

SAFETY EVALUATION REPORT BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
EQUIPMENT QUALIFICATION BRANCH

FOR WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH UNITS 1 AND 2

DOCKET NO. 50-266/301

CONTENTS

	Page
1 Introduction	1
2 Background	1
2.1 Purpose	2
2.2 Scope	2
3 Staff Evaluation	2
3.1 Completeness of Safety-Related Equipment	2
3.2 Service Conditions	3
3.3 Temperature, Pressure, and Humidity Conditions Inside Containment	4
3.4 Temperature, Pressure, and Humidity Conditions Outside Containment	5
3.5 Submergence	5
3.6 Chemical Spray	5
3.7 Aging	5
3.8 Radiation (Inside and Outside Containment)	6
4 Qualification of Equipment	6
4.1 Equipment Requiring Immediate Corrective Action	7
4.2 Equipment Requiring Additional Information and/or Corrective Action	7
4.3 Equipment Considered Acceptable or Conditionally Acceptable	8
5 Deferred Requirements	9
6 Conclusions	9
APPENDIX A Equipment Requiring Immediate Corrective Action ..	A-1
APPENDIX B Equipment Requiring Additional Information and/or Corrective Action	B-1
APPENDIX C Equipment Considered Acceptable or Conditionally Acceptable	C-1
APPENDIX D Safety-Related Systems List	D-1

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ENVIRONMENTAL QUALIFICATION OF SAFETY-RELATED ELECTRICAL EQUIPMENT

1 INTRODUCTION

General Design Criteria 1 and 4 specify that safety-related electrical equipment in nuclear facilities must be capable of performing its safety-related function under environmental conditions associated with all normal, abnormal, and accident plant operation. In order to ensure compliance with the criteria, the NRC staff required all licensees of operating reactors to submit a reevaluation of the qualification of safety-related electrical equipment which may be exposed to a harsh environment.

2 BACKGROUND

On February 8, 1979, the NRC Office of Inspection and Enforcement (IE) issued to all licensees of operating plants (except those included in the systematic evaluation program (SEP)) IE Bulletin IEB 79-01, "Environmental Qualification of Class IE Equipment." This bulletin, together with IE Circular 78-08 (issued on May 31, 1978), required the licensees to perform reviews to assess the adequacy of their environmental qualification programs.

Subsequently, Commission Memorandum and Order CLI-80-21 (issued on May 23, 1980) states that the DOR guidelines and portions of NUREG-0588 (which were issued on January 14, 1980, as enclosures 4 and 5 to IEB-79-01B) form the requirements that licensees must meet regarding environmental qualification of safety-related electrical equipment in order to satisfy those aspects of 10 CFR 50, Appendix A, General Design Criterion (GDC)-4. This order also requires the staff to complete safety evaluation reports (SERs) for all operating plants by February 1, 1981. In addition, this order requires that the licensees have qualified safety-related equipment installed in their plants by June 30, 1982.

Supplements to IEB 79-01B were issued for further clarification and definition of the staff's needs. These supplements were issued on February 29, September 30, and October 24, 1980.

In addition, the staff issued orders dated August 29, 1980 (amended in September 1980) and October 24, 1980 to all licensees. The August order required that the licensees provide a report, by November 1, 1980, documenting the qualification of safety-related electrical equipment. The October order required the establishment of a central file location for the maintenance of all equipment-qualification records. The central file was mandated to be established by December 1, 1980. The order also required that all safety-related electrical equipment be qualified by June 30, 1982. In response, the licensee submitted information through letters dated April 18, September 12, and October 30, 1980.

2.1 Purpose

The purpose of this SER is to identify equipment whose qualification program does not provide sufficient assurance that the equipment is capable of performing the design function in hostile environments. The staff position relating to any identified deficiencies is provided in this report.

2.2 Scope

The scope of this report is limited to an evaluation of the equipment which must function in order to mitigate the consequences of a loss-of-coolant accident (LOCA) or a high-energy-line-break (HELB) accident, inside or outside containment, while subjected to the hostile environments associated with these accidents.

3 STAFF EVALUATION

The staff evaluation of the licensee's response included an onsite inspection of selected Class IE equipment and an examination of the licensee's report for completeness and acceptability. The criteria described in the DOR guidelines and in NUREG-0588, in part, were used as a basis for the staff evaluation of the adequacy of the licensee's qualification program.

The NRC Office of Inspection and Enforcement performed (1) a preliminary evaluation of the licensee's response, documented in a technical evaluation report (TER) and (2) an onsite verification inspection (April 21, 1980 for Units 1 and 2 and October 10, 1980 for Unit 1) of selected safety-related electrical equipment. Components of the residual heat removal (RHR) and component cooling water (CCW) systems of Unit 1 were inspected, and components of safety injection systems of Units 1 and 2 were inspected. The inspection at both units 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 inspections are documented in letters dated April 24, 1980 from F. J. Jablonski (Region III) to V. D. Thomas (IE) and October 21, 1980 from D. W. Hayes (Region III) to E. L. Jordan (IE). Deficiencies outlined in these letters included a lack of plant equipment identification numbers and nameplate data that did not correspond to the CES. Additionally, pump and valve motors of the safety injection and containment spray systems of both Units 1 and 2 are located in the same room without sufficient separation. The staff believes that this arrangement is not consistent with the separation criteria; therefore, the licensee should address this situation. For this review, the documents referenced above have been factored into the overall staff evaluation.

3.1 Completeness of Safety-Related Equipment

In accordance with IEB 79-01B, the licensee was directed to (1) establish a list of systems and equipment that are required to mitigate a LOCA and an HELB and (2) identify components needed to perform the function of safety-related display information, post-accident sampling and monitoring, and radiation monitoring.

The staff developed a generic master list based upon a review of plant safety analyses and emergency procedures. The instrumentation selected includes parameters to monitor overall plant performance as well as to monitor the performance of the systems on the list. 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 list of safety-related systems provided by the licensee was reviewed against the staff-developed master list.

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

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

The licensee identified 234 items of equipment which were assessed by the staff. Because Units 1 and 2 are nearly identical, the review can be performed as one. Where necessary, differences in the units will be noted for clarity.

3.2 Service Conditions

Commission Memorandum and Order CLI-80-21 requires that the DOR guidelines and the "For Comment" NUREG-0588 are to be used as the criteria for establishing the adequacy of the safety-related electrical equipment environmental qualification program. These documents provide the option of establishing a bounding pressure and temperature condition based on plant-specific analysis identified in the licensee's Final Safety Analysis Report (FSAR) or based on generic profiles using the methods identified in these documents.

On this basis, the staff has assumed, unless otherwise noted, that the analysis for developing the environmental envelopes for Point Beach Units 1 and 2, relative to the temperature, pressure, and the containment spray caustics, has been performed in accordance with the requirements stated above. The staff has reviewed the Component Evaluation Work Sheets to ensure that the qualification data envelope meets the specifications established by the licensee. During this review, the staff assumed that for plants designed and equipped with an automatic containment spray system which satisfies the single-failure criterion, the main-steam-line-break (MSLB) environmental conditions are enveloped by the large-break-LOCA environmental conditions. The staff 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 possibility exists that flooding of equipment may result from HELBs.

3.3 Temperature, Pressure, and Humidity Conditions Inside Containment

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

	<u>Max Temp (°F)</u>	<u>Max Press (psig)</u>	<u>Humidity (%)</u>
LOCA	278	53	not provided
MSLB	not provided	not provided	not provided

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

The licensee's specified temperature (service condition) of 278°F does not satisfy the above requirement. A saturation temperature corresponding to the peak profile (301°F peak temperature at 53 psig) should be used instead. The licensee should update his equipment summary tables to reflect this change. If there is any equipment that does not meet the staff position, the licensee must provide either justification that the equipment will perform its intended function under the specified conditions or propose corrective action.

The licensee has provided service condition pressure and temperature profiles for the containment and an assortment of components. The staff assumed that the containment service condition profiles in the licensee's October 30, 1980 submittal are for a LOCA. However, for this review, the licensee should specify the relative humidity associated with each profile and provide service condition profiles--including pressure, temperature, and humidity--for all areas subject to a potential HELB. In addition, room numbers or other applicable designation should be used to specify the area to which each profile applies.

3.4 Temperature, Pressure, and Humidity Conditions Outside Containment

The licensee should provide service condition profiles for all areas outside containment subject to a potential HELB, as stated in Section 3.3 of this report.

3.5 Submergence

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 14 ft 10 in. The licensee has identified three solenoid valves and three limit switches as having the potential for becoming submerged after a postulated event. The licensee stated that this equipment will perform its safety function before becoming submerged. In this case, the licensee should provide an assessment of the failure modes associated with the submergence of these components. The licensee should also provide assurance that their subsequent failure 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.

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

3.6 Chemical Spray

The licensee's values for chemical sprays, as specified on the CES, are B_3BO_3 -NaOH solution: pH 7.9-10.0. For this review, the exact chemical concentration of boric acid and sodium hydroxide used in qualification testing should be discussed. Therefore, 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.

3.7 Aging

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 the result of their effort.
- (2) Establish an ongoing program to review surveillance and maintenance records to identify potential age-related degradations.

- (3) Establish component maintenance and replacement schedules which include considerations of aging characteristics of the installed components.

The licensee identified a number of equipment items for which a specified qualified life was established (for example, 7 years, 10 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 identify and verify 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 staff will review the licensee's response when it is submitted and discuss its evaluation in a supplemental report.

3.8 Radiation (Inside and Outside Containment)

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 5.8×10^7 rads. This value envelopes the DOR guideline requirements and is therefore acceptable.

A required value outside containment of 6.51×10^6 rads has been used by the licensee to specify limiting radiation levels in the vicinity of the safety injection system in the auxiliary building. This value appears to consider the radiation levels influenced by the source term methodology associated with recirculation fluid lines and is therefore acceptable.

4 QUALIFICATION OF EQUIPMENT

The following subsections present the staff's assessment, based on the licensee's submittal, of the qualification status of safety-related electrical equipment.

The staff has separated the safety-related equipment into three categories: (1) equipment requiring immediate corrective action, (2) equipment requiring additional qualification information and/or corrective action, and (3) equipment considered acceptable if the staff's concern identified in Section 3.7 is satisfactorily resolved.

In its assessment of the licensee's submittal, the NRC staff did not review the methodology employed to determine the values established by the licensee. However, in reviewing the data sheets, the staff made a determination as to the stated conditions presented by the licensee. Additionally, the staff has

not completed its review of supporting documentation referenced by the licensee (for example, test reports). It is expected that when the review of test reports is complete, the environmental qualification data bank established by the staff will provide the means to cross reference each supporting document to the referencing licensee.

If supporting documents are found to be unacceptable, the licensee will be required to take additional corrective actions to either establish qualification or replace the item(s) of concern. This effort will begin in early 1981.

An appendix for each subsection of this report provides a list of equipment for which additional information and/or corrective action is required. Where appropriate, a reference is provided in the appendices to identify deficiencies. It should be noted, as in the Commission Memorandum and Order, that the deficiencies identified do not necessarily mean that equipment is unqualified. However, they are cause for concern and may require further case-by-case evaluation.

4.1 Equipment Requiring Immediate Corrective Action

Appendix A identifies equipment (if any) in this category. The licensee was asked to review the facility's safety-related electrical equipment. The licensee's review of this equipment has not identified any equipment requiring immediate corrective action; therefore, no licensee event reports (LERs) were submitted. In addition, in this review, the staff has not identified any safety-related electrical equipment which is not able to perform its intended safety function during the time in which it must operate.

4.2 Equipment Requiring Additional Information and/or Corrective Action

Appendix B identifies equipment in this category, including a tabulation of deficiencies. The deficiencies are noted by a letter relating to the legend (identified below), indicating that the information provided is not sufficient for the qualification parameter or condition.

Legend

R - radiation
T - temperature
QT - qualification time
RT - required time
P - pressure
H - humidity
CS - chemical spray
A - material-aging evaluation; replacement schedule; ongoing equipment surveillance
S - submergence
M - margin
I - HELB evaluation outside containment not completed
QM - qualification method
RPN - equipment relocation or replacement; adequate schedule not provided
EXN - exempted equipment justification inadequate
SEN - separate-effects qualification justification inadequate
QI - qualification information being developed
RPS - equipment relocation or replacement schedule provided

As noted in Section 4, these deficiencies do not necessarily mean that the equipment is unqualified. However, the deficiencies are cause for concern and require further case-by-case evaluation. The staff has determined that an acceptable basis to exempt equipment from qualification, in whole or part, can be established provided the following can be established and verified by the licensee:

- (1) Equipment does not perform essential safety functions in the harsh environment, and equipment failure in the harsh environment will not impact safety-related functions or mislead an operator.
- (2a) Equipment performs its function before its exposure to the harsh environment, and the adequacy for the time margin provided is adequately justified, and
- (2b) Subsequent failure of the equipment as a result of the harsh environment does not degrade other safety functions or mislead the operator.
- (3) The safety-related function can be accomplished by some other designated equipment that has been adequately qualified and satisfies the single-failure criterion.
- (4) Equipment will not be subjected to a harsh environment as a result of the postulated accident.

The licensee is, therefore, required to supplement the information presented by providing resolutions to the deficiencies identified; these resolutions should include a description of the corrective action, schedules for its completion (as applicable), and so forth. The staff will review the licensee's response, when it is submitted, and discuss the resolution in a supplemental report.

It should be noted that in cases where testing is being conducted, a condition may arise which results in a determination by the licensee that the equipment does not satisfy the qualification test requirements. For that equipment, the licensee will be required to provide the proposed corrective action, on a timely basis, to ensure that qualification can be established by June 30, 1982.

4.3 Equipment Considered Acceptable or Conditionally Acceptable

Based on the staff review of the licensee's submittal, the staff identified the equipment in Appendix C as (1) acceptable on the basis that the qualification program adequately enveloped the specific environmental plant parameters, or (2) conditionally acceptable subject to the satisfactory resolution of the staff concern identified in Section 3.7.

For the equipment identified as conditionally acceptable, the staff determined that the licensee did not clearly

- (1) state that an equipment material evaluation was conducted to ensure that no known materials susceptible to degradation because of aging have been used,

- (2) establish an ongoing program to review the plant surveillance and maintenance records in order to identify equipment degradation which may be age related, and/or
- (3) propose a maintenance program and replacement schedule for equipment identified in item 1 or equipment that is qualified for less than the life of the plant.

The licensee is, therefore, required to supplement the information presented for equipment in this category before full acceptance of this equipment can be established. The staff will review the licensee's response when it is submitted and discuss the resolution in a supplemental report.

5 DEFERRED REQUIREMENTS

IEB 79-01B, Supplement 3 has relaxed the time constraints for the submission of the information associated with cold shutdown equipment and TMI lessons-learned modifications. The staff has required that this information be provided by February 1, 1981. The staff will provide a supplemental safety evaluation addressing these concerns.

6 CONCLUSIONS

The staff has determined that the licensee's listing of safety-related systems and associated electrical equipment whose ability to function in a harsh environment following an accident is required to mitigate a LOCA or HELB is complete and acceptable, except as noted in Section 3 of this report. The staff has also determined that the environmental service conditions to be met by the electrical equipment in the harsh accident environment are appropriate, except as noted in Section 3 of this report. Outstanding information identified in Section 3 should be provided within 90 days of receipt of this SER.

The staff has reviewed the qualification of safety-related electrical equipment to the extent defined by this SER and has found no outstanding items which would require immediate corrective action to ensure the safety of plant operation. However, the staff has determined that many items of safety-related electrical equipment identified by the licensee for this review do not have adequate documentation to ensure that they are capable of withstanding the harsh environmental service conditions. This review was based on a comparison of the qualification values with the specified environmental values required by the design, which were provided in the licensee's summary sheets.

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.

Subsection 4.3 identified acceptance and conditional acceptance based on noted deficiencies. Where additional information is required, the licensee should respond within 90 days of receipt of this SER by providing assurance that these concerns will be satisfactorily resolved by June 30, 1982.

The staff issued to the licensee Sections 3 and 4 of this report and requested, under the provisions of 10 CFR 50.54(f), that the licensee review the deficiencies enumerated and the ramifications thereof to determine whether safe operation of the facility would be impacted in consideration of the deficiencies. The licensee has completed a preliminary review of the identified deficiencies and has determined that, after due consideration of the deficiencies and their ramifications, continued safe operation would not be adversely affected.

Based on these considerations, the staff concludes that conformance with the above requirements and satisfactory completion of the corrective actions by June 30, 1982 will ensure compliance with the Commission Memorandum and Order of May 23, 1980. The staff further concludes that there is reasonable assurance of continued safe operation of this facility pending completion of these corrective actions. This conclusion is based on the following:

- (1) that there are no outstanding items which would require immediate corrective action to assure safety of plant operation
- (2) some of the items found deficient have been or are being replaced or relocated, thus improving the facility's capability to function following a LOCA or HELB
- (3) the harsh environmental conditions for which this equipment must be qualified result from low-probability events; events which might reasonably be anticipated during this very limited period would lead to less demanding service conditions for this equipment.

APPENDIX A

Equipment Requiring
Immediate Corrective Action
(Category 4.1)

Equipment Description	Manufacturer	Component No.
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No equipment in this category

APPENDIX B

Equipment Requiring Additional Information
and/or Corrective Action
(Category 4.2)

LEGEND:

Designation for Deficiency

- R - Radiation
- T - Temperature
- QT - Qualification Time
- RT - Required Time
- P - Pressure
- H - Humidity
- CS - Chemical spray
- A - Material aging evaluation, replacement schedule, ongoing equipment surveillance
- S - Submergence
- M - Margin
- I - HELB evaluation outside containment not completed
- QM - Qualification method
- RPN - Equipment relocation or replacement, adequate schedule not provided
- EXN - Exempted equipment justification inadequate
- SEN - Separate effects qualification justification inadequate
- QI - Qualification information being developed
- RPS - Equipment relocation or replacement schedule provided

Equipment Description	Manufacturer	Component No.	Deficiency
480 Motor AC	Westinghouse	1-P14A	A,QT,T
480 Motor AC	Westinghouse	1-P14B	A,QT,T
480 Motor AC	Westinghouse	2-P14A	A,QT,T
480 Motor AC	Westinghouse	2-P14B	A,QT,T
4160 Motor AC	Westinghouse	1-P15A	A,QT,T
4160 Motor AC	Westinghouse	1-P15B	A,QT,T
4160 Motor AC	Westinghouse	2-P15A	A,QT,T
4160 Motor AC	Westinghouse	2-P15B	A,QT,T
Valve Motor	Limitorque	1-S1851A	A,QT,T

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Valve Motor	Limitorque	1-S1851B	A,QT,T
Valve Motor	Limitorque	2-S1851A	A,QT,T
Valve Motor	Limitorque	2-S1851B	A,QT,T
Valve Motor	Limitorque	1-S1871A	A,T
Valve Motor	Limitorque	1-S1871B	A,T
Valve Motor	Limitorque	2-S1871A	A,T
Valve Motor	Limitorque	1-S1871B	A,T
Valve Motor	Limitorque	1-S1860A	A,T
Valve Motor	Limitorque	1-S1860B	A,T
Valve Motor	Limitorque	2-S1860A	A,T
Valve Motor	Limitorque	2-S1860B	A,T
Valve Motor	Limitorque	1-S1852A	A,T,P,H
Valve Motor	Limitorque	1-S1852B	A,T,P,H
Valve Motor	Limitorque	2-S1852A	A,T,P,H
Valve Motor	Limitorque	2-S1852B	A,T,P,H
Valve Motor	Limitorque	1-S1878B	A,T,P,H
Valve Motor	Limitorque	1-S1878D	A,T,P,H
Valve Motor	Limitorque	2-S1878B	A,T,P,H
Valve Motor	Limitorque	2-S1878D	A,T,P,H
Electro-Pneumatic Transducers	Fisher Co.	1-S1836A	QT,A
Electro-Pneumatic Transducers	Fisher Co.	1-S1836B	QT,T,H,A
Electro-Pneumatic Transducers	Fisher Co.	2-S1836A	QT,T,H,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Electro-Pneumatic Transducers	Fisher Co.	2-S1836B	QT,T,H,A
Limit Switch	NAMCO (D2400X)	1-S1836A	RPN,A
Limit Switch	NAMCO (D2400X)	1-S1836B	RPN,A
Limit Switch	NAMCO (D2400X)	2-S1836A	RPN,A
Limit Switch	NAMCO (D2400X)	2-S1836B	RPN,A
Pressure Transmitter	Foxboro (511GM)	1-PT922	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT923	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT922	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT923	RPN,A
Flow Transmitters	Barton (333)	1-FT924	RPN,A
Flow Transmitters	Barton (333)	1-FT925	RPN,A
Flow Transmitters	Barton (333)	2-FT924	RPN,A
Flow Transmitters	Barton (333)	2-FT925	RPN,A
Flow Transmitters	Barton (295)	1-FT928	RPN,A
Flow Transmitters	Barton (295)	2-FT928	RPN,A
Level Transmitters	Barton (332)	1-LT931	RPN,A
Level Transmitters	Barton (332)	2-LT931	RPN,A
Level Switches	Magnetrol (A153)	1-LC942A	RPN,A
Level Switches	Magnetrol (A153)	1-LC942B	RPN,A
Level Switches	Magnetrol (A153)	1-LC943A	RPN,A
Level Switches	Magnetrol (A153)	1-LC943B	RPN,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Level Switches	Magnetrol (A153)	2-LC942A	RPN,A
Level Switches	Magnetrol (A153)	2-LC942B	RPN,A
Level Switches	Magnetrol (A153)	2-LC943A	RPN,A
Level Switches	Magnetrol (A153)	2-LC943B	RPN,A
Oil (S1 Motors)	American Oil Co. (#35)	1-P15A	QT,H,A
Oil (S1 Motors)	American Oil Co. (#35)	1-P15B	QT,H,A
Oil (S1 Motors)	American Oil Co. (#35)	2-P15A	QT,H,A
Oil (S1 Motors)	American Oil Co. (#35)	2-P15B	QT,H,A
Pump Motors	Westinghouse	1-P10A	QT,A,H
Pump Motors	Westinghouse	1-P10B	QT,A,H
Pump Motors	Westinghouse	2-P10A	QT,A,H
Pump Motors	Westinghouse	2-P10B	QT,A,H
Pump Motors	Westinghouse	1-P11A	QT,H,R,A,T
Pump Motors	Westinghouse	1-P11B	QT,H,R,A,T
Pump Motors	Westinghouse	2-P11A	QT,H,R,A,T
Pump Motors	Westinghouse	2-P11B	QT,H,R,A,T
Valve Motor	Limitorque	1-AC738A	QT,A
Valve Motor	Limitorque	1-AC738B	QT,A
Valve Motor	Limitorque	2-AC738A	QT,A
Valve Motor	Limitorque	2-AC738B	QT,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Electro-Pneumatic Transducers	Fisher (546)	1-AC624	QT,H,A
Electro-Pneumatic Transducers	Fisher (546)	1-AC625	QT,H,A
Electro-Pneumatic Transducers	Fisher (546)	2-AC624	QT,H,A
Electro-Pneumatic Transducers	Fisher (546)	2-AC625	QT,H,A
Electro-Pneumatic Transducers	Fisher (546)	1-AC626	QT,H,A
Electro-Pneumatic Transducers	Fisher (546)	2-AC626	QT,H,A
Limit Switches	NAMCO (D2400X)	1-AC624	RPN,A
Limit Switches	NAMCO (D2400X)	1-AC625	RPN,A
Limit Switches	NAMCO (D2400X)	2-AC624	RPN,A
Limit Switches	NAMCO (D2400X)	2-AC625	RPN,A
Limit Switches	NAMCO (D2400X)	1-AC626	RPN,A
Limit Switches	NAMCO (D2400X)	2-AC626	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT628	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT629	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT628	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT629	RPN,A
Flow Transmitter	Foxboro (613DM)	1-FT626	RPN,A
Flow Transmitter	Foxboro (613DM)	2-FT626	RPN,A
Flow Transmitter	Foxboro (613DM)	1-FT619	RPN,A
Flow Transmitter	Foxboro (613DM)	2-FT619	RPN,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Oil (Pump)	American Oil (#21)	1-P11A	QT,H,A
Oil (Pump)	American Oil (#21)	1-P11B	QT,H,A
Oil (Pump)	American Oil (#21)	2-P11A	QT,H,A
Oil (Pump)	American Oil (#21)	2-P11B	QT,H,A
Level Transmitter	Foxboro (613DM)	1-LT106	RPN,A
Level Transmitter	Foxboro (613DM)	1-LT172	RPN,A
Level Transmitter	Foxboro (613DM)	1-LT190	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT106	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT172	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT190	RPN,A
Level Transmitter	Foxboro (613DM)	LT102	RPN,A
Level Transmitter	Foxboro (613DM)	LT171	RPN,A
Level Transmitter	Foxboro (613DM)	LT189	RPN,A
Level Transmitter	Foxboro (613DM)	1-LT426	RPN,A
Level Transmitter	Foxboro (613DM)	1-LT427	RPN,A
Level Transmitter	Foxboro (613DM)	1-LT428	RPN,A
Level Transmitter	Foxboro (613DM)	1-LT433	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT426	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT427	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT428	RPN,A
Level Transmitter	Foxboro (613DM)	2-LT433	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT429	RPN,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Pressure Transmitter	Foxboro (611GM)	1-PT430	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT431	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT449	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT429	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT430	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT431	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT449	RPN,A
Pressure Transmitter	Barton (332)	1-PT945	RPN,A
Pressure Transmitter	Barton (332)	1-PT946	RPN,A
Pressure Transmitter	Barton (332)	2-PT945	RPN,A
Pressure Transmitter	Barton (332)	2-PT946	RPN,A
Pressure Transmitter	Barton (332)	1-PT947	RPN,A
Pressure Transmitter	Barton (332)	1-PT948	RPN,A
Pressure Transmitter	Barton (332)	2-PT947	RPN,A
Pressure Transmitter	Barton (332)	2-PT948	RPN,A
Pressure Transmitter	Barton (332)	1-PT949	RPN,A
Pressure Transmitter	Barton (332)	1-PT950	RPN,A
Pressure Transmitter	Barton (332)	2-PT949	RPN,A
Pressure Transmitter	Barton (332)	2-PT950	RPN,A
Pressure Transmitter	Foxboro (611GH)	1-PT420	RPN,A
Pressure Transmitter	Foxboro (611GH)	2-PT420	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT461	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT462	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT463	RPN,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Level Transmitter	Foxboro (613HM)	2-LT461	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT462	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT463	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT471	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT472	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT473	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT471	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT472	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT473	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT460	RPN,A
Level Transmitter	Foxboro (613HM)	1-LT470	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT450	RPN,A
Level Transmitter	Foxboro (613HM)	2-LT470	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT468	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT469	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT482	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT468	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT469	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT482	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT478	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT479	RPN,A
Pressure Transmitter	Foxboro (611GM)	1-PT483	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT478	RPN,A
Pressure Transmitter	Foxboro (611GM)	2-PT479	RPN,A

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Pressure Transmitter	Foxboro (611GM)	2-PT483	RPN,A
Flow Transmitter	Foxboro (630)	1-FT464	RPN,A
Flow Transmitter	Foxboro (630)	1-FT465	RPN,A
Flow Transmitter	Foxboro (630)	1-FT474	RPN,A
Flow Transmitter	Foxboro (630)	1-FT475	RPN,A
Flow Transmitter	Foxboro (630)	2-FT464	RPN,A
Flow Transmitter	Foxboro (630)	2-FT465	RPN,A
Flow Transmitter	Foxboro (630)	2-FT474	RPN,A
Flow Transmitter	Foxboro (630)	2-FT475	RPN,A
480 VAC Motor	Westinghouse	1-W1A1	QT,T,A
480 VAC Motor	Westinghouse	1-W1B1	QT,T,A
480 VAC Motor	Westinghouse	1-W1C1	QT,T,A
480 VAC Motor	Westinghouse	1-W1D1	QT,T,A
480 VAC Motor	Westinghouse	2-W1A1	QT,T,A
480 VAC Motor	Westinghouse	2-W1B1	QT,T,A
480 VAC Motor	Westinghouse	2-W1C1	QT,T,A
480 VAC Motor	Westinghouse	2-W1D1	QT,T,A
Cable Splice	Westinghouse	1-W1A1	QT,A,QM
Cable Splice	Westinghouse	1-W1B1	QT,A,QM
Cable Splice	Westinghouse	1-W1C1	QT,A,QM
Cable Splice	Westinghouse	1-W1D1	QT,A,QM
Cable Splice	Westinghouse	2-W1A1	QT,A,QM
Cable Splice	Westinghouse	2-W1B1	QT,A,QM
Cable Splice	Westinghouse	2-W1C1	QT,A,QM

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Cable Splice	Westinghouse	2-W1D1	QT,A,QM
Solenoid Valve	ASCO (LBX831614)	1-CV1296	RPN,A
Solenoid Valve	ASCO (LBX831614)	2-CV1296	RPN,A
Solenoid Valve	ASCO (HB8302C25)	1-HC3200C	RPN,A
Solenoid Valve	ASCO (HB8302C25)	2-HC3200C	RPN,A
Solenoid Valve	ASCO (8320A7)	1-HV3213	RPN,A
Solenoid Valve	ASCO (8320A7)	1-HV3245	RPN,A
Solenoid Valve	ASCO (8320A7)	2-HV3213	RPN,A
Solenoid Valve	ASCO (8320A7)	2-HV3245	RPN,A
Limit Switch	NAMCO (EA180-11302)	1-CV1296	QM,A,T,P,H,S
Limit Switch	NAMCO (EA180-11302)	2-CV1296	QM,A,T,P,H,S
Limit Switch	NAMCO (EA180-11302)	1-HV3200C	QM,A,T,P,H
Limit Switch	NAMCO (EA180-11302)	2-HV3200C	QM,A,T,P,H
Limit Switch	NAMCO (EA180-11302)	1-HV3213	QM,A,T,P,H
Limit Switch	NAMCO (EA180-11302)	1-HV3245	QM,A,T,P,H
Limit Switch	NAMCO (EA180-11302)	2-HV3213	QM,A,T,P,H

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Limit Switch	NAMCO (EA180-11302)	2-HV3245	QM,A,T,P,H
Liquid Level	Foxboro (613DM)	LT-4025	RPN,A
Liquid Level	Foxboro (613DM)	LT-4031	RPN,A
Power Cable	Kerite (600VAC)	Generic*	R,T,QT,P,H,CS,A
Control Cable	Kerite (600V)	Generic*	R,T,QT,P,H,CS,A
Power Cable	Okonite (5000VAC)	Generic*	R,T,QT,P,H,A
Instrument Cable	Okonite	Generic*	R,T,QT,P,H,A
Power Cable	Rome (600V)	Generic*	R,T,QT,P,H,A
Electrical Penetration Assembly	Crause Hinds/ Westinghouse	Generic*	R,A,QT,T,P

*The qualification reference in the qualification column was not part of the data package the reviewer had.

APPENDIX C

Equipment Considered Acceptable
or Conditionally Acceptable
(Category 4.3)

Equipment Description	Manufacturer	Component No.	Deficiency
Resistance Temp. Elements	Foxboro	1-TE627	A
Resistance Temp. Elements	Foxboro	1-TE630	A
Resistance Temp. Elements	Foxboro	2-TE627	A
Resistance Temp. Elements	Foxboro	2-TE630	A
Resistance Temp. Elements	Foxboro	1-TE621	A
Resistance Temp. Elements	Foxboro	2-TE621	A
Valve Motor Operator	Limitorque	1-MS2019	A
Valve Motor Operator	Limitorque	1-MS2020	A
Valve Motor Operator	Limitorque	2-MS2019	A
Valve Motor Operator	Limitorque	2-MS2020	A
Grease	Chevron (BRB-2)	1-W1A1	A
Grease	Chevron (BRB-2)	1-W1B1	A
Grease	Chevron (BRB-2)	1-W1C1	A
Grease	Chevron (BRB-2)	1-W1D1	A
Grease	Chevron (BRB-2)	2-W1A1	A

APPENDIX C (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Grease	Chevron (BRB-2)	2-W1B1	A
Grease	Chevron (BRB-2)	2-W1C1	A
Grease	Chevron (BRB-2)	1-W1D1	A
Grease	American Oil (Amolith #2)	General	A
Grease	American Oil (Amolith #1)	Valve Motor Operator	A
Grease	Mobil Oil (#28)	Valve Motor Gears	A
Oil	American Oil (Rykon #15)	Pump and Motor Bearing	A
Cable Splice	Bechtel/Raychem (SK-E-165)	Generic	A

APPENDIX D
Safety-Related Systems List¹

Safety Injection
Auxiliary Coolant
Chemical and Volume Control
Reactor Control and Protection
Reactor Coolant
Main Feedwater (instrumentation only)
Main Steam (instrumentation only)
Containment Air Recirculation Cooling
Containment Isolation
Auxiliary Feedwater

¹As submitted by the licensee