Qualification Adequate	These level transmitters were installed as a result of a commitment to monitor the narrow range containment sump to satisfy NUREG-0588. The actual test was completed during the fourth quarter of 1982 and the test results were issued from Wyle Laboratories on December 8, 1982, as NEQ Test Report 45700-1. Based on the results of this test report, the Gems-Delavel level monitor in the containment leakage collection sump is environmentally qualified for use in the FNP containment.
	27	Feedwater Control	1.b	Aging Degradation Concern Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Radiation Criteria Regarding Instrument Accuracy Test Duration Margin (1 hour and function Time)	See Supplement 3

0057635

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	28, 32	Valve Position Indication	II.c	Qualified Life or Replacement Schedule Established (If Required)	A qualified life of 8 years has been established for NAMCO EA-180 limit switches inside containment.
	29, 30 31, 46	Valve Position Indication	I.b	Pending Modification	These limit switches have been replaced with qualified NAMCO EA-180 limit switches. The NAMCO EA 180 limit switches have a qualified life of 8 years inside containment and 18 years outside containment.
	33	Valve Position Indication	II.a	Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Submergence Satisfied	A qualified life of 8 years has been established for NAMCO EA-180 limit switches inside containment. These limit switches will not be subject to submergence or will perform their intended function prior to becoming submerged and any circuit shorts that could occur will not mislead the operator. (Reference APCo submittal response to TER dated March 14, 1983.)

IX. ELECTRICAL PENETRATIONS

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	34	Containment Boundary Electrical Penetration	I.a	None	None Required.
	35	Containment Isolation			

0057636

X. TERMINAL BLOCKS

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	38,37,38	Conductor Termination	I.a	None	None Required.

0057637

0057638

UNIT ONE	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	39, 40, 41	Electrical Instrumentation	IV	Documentation not Available	The FNP cables have been fully qualified by Boston Insulated Wire and Cable Company's Test Report 73E062, dated September 7, 1983, and their clarification letter dated August 21, 1981. The test report was submitted to the NRC in the May 20, 1983 response to 10CFR50.49. The test conditions envelop the FNP service requirements.
	42, 43, 44	Electrical Power and Control	II.a	Adequate Similarity Between Equipment and Test Specimen Established	In a letter dated June 22, 1981, the Okonite Company has certified that all power and control cables supplied for Joseph M. Farley Nuclear Plant Unit 2 are qualified by Test Report N-1, dated July 3, 1978. As documented by Bechtel letter AP-6185 dated September 2, 1981, the cables for Joseph M. Farley Nuclear Plant Unit 1 were procured to the same specifications as the Unit 2 cables and are identical in construction to the Unit 2 cables. Therefore, all qualified power and control cables are fully qualified by Test Report N-1, dated July 3, 1978.

UNIT 2

0057639

I. OPERATORS FOR MOTOR OPERATED VALVES (MOVs)

0057640 UNIT TWO

TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
1,3	Containment Isolation (MOV3350A,B,C) (MOV3232A,B,C) (MOV3536) (MOV3530) (MOV3318B) (MOV8112) (MOV3872A,B) (MOV3660)	II.a.	Adequate Similarity Between Equipment and Test Specimen Established Aging Degradation Evaluated Adequately Qualified Life or Replacement Schedule Established (If Required)	Similarity is documented by Limitorque in letter dated October 13, 1980. Limitorque Test Report "Nuclear Qualifications" Section 3.1 established qualification in excess of 40 years.
2	Containment Isolation (MOV8808A,B,C)	III.a	Exempt	None Required.

0057641

UNIT TWO ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
4	Actuate Air Operated Valve for Isolation	II.a	Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Submergence Satisfied	A qualified life of 8 years has been established for ASCO solenoid valves inside containment. These solenoids are located above the flood level inside containment or will perform their intended function prior to becoming submerged and will not mislead the operator.
6	Reactor Head Vent System	I.b	Pending Modification	APCo will review the Target Rock solenoid valve test report when issued by Westinghouse for applicability to FNP. This test report is currently scheduled to be issued by Westinghouse during the second quarter of 1984.
7,9	Actuate Air Operated Valve for Isolation	I.b.	Pending Modification	These valves were replaced with qualified ASCO NP series solenoid valves that have a qualified life of 8 years inside containment and a qualified life of 18 years outside containment.
5,8,10	Actuate Air Operated Valve for Isolation	II.c	Qualified Life or Replacement Schedule Established (If Required)	ASCO NP series solenoid valves have a qualified life of 18 years outside containment.

0057642

III. HYDROGEN RECOMBINERS

UNIT TWO	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	11	Hydrogen Concentration Reduction (K001A,B)	I.a	None	None Required.

0057643

UNIT TWO	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	12	Hydrogen Concentration Reduction and Containment Cooling	II.a	Adequate Similarity Between Equipment and Test Specimen Established	American Air Filter letter dated March 22, 1983 documented Joy Manufacturing Company's Report X-604 dated April 6, 1977 is applicable to the fan motors for the FNP Unit 1 containment coolers. The FNP Unit 2 containment coolers are identical to those installed in Unit 1 and were supplied by Joy Manufacturing. Therefore, the units in Unit 2 are fully qualified. The motor data for motors used in the Post-LOCA Hydrogen Control system indicates that these motors are generically the same as the motors tested in Joy's Test Report X-604, and hence are fully qualified for use inside the FNP containment.

V. TEMPERATURE MEASURING DEVICES

UNIT TWO	IER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
0057344	13, 14	Reactor Trip	I.b	Aging Degradation Concern Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Spray Criteria Regarding Functional Testing Criteria Regarding Instrument Accuracy	See Supplement 1

VI RADIATION DETECTORS

UNIT TWO	IER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	15	Radiation Monitor	I.b	Adequate Similarity Between Equipment and Test Specimens Established	Victoreen Qualification Test Report No. 950.301 dated June 19, 1981, fully supports the qualification of the detector (Model 877.1) and the cable (Model 878.1) installed at FNP. Duplication of the sealing procedure followed in the Victoreen Test Report No. 950.301 was implemented on the detectors installed at FNP and, therefore, maintaining qualification.

0057645

UNIT TWO	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	16 17 21 22	Post-Accident Monitors Reactor Trip Pressurizer Level, Feedwater Control, Level Indication Feedwater Control	IV	Documentation Not Made Available	Westinghouse proprietary document WCAP-9885 is the qualification document for Barton Transmitter (Lot 2). See Supplement 2 for additional information.
	18 20	Main Feed Pump Trip Post-Accident Level Monitor	II.b	Adequate Similarity Between Equipment and Test Specimens Aging Degradation Evaluated Criteria Regarding Test Failure or Severe Anomalies (If Any)	See Supplement 4
	19	Level Indication	I.b	Pending Modification - Testing Not Completed	Wyle Laboratories Test Report 45700-1 dated December 8, 1982 documents qualification of the GEMS-Delaval level monitors.

0057648

VIII. LIMIT SWITCHES

UNIT TWO	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	23,25,27	Valve Position Indication	II.c	Qualified Life or Replacement Schedule Established (If Required)	NAMCO EA-180 limit switches have a qualified life of 8 years inside containment and 18 years outside containment.
	24	Valve Position Indica*	II.a	Aging Degradation Evaluated Adequately Criteria Regarding Submergence Satisfied	NAMCO EA-180 limit switches located outside containment have a qualified life of 18 years. These limit switches are located above the flood level or have watertight fittings installed on them that have been qualified by test in accordance with submergence requirements of NUREG-0588, Section 2.2(5), Category II. (Reference APCo submitted response to TER dated March 14, 1983)
	26	Valve Position Indication	II.a	Qualified Life or Replacement Schedule Established (If Required) Criteria Regarding Submergence Satisfied	NAMCO EA-180 limit switches located inside containment have a qualified life of 8 years. These limit switches are located above the flood level or will perform their intended function prior to becoming submerged and any circuit shorts that could occur will not mislead the operator. (Reference APCo submittal response to TER dated March 14, 1983)

0057647

IX. ELECTRICAL PENETRATIONS

UNIT TWO	IER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	28 29	Containment Isolation Containment Boundary Electrical Penetration	1.a	None	None Required.

0057648

X. TERMINAL BLOCKS

UNIT TWO	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	30,31,32,33	Conductor termination	1.a	None	None Required.

0057G19

UNIT TWO	TER ITEM NO.	FUNCTION/DESCRIPTION	NRC CATEGORY	DEFICIENCIES	PROPOSED SOLUTION
	34,35,36,37	Electrical Instrumentation	IV	Documentation not available	Boston Insulated Wire and Cable Company's Test Report 73E062, submitted to the NRC in the May 20, 1983 response, fully qualifies the referenced cable.
	38,39,40,41	Electrical Power and Control	II.a	Adequate Similarity Between Equipment and Test Specimen Established	Okonite Cable Company letter dated June 22, 1981 certified all cable supplied to FNP is qualified by their test report N-1, dated July 3, 1978.

0057650

Supplement 1
Proposed Solution for the Rosemount RTD's
Unit 1 TER Items 18 and 19
Unit 2 TER Items 13 and 14

Aging Degradation Concern and Qualified Life or Replacement Schedule Established (If Required)

Bechtel letter AP-8293, dated April 29, 1 `3, establishes a radiation aging qualified life of 40 years for RTD Models 176KF and KS which are installed at FNP. Westinghouse letter APW-A-6006 dated June 14, 1982, established a thermal aging of 40 years. This thermal aging analysis report is applicable to the FNP RTDs and is maintained on file at the Westinghouse Water Reactor Division since this information is considered proprietary.

Criteria Regarding Spray and Functional Testing

Following a radiation test to [1 x 10^8]bce rads, the RTDs were exposed to a High Energy Line Break (HELB) environment of [332°F, 66 psig and a chemical spray of 8.5 pH]bce. The spray was injected into the test chamber over the first 24 hours of testing at a range of 6.0 gal/hr. This test, which envelops the FNP accident conditions, was successfully completed with no degradation in performance detected during the test program.

As noted in the test program, the complete RTD assembly was subjected to the accident environment which is a conservative test configuration. Under normal operating conditions, only the sensing end (head) would be exposed to the process temperatures and pressures. The qualification program was developed to qualify the head of the RTD (where the cable enters the sheath) and the cable extension to the accident environment to which they may be exposed. The test configuration, which envelops the FNP accident conditions, demonstrated the capability of this component to perform properly in a harsh environment.

Criteria Regarding Instrument Accuracy

The RTDs were calibrated by the vendor at 32°F, 525°F and 625°F, expressed as a percent of real span (670°F), which demonstrates accuracy over the temperature range of interest. During this process no degradation was identified or is it expected if the RTDs are subjected to an accident environment. The test data demonstrates that the RTD's did not suffer moisture damage which would be the only source of error other than shorts or opens. Calibration checks after the test provided additional evidence that the RTDs were not degraded.

Supplement 2
Proposed Solution for the Barton Lot 1 and 2 Transmitters
Unit 1 TER Item Nos. 21, 26 and 45 (Lot 1)
Unit 2 TER Item Nos. 16, 17, 21 and 22 (Lot 2)

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Supplement 3
Proposed Solution for the Foxboro Models E11 (MCA)
and E13DM Transmitters
Unit 1 TER Item No. 22 and 27

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BOARD ORDER"

005765

Supplement 4
Proposed Solution for the Gems DeLaval Transmitters
(Models LS36497 and XM36495)
Unit 1 TER Item Nos. 23 and 25
Unit 2 TER Item Nos. 18 and 20

Adequate Similarity Between Equipment and Test Specimens Established

For Unit 1 Item 25 and Unit 2 Item 20, Franklin Institute Research Laboratories (FIRL) Report F-C3834 describes the test specimen as "P/N XM 36495 "; it is noted that the test model is identical to the model number XM 36495 which is used at FNP for containment sump level monitoring.

For Unit 1 Item 23 and Unit 2 Item 18, the FIRL Test Report F-C3834 is also applicable to the main steam valve room level switches (Model LS36497). The basis for this similarity conclusion is documented on Gems DeLaval drawing LS36497, dated June 8, 1975.

Aging Degradation Concerns

An Environmental Qualification Administrative Program is being implemented at FNP, which covers the Gems DeLaval Models LS36497 and XM36495. This program provides for scheduled inspection of equipment and the replacement of susceptible components as a result of significant degradation due to thermal and radiation aging. In addition, APCo is reviewing the preventive maintenance provisions for comparable Gems DeLaval transmitters presently environmentally qualified by NEQ Test Report 45700-Z. Applicable preventive maintenance provisions of the presently environmentally qualified Gems DeLaval transmitters will be applied to the environmental qualification administrative actions for FNP Gems DeLaval Models LS 36497 and XM36495.

The test deficiency listed in the TER regarding the FIRL Report S-C3834 (1888) Supplement was a test which subjected the units to a temperature of 346°F at a pressure of 126 psig which precipitated failure of the units in less than 90 minutes. Based on Gems DeLaval letter dated February 25, 1983, this was a destructive test and was not meant as part of the unit qualification. As documented in previous APCo submittals, the maximum surface temperature of these FNP components is 214°F in the main steam valve room and 270°F in containment. The maximum pressure at FNP is 5.8 psig in the main steam valve room and 47.5 psig in containment. As stated in the subject letter and test report, the unit is qualified for 280°F and 55 psig. Since the qualification temperature and pressure are not exceeded, the FNP DeLaval level sensors are considered to be qualified and the supplemental report, referenced in the TER, is not applicable to FNP.

Attachment 2

Resolutions to Specific NRC Staff Comments
Identified at the January 11, 1984 Meeting

1. NRC Comment

Provide criteria and methodology utilized to develop the Equipment Master List for Farley Nuclear Plant Units 1 and 2.

APCo Response

The criteria and methodology utilized to develop the Equipment Master List for Farley Nuclear Plant Units 1 and 2 are as follows:

1) Electrical systems and components in a harsh environment required to perform a safety-related function are included in the Master List.

2) The control circuitry of components identified in Item 1) above was reviewed for connections (interlocks) to other safety-related and nonsafety-related components. If spurious or inadvertent operation due to environmentally induced failures of the connected components in the harsh environment could adversely affect the completion of a safety function, the connected (interlocks) safety-related or nonsafety-related components were included in the Equipment Master List.

3) The instrumentation circuitry of components identified in Item 1) above was reviewed for connection to other safety-related and nonsafety-related components. If spurious or inadvertent operation due to environmentally induced failures of the connected components in the harsh environment could cause erroneous indication of the status of safety-related components, the connected safety-related or nonsafety-related components were included in the Equipment Master List.

4) The power circuitry of components identified in Item 1) above, inside the harsh environment was reviewed. If environmentally induced failures could result in a loss of power to components required to complete a safety-related function, the safety-related or nonsafety-related power circuitry components were included in the Equipment Master List. There are no connected safety/related/nonsafety- related power circuits in the harsh environment.

The Equipment Master List developed from this review criteria and methodology identifies safety-related equipment that is relied upon to remain functional during and following design basis events and nonsafety-related equipment whose environmentally caused failure could unacceptably impair the intended function of safety-related equipment. In the opinion of Alabama Power Company, the equipment identified in the Equipment Master List complies with paragraphs (b)(1) and (b)(2) of 10CFR50.49.

0057658

2. NRC Comment

Provide a description of the Environmental Qualification Administrative Program (EQAP) implemented at Farley Nuclear Plant.

APCo Response

APCo has developed an EQAP to ensure that currently qualified equipment within the scope of 10CFR50.49 will be maintained qualified throughout the life of the plant. It is the position of APCo that this program complies with 10CFR50.49, DOR Guidelines and NUREG-0588 as described herein.

Design Control

The EQAP requires that each design change will identify equipment that must be environmentally qualified and, for equipment models not previously installed at FNP, will reference the test report applicable to the equipment. The designer is responsible to ensure that the specified configuration is qualified and satisfies the Farley-specific harsh environment. A list of vendor test reports (Acceptable Test Report List) previously reviewed and found acceptable is maintained as a controlled document by Farley Document Control.

Procurement Control

The EQAP requires that Material Requisitions identify equipment requiring qualification and the test report associated with the specified equipment as indicated by the Equipment Master List and Acceptable Test Report List. The program requires that engineered requisitions be prepared by the designers for equipment specified in a design change but not included on the Acceptable Test Report List. The Equipment Master List, a controlled document maintained by Farley Document Control, identifies, by plant I.D. numbers, all equipment to be qualified. The EQAP provides that subcomponents not assigned a plant I.D. number satisfy the applicable environmental requirements of the equipment having a plant I.D. number of which the subcomponent is a constituent part. The Acceptable Test Report List identifies all test reports that have been reviewed and found acceptable. The vendor is required to submit a test report for equipment not previously installed at FNP or, for equipment previously installed at FNP, a certificate of conformance to a report identified on the Material Requisition. All new test reports not identified on the Acceptable Test

0057654

Report List as required to be reviewed and their acceptability documented before the issuance of a purchase order.

In accordance with the EQAP, components used to maintain qualified equipment must be qualified to the applicable requirements of the equipment being maintained. Identical components used to maintain the qualification of equipment are to be qualified by exisiting test reports which have been reviewed to meet the requirements of the DOR guidelines or NUREG-0588. If identical components cannot be obtained, the existing equipment is required to be replaced with new components procured to meet provisions of test reports that have been reviewed and accepted by APCo to the requirements of 10CFR50.49. A component used for the maintenance of environmental qualification is not to be considered identical if its installation requires a design change or its environmental qualification test report has not been reviewed and accepted by APCo.

Storeroom Control

The EQAP assures that the storeroom provides qualified equipment, which is identified by plant I.D. number on the Equipment Master List, for installation into the plant by completing a Material Issuance Form. Inventory level is maintained by the use of the FNP Inventory Record System. Material is stored and handled in accordance with appropriate vendor's instructions and storeroom practices. Proper segregation of environmentally qualified equipment from equipment that is not qualified is employed using storage room bins and locator numbers.

Preventive Maintenance

The EQAP identifies components requiring maintenance and their maintenance frequency. The EQAP provides scheduled maintenance of limited and indeterminate life components/subcomponents and materials and will schedule the normal maintenance of 40-year life equipment. Limited life equipment has a qualified life of less than 40 years. Indeterminate life equipment has not been subjected to thermal age testing and does not include material and subcomponents that are known to be susceptible to significant age degradation. Maintenance activities include selection of the component for which surveillance is performed. Component examination is required to be performed by maintenance personnel in accordance with the Environmental Qualification

0057660

Surveillance program during maintenance activities. The program requires that the results of the component examination be assessed for aging in accordance with the Environmental Qualification Surveillance program described below. Failure to replace components on schedule requires justification for interim operation.

Environmental Qualification Surveillance

The EQAP requires the assessment of the effects of in-service aging. This is a program of visual examination and document evaluation. The in-service surveillance procedures are keyed to the degradation mechanisms that have been identified and are capable of detection and interpretation by the FNP Staff. The methods of interpretation are not based on a statistical analysis of equipment failures or reliance on one indication, but rather a consideration and review of the total evidence of equipment operability based on in-house records, licensing documents and vendor information. There are three types of equipment addressed by the program: equipment with an indeterminate life, equipment with a limited life, and equipment with a 40-year life. Each of these categories is required to have an incremental increase in surveillance requirements to compensate for the susceptibility to, or indeterminate aspects of, aging degradation. The functional capability of 40-year life equipment, as with all equipment, is required to be subject to the normal cognitive responsibilites of plant personnel; no additional surveillance requirements will be specified by this program. The limited life equipment surveillance includes a documented examination of a sample of the subcomponents (specimen) replaced at the end of their life. The examination of the specimen will be documented on the Specimen Surveillance Checklist during the replacement of the subcomponents. The indeterminate life equipment surveillance includes an examination of a specimen as well as completion of a documented evaluation of in-house records providing insights to the condition of the equipment. The evaluation of in-house records are to be documented on the Document Summary Sheet. An evaluation of the Specimen Surveillance Checklist and the Document Summary Sheets will be performed and the necessary action taken (e.g. procedure revisions, modification of qualified life, no action necessary, etc.).

0057661

Document Control

The EQAP ensures that documentation is forwarded to Document Control for permanent retention. The following is kept in the environmental qualification central file or appropriately referenced to other file locations: test reports, evaluation documents, justifications for interim operation, certificates of conformance, maintenance requirements, Specimen Surveillance Checklists, Document Summary Sheets, Work Authorizations, Production Change Notices (PCNs), Engineering Support (ES) Authorizations, Systems Performance Group Problem Reports, Problem Report Response Sheets and Material Issuance Forms. Also, Document Control maintains the Acceptable Test Report List and Equipment Master List as control documents for issuance to the appropriate organizations.

3. NRC Comment

Provide a discussion on the approach used to evaluate the information in IE Information Notices (IEN) regarding environmental qualification problems and the mechanisms used by APCo to take any appropriate action. Specifically address IENs 81-29, 82-52 and 83-72.

APCo Response

Responses to IE Information Notices (IENs) and Circulars (IEC) are not required to be submitted to the NRC. However, it is APCo policy that all notices and circulars are reviewed for applicability to FNP and formally documented in the FNP files for permanent retention. All required corrective action to any notice or circular applicable to FNP is determined prior to the response being written to ensure that all documented responses address each notice or circular.

Specifically, IENs 81-29, 82-52, and 83-72 have been issued regarding adverse environmental qualification testing experience. Described herein is the current status of APCo's review on these IENs.

IEN 81-29

IEN 81-29 identified ten items for which anomolous test results were documented during environmental qualification. FNP has three items installed in various locations throughout the plant. These three items have been reviewed with corresponding corrective actions identified. These actions include a plant design change and the development of additional justification for each item.

0057662

IEN 82-52

This information notice was provided to inform the licensees of the status and test results published in IEN 81-29. APCo has reviewed IEN 82-52 and determined that no additional action is required at this time and actions taken as a result of IEN 81-29 were not affected by this additional information.

IEN 83-72

IEN 83-72 provided information of environmental qualification test failures on twelve equipment items. APCo is presently evaluating those items applicable to FNP to determine if any corrective action is required to provide compliance with the notice. The conclusion of this review will be formally documented in the FNP files for permanent retention noting any required actions.

4. NRC Comment

Address the current leakage of States Terminal Blocks and its effects on equipment within the scope of 10CFR50.49.

APCO Response

The environmental qualification test report for States Company Terminal Blocks, Wyle Laboratories Report 44354-1 provides the values of leakage currents. The States Terminal Blocks were LOCA tested with an applied voltage of 137.5 VDC which is the normal operation voltage of the terminal blocks. Instrumentation was attached to the terminal blocks at the conclusion of the LOCA test and leakage current values were recorded. The values of leakage current were recorded from terminal point-to-point and point-to-ground on the States Terminal Block. Also included were conductor-to-conductor and conductor-to-ground leakage current. These values were recorded for multiple combinations with an applied voltage of 137.5 VDC.

The test leakage current values are being used in the development of the revised FNP Emergency Operating Procedures (EOPs) presently being prepared by Westinghouse/APCo.

5. NRC Comment

Confirm that design basis events at FNP, which could result in a potentially harsh environment including flooding outside containment, were addressed in the identification of safety-related electrical equipment at FNP required to be environmentally qualified.

00570[illegible]

APCo Response

The flooding and environmental (temperature and pressure parameters) effects resulting from the worst case High Energy Line Break (HELB) outside containment was considered in the IEB 79-01B and NUREG-0588 analyses. The main steam valve room is the only area outside containment which is subject to a HELB and contains components required to mitigate the accident. The action taken to ensure equipment functions as intended is documented in the IEB 79-01B and NUREG-0588 submittals. The effects of flooding from HELB in areas outside containment other than the main steam valve room was analyzed as documented in FSAR Appendix 3K.

6. NRC Comment

Identify the mechanism for verifying the accuracy of vendor's evaluation of the similarity of the test specimen to FNP installed equipment.

APCo Response

APCo has vendor documents located in the FNP Central File which confirm or certify similarity between environmentally tested equipment and the equipment installed in FNP. These vendors include Gems DeLaval, Joy Manufacturing, American Air Filter, Limitorque and Okonite Companies.

As verification of the accuracy of vendor similarity evaluations, APCo is requesting each identified vendor to provide a discussion on the methodology used to reach the conclusions of their similarity evaluation. This discussion on methodology will be included in the FNP Central File. It is the judgement of APCo that the acceptance of the vendor similarity evaluation information will provide reasonable confidence in the accuracy of vendor documents on similarity.

0057664

7. NRC Comment

Ensure electrical equipment within the scope of environmental qualification is returned to its original installed configuration after maintenance is performed.

APCo Response

As stated in the Environmental Qualification Administrative Program, "efforts will be made to ensure that corrective maintenance will not compromise the qualification status of the equipment identified on the Equipment Master Lists". Equipment within the scope of environmental qualification is identified on the plant work requests during planning of the work activity. Planning is performed by a plant staff group to ensure that the maintenance activity will not compromise the qualification status of the equipment identified on the Equipment Master List. For such equipment, a statement on the plant work request clearly states that the equipment is environmentally qualified. In addition, the journeymen performing the work are routinely trained to return such equipment to its original installed configuration. Also, drawings are used for maintenance on cables and conduits that provide visual installation details to ensure resealing of the cables to their original configuration. Consequently, equipment is returned to its original configuration unless work is being performed as a result of a design modification.

0057665

ATTACHMENT 3

WESTINGHOUSE AFFIDAVIT REQUESTING
INFORMATION IN SUPPLEMENTS 1, 2, 3 and 4
TO BE WITHHELD
FROM PUBLIC DISCLOSURE

AW-80-27

AFFIDAVIT

0057666

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Robert A. Wiesemann, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Robert A. Wiesemann

Robert A. Wiesemann, Manager
Regulatory and Legislative Affairs

Sworn to and subscribed
before me this 18 day
of June 1980.

Notary Public

0057667

(1) I am Manager, Regulatory and Legislative Affairs, in the Nuclear Technology Division, of Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing or rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Water Reactor Divisions.

(2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Nuclear Energy Systems in designating information as a trade secret, privileged or as confidential commerical or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(g) It is not the property of Westinghouse, but must be treated as proprietary by Westinghouse according to agreements with the owner.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition in those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in the attachment to Westinghouse Letter No. NS-TMA-2257, Anderson to Miller, dated June 16, 1980 concerning the Westinghouse Equipment Qualification Program to address Regulatory Guides 1.89 and 1.100. The letter and attachment are being submitted to complete the information provided in WCAP-8587, Supplement 1, which was requested by the NRC via PBS Standard Question No. 4, "Environmental Qualification of Class 1E Equipment."

This information enables Westinghouse to:

(a) Develop test inputs and procedures to satisfactorily verify the design of Westinghouse supplied equipment.

(b) Assist its customers to obtain licenses.

Further, the information has substantial commercial value as follows:

(a) Westinghouse can sell the use of this information to customers.

(b) Westinghouse uses the information to verify the design of equipment which is sold to customers.

(c) Westinghouse can sell testing services based upon the experience gained and the test equipment and methods developed.

Public disclosure of this information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to design, manufacture, verify, and sell electrical equipment for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others having the same or similar equipment to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the equipment described in part by the information is the result of many years of development by Westinghouse and the expenditure of a considerable sum of money.

This could only be duplicated by a competitor if he were to invest similar sums of money and provided he had the appropriate talent available and could somehow obtain the requisite experience.

Further the deponent sayeth not.