

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

FOR PORTLAND GENERAL ELECTRIC COMPANY
TROJAN NUCLEAR PLANT

DOCKET NO. 50-344

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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 March 7, April 25, May 19, and September 5, 1980 and January 13, 1981.

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 (HEL3) 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 DCR 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 16-18 and October 27-31, 1980) of selected safety-related electrical equipment. The safety injection system was 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 first and second site inspections are documented in reports IE 50-344/80-08 and 344/80-27, respectively. No deficiencies were noted. 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 79-018, the licensee was directed to (1) establish a list of systems and equipment that are required to mitigate a LOCA and an HEL3 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 416 items of equipment which were assessed by the staff.

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, relative to the temperature, pressure, and the containment spray caustics, has been performed in accordance with the requirements stated above. The staff has reviewed the qualification documentation to ensure that the qualification specifications envelope the conditions established by the licensee. During this review, the staff assumed that for plants designed and equipped with an automatic containment spray system which satisfies the single-failure criterion, the main-steam-line-break (MSLB)

environmental conditions are enveloped by the large-break-LOCA environmental conditions. The staff 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	286	60	100
MSLB	not provided	not provided	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 specified temperature (service condition) of 286°F does not satisfy the above requirement. A saturation temperature corresponding to the pressure profile (307°F peak temperature at 60 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.

3.4 Temperature, Pressure, and Humidity Conditions Outside Containment

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

- (1) Auxiliary building
- (2) Main steam support structure between turbine and containment building
- (3) Outside area between containment building and main steam support structure
- (4) Piping penetration area between fuel building, containment building, and auxiliary building.

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

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 stated that all equipment required for post-LOCA/MSLB long-term operation has either been relocated above flood level, or replaced by equipment qualified for submergence, or is scheduled for replacement by equipment qualified for submergence. However, the licensee's value was not reported in his submittals. In view of the fact that maximum flood level inside containment cannot be established by the review of licensee submittals, submergence will be considered as an open item for this evaluation. Components having the potential to be submerged can be exempt from submergence qualification if the licensee can provide an assessment of the failure modes associated with these components. The licensee should also provide assurance that the subsequent failure of this component 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 30-day response and upgrade the CES as appropriate.

3.6 Chemical Spray

The licensee's FSAR value for the chemical concentration is not mentioned in his submittals; however, the pH value quoted in the TER for spray inside containment is 4.9-10.0. 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.

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 ICB-79-018 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, 5 years, 15 years, or 40 years). In its assessment of these submittals, the staff did not review the adequacy of the methodology nor the basis used to arrive at these values; the staff has assumed that the established values are based on state-of-the-art technology and are acceptable.

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

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

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 IES-79-018, 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 2.1×10^7 rads. These values do not envelope the DOR guideline requirements and therefore are not acceptable. The radiation service condition provided by the licensee is lower than provided in the guidelines for gamma and beta radiation. The licensee is requested to either provide justification for using the lower service condition or use the guidelines for both gamma and beta radiation. If the former option is chosen, then the analysis--including the basis, assumptions, and a sample calculation--should be provided.

A required value outside containment of 2.1×10^7 rads has been used by the licensee to specify limiting radiation levels in areas containing recirculating reactor coolant in the auxiliary building. 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 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, in accordance with the requirements of IEB 79-018, has identified several types of equipment (see Appendix A) where reasonable assurance does not exist that the equipment will not fail when it is exposed to the environmental conditions postulated in IEB 79-018. Therefore, a licensee event report (LER 80-22) was submitted by the licensee to the NRC on October 31, 1980. The licensee stated that the occurrence was caused by changes in the criteria for environmental qualification of safety-related electrical equipment from the FSAR to those required by IEB 79-018, and has no effect on either plant or public safety. The immediate corrective action taken by the licensee was to perform a safety evaluation to ensure that equipment failure would not preclude the performance of safety-related functions, as documented in Enclosure 4 of the licensee's submittal of September 5, 1980. The permanent corrective action taken will be replacement or modification of equipment to meet the qualification criteria of IEB 79-018 before June 30, 1982. In addition, 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 79-018, 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 (qualification, 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 Section 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)

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

<u>Equipment</u>				
<u>Description</u>	<u>Manufacturer</u>	<u>Model No.</u>	<u>Component No.</u>	<u>Deficiency</u>
Differential Pressure Transmitter	Barton	384	FT970A	QT,T,P,R,A,QM,RPS
Differential Pressure Transmitter	Barton	384	FT970B	QT,T,P,R,A,QM,RPS
Differential Pressure Transmitter	Barton	384	FT971A	QT,T,P,R,A,QM,RPS
Differential Pressure Transmitter	Barton	384	FT971B	QT,T,P,R,A,QM,RPS
Differential Pressure Transmitter	Barton	384	FT918	QT,T,P,R,A,QM,RPS
Differential Pressure Transmitter	Barton	384	FT922	QT,T,P,R,A,QM,RPS

APPENDIX A (Continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Level Transmitter	Barton	384	LT547	QT,T,P,CS,R,A,QM,RPS
Flow Transmitter	Barton	384	FT542	T,P,CS,R,A,QM,RPS
Pressure Transmitter	Barton	345	PT419	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	345	PT925	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	345	PT515	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	345	PT525	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	345	PT535	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	345	PT545	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	389	PT403	T,P,H,CS,A,S,QM,RPS
Pressure Transmitter	Barton	393	PT2080	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	393	PT2081	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	393	PT2082	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	393	PT2083	QT,T,P,H,R,A,QM,RPS
Pressure Transmitter	Barton	393	PT458	QT,T,P,H,CS,R,A,QM,RPS
RTD	Burns	POR-302	TE604	QT,T,P,H,R,A,QM,RPS
RTD	Burns	POR-302	TE605	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS1782	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS1783	QT,T,P,H,R,A,QM,RPS

APPENDIX A (Continued)

Equipment				
Description	Manufacturer	Model No.	Component No.	Deficiency
Limit Switch	NAMCO	D2400X	ZS8880	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS8888	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS2256	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS2276	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS2295	QT,T,P,H,R,A,QM,RPS
Limit Switch	NAMCO	D2400X	ZS2297	QT,T,P,H,R,A,QM,RPS
Motor Operated Valve	Limitorque	SMB-00	M08700A	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08700B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08716A	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08716B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08804A	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08804B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08809A	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08809B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08811A	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08811B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-0	M01120	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-0	M0112E	QT,T,P,A,QM**

Note: **Replace brakes with Limitorque SB conversion kit by June 1982.

APPENDIX A (Continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-00	M08924	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-0	M08806	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08807A	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08807B	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-4	M08808A	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-4	M08808B	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-4	M08808C	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-4	M08808D	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M08923A	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-3	M010002	T,P,CS,R,M,A**
Motor Operated Valve	Limitorque	SMB-3	M010003	T,P,CS,A,R,QI**
Motor Operated Valve	Limitorque	SMB-00	M010005	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M010006	T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M010007	QT,T,P,CS,R,A,QI**
Motor Operated Valve	Limitorque	SMB-00	M010008	QT,T,P,CS,R,A,QI**
Motor Operated Valve	Limitorque	SMB-00	M010009	QT,T,P,CS,R,A,QI**

Note: **Replace breaks with Limitorque SB conversion kit by June 1982.

APPENDIX A (Continued)

Equipment				
Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-00	M010010	QT,T,P,CS,R,A,QI**
Motor Operated Valve	Limitorque	SMB-00	M010011	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-00	M010012	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-2	M02052A	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-1	M02053B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-2	M02052B	QT,T,P,A,QM**
Motor Operated Valve	Limitorque	SMB-1	M02053A	QT,T,P,A,QM**

Note: **Replace brakes with Limitorque SB conversion kit by June 1982.

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	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-0	M08801A	QT,A
Motor Operated Valve	Limitorque	SMB-0	M08801B	QT,A
Motor Operated Valve	Limitorque	SMB-0	M08802A	QT,A
Motor Operated Valve	Limitorque	SMB-0	M08802B	QT,A
Motor Operated Valve	Limitorque	SMB-00	M03294	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03296	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03300	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03301A	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03301B	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03302A	A,T,CS

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-00	M033028	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03305A	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M033058	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M033068	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03309A	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M033098	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M033108	A,T,CS,QI
Motor Operated Valve	Limitorque	SMB-00	M03313A	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M033138	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M03314A	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M033148	A,T,CS
Motor Operated Valve	Limitorque	SMB-00	M02050A	A,QM
Motor Operated Valve	Limitorque	SMB-00	M020508	A,QM
Motor Operated Valve	Limitorque	SMB-00	M08000A	A,P,CS,QM
Motor Operated Valve	Limitorque	SMB-00	M080008	A,P,CS,QM
Motor Operated Valve	Limitorque	SMB-000	M03299	T,CS,A
Motor Operated Valve	Limitorque	SMB-000	M03320	T,CS,A
Motor Operated Valve	Limitorque	SMB-000	M03347	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M010013	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M010016	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M02218	CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M02228	CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M02238	CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M02248	CS,QM,A

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-000	M03210A	QT,A,M
Motor Operated Valve	Limitorque	SMB-000	M03210B	QT,A,M
Motor Operated Valve	Limitorque	SMB-000	M05663	QT,A,M
Motor Operated Valve	Limitorque	SMB-000	M05672	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05673	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05674	P,CS,QM,QI
Motor Operated Valve	Limitorque	SMB-000	M05675	QT,A,M,A
Motor Operated Valve	Limitorque	SMB-000	M05676	QT,A,M,A
Motor Operated Valve	Limitorque	SMB-000	M05677	QT,A,M,A
Motor Operated Valve	Limitorque	SMB-000	M05678	QT,A,M,A
Motor Operated Valve	Limitorque	SMB-000	M05651A	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05651B	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05651C	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05651D	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05671	QT,A,M
Motor Operated Valve	Limitorque	SMB-000	M05654	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05656	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05658	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M04005	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M05660	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M04180	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-000	M04300	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-3	M02069A	QT,T,P,H,A,QM,QI
Motor Operated Valve	Limitorque	SMB-3	M02069B	QT,T,P,H,A,QM,QI

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-3	M08812	P,CS,QM,A
Motor Operated Valve	Limitorque	SMB-3	M08835	QT,A,M
Motor Operated Valve	Limitorque	SMB-2	M08701	T,QT,CS,M,A
Motor Operated Valve	Limitorque	SMB-2	M08703	T,QT,M,A
Splices	Raychem	WCSF-N	-	CS,A
Feedthrough	Conax	N11001-33	-	T,P,H,CS,A
Cable	Okonite	350MCM,5KV, EP	A13	QT,P,H,A
Terminal Block	GE	EB-5	ATB409	QT,H,A
Terminal Block	GE	EB-5	ATB440	QT,H,A
Terminal Block	GE	EB-5	ATB425	QT,H,A
Terminal Block	GE	EB-5	ATB460	QT,H,A
Limit Switch	NAMCO	EA17011302	ZS8814	H,A,QM,P
Limit Switch	NAMCO	EA170	ZS8152	H,A,QM,P
Limit Switch	NAMCO	EA170	ZS8811A	H,A,QM,P
Limit Switch	NAMCO	EA170	ZS8811B	H,A,QM,P
Limit Switch	NAMCO	EA17011302	ZS8813	H,A,QM,P
Limit Switch	NAMCO	EA17011302	ZS8883	H,A,QM,P
Limit Switch	NAMCO	EA17011302	ZS8964	H,A,QM,P
Limit Switch	NAMCO	EA17011302	ZS8028	H,A,QM,P
Instrument Cable	Rockbestos	2C,#16,600V, XLPE	KD2	QT,P,H,A,QM,R,T
Pressure & Differential Pressure Transmitters	Barton	764	LT517	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT518	CS,A,QM,H

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Pressure & Differential Pressure Transmitters	Barton	764	LT519	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT528	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT529	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT537	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT538	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT539	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT548	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	764	LT549	CS,A,QM,H
Pressure & Differential Pressure Transmitters	Barton	389	PT403	R,T,QT,P,H,CS,A,QM,S
Pressure & Differential Pressure Transmitters	Barton	763	PT455	H,CS,A,QM
Pressure & Differential Pressure Transmitters	Barton	763	PT456	H,CS,A,QM
Pressure & Differential Pressure Transmitters	Barton	763	PT457	H,CS,A,QM
RTD	Rosemount	176KF	TE410A	H,CS,A
RTD	Rosemount	176KF	TE410B	H,CS,A
RTD	Rosemount	176KF	TE411A	H,CS,A
RTD	Rosemount	176KF	TE411B	H,CS,A
RTD	Rosemount	176KF	TE413A	H,CS,A

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
RTD	Rosemount	176KF	TE4138	H,CS,A
RTD	Rosemount	176KF	TE420A	H,CS,A
RTD	Rosemount	176KF	TE4208	H,CS,A
RTD	Rosemount	176KF	TE421A	H,CS,A
RTD	Rosemount	176KF	TE4218	H,CS,A
RTD	Rosemount	176KF	TE423A	H,CS,A
RTD	Rosemount	176KF	TE4238	H,CS,A
RTD	Rosemount	176KF	TE430A	H,CS,A
RTD	Rosemount	176KF	TE4308	H,CS,A
RTD	Rosemount	176KF	TE431A	H,CS,A
RTD	Rosemount	176KF	TE4318	H,CS,A
RTD	Rosemount	176KF	TE433A	H,CS,A
RTD	Rosemount	176KF	TE4338	H,CS,A
RTD	Rosemount	176KF	TE440A	H,CS,A
RTD	Rosemount	176KF	TE4408	H,CS,A
RTD	Rosemount	176KF	TE441A	H,CS,A
RTD	Rosemount	176KF	TE4418	H,CS,A
RTD	Rosemount	176KF	TE443A	H,CS,A
RTD	Rosemount	176KF	TE4438	H,CS,A
Motor	Allis-Chalmers Type GV		MP204A	T,QT,P,H,A,QM
Motor	Allis-Chalmers Type GV		MP204B	T,QT,P,H,A,QM
Solenoid Valves	ASCO	NP831654E	SV8149A	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV8149A1	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV8149B	P,H,CS,A

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Solenoid Valves	ASCO	NP831654E	SV8149B1	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV8149C	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV8149C1	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV455AA	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV455AB	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV456A	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV456B	P,H,CS,A
Solenoid Valves	ASCO	NP831654E	SV8026	P,H,CS,A
Power Cables	General Cable	2C,#14,600V,EP	N02	R,CS,A
Power Cables	General Cable	2C,#14,600V,EP	N02	CS,A,
Power Cables	General Cable	3C,#14,600V,EP	N05	CS,A,QM,S
Power Cables	General Cable	7C,#14,600V,EP	N07	CS,A,QM,S
Power Cables	General Cable	9C,#14,600V,EP	N09	CS,A,QM,S
Power Cables	General Cable	1C,#4/0,600V,EP	P05	CS,A,QM,S
Power Cables	General Cable	1C,#1/0,600V,EP	P07	R,T,QT,P,H,CS, A,QM,S
Power Cables	General Cable	3C,#8,600V,EP	P15	CS,A
Power Cables	General Cable	3C,#8,600V,EP	P15	CS,A,QM,S
Power Cables	General Cable	3C,#10,600V,EP	P16	CS,A,QM,S
Power Cables	General Cable	3C,#12,600V,EP	P17	CS,A,QM,S
Power Cables	General Cable	3C,#6,600V,EP	P18	CS,A,QM,S
Power Cables	General Cable	2C,#12,600V,EP	P20	R,T,QT,P,H,CS, A,QM,S

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Cable	American Wire & Cable	2C/S,#16,300V, EP	I02	P,CS,A,QM,S,M
Cable	American Wire & Cable	4C/S,#16,300V, EP	I04	P,CS,A,QM,S,M
Cable	American Wire & Cable	2C/S,#16,300V, EP	S02	P,CS,A,QM,S,M
Cable	American Wire & Cable	2C/S,#16,300V, EP	Z02	P,CS,A,QM,S,M
Cable	American Wire & Cable	4C/S#16,300V, EP	Z04	P,CS,A,QM,S,M
Limit Switch	NAMCO	EA180	ZS8701	H,CS,A
Limit Switch	NAMCO	EA180	ZS8702	H,CS,A
Limit Switch	NAMCO	EA180	ZS8026	H,CS,A
Limit Switch	NAMCO	EA180	ZS8871	H,CS,A
Limit Switch	NAMCO	EA180	ZS455A	H,CS,A
Limit Switch	NAMCO	EA180	ZS456	H,CS,A
Solenoid Valves	ASCO	WPLB8300864RF	SV8870A	A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8870B	A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8871	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8875A	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8875B	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8875C	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8875D	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8877A	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8877B	CS,A,QM
Solenoid Valves	ASCO	WPLB8300864RF	SV8877C	CS,A,QM

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Solenoid Valves	ASCO	WPLB8300B64RF	SV8877D	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8878A	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8878B	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8878C	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8878D	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8879A	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8879B	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8879C	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8879D	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8881	CS,A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8883	A,QM
Solenoid Valves	ASCO	WPLB8300B64RF	SV8964	A,QM
Solenoid Valves	ASCO	FT80033	SV2297B	A,R,QM
Solenoid Valves	ASCO	FT831J654	SV8880	A,QM
Solenoid Valves	ASCO	FT831654	SV8152	A,QM
Solenoid Valves	ASCO	HT80073	SV2297A	A,R,QM
Solenoid Valves	ASCO	HT8033	SV1783	A,QM
Solenoid Valves	ASCO	HT8320A36	SV2295A	A,R,QM
Solenoid Valves	ASCO	HT8320A36	SV2295B	A,R,QM
Solenoid Valves	ASCO	8320A90HT	SV1782	A,QM
Solenoid Valves	ASCO	L8331054	SV8888	A,QM
Solenoid Valves	ASCO	L8331654	SV8033	A,QM
Solenoid Valves	ASCO	8316C35HT	SV10001	A,R,QM
Solenoid Valves	ASCO	8316C35HT	SV10004	A,QM

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Solenoid Valves	ASCO	8316C35HT	SV10014	A,QM
Solenoid Valves	ASCO	8316C35HT	SV10015	A,QM
Solenoid Valves	ASCO	8602B26	SV4006	A,QM
Solenoid Valves	ASCO	FT8320101	SV8028	A,QM
Solenoid Valves	ASCO	HT8302828RU	SV4000	A,QM
Solenoid Valves	ASCO	8302C2GRU	SV4181	QT,T,P,H,CS, R,A,S,QM
Solenoid Valves	ASCO	8302C2GRU	SV4301	QT,T,P,H,CS, R,A,S,QM
Level Transmitter	Fisher & Porter	1302493	LT2069A	A,QT,T,P,H,QM, QI,RPS
Level Transmitter	Fisher & Porter	1302493	LT2069B	A,QT,T,P,H,QM, QI,RPS
Level Transmitter	Fisher & Porter	1082495	FT3043C	A,H,QT,QM,RP
Level Transmitter	Fisher & Porter	1082495	FT3043D	A,H,QT,QM,RP
Penetrations	Amphenol	N/A	AZ01	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	AZ03	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	AZ05	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	AZ06	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	AZ07	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	BZ01	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	BZ03	A,QT,T,P,H,CS, QM,QI,RPN

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Penetrations	Amphenol	N/A	BZ05	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	BZ07	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	CZ07	A,QT,T,P,H,CS, QM,QI,RPN
Penetrations	Amphenol	N/A	OZ07	A,QT,T,P,H,CS, QM,QI,RPN
Level Switch	Fisher & Porter	LS38365	LS2074	QT,T,P,H,CS,R, A,S,QM,RPS
Level Switch	Fisher & Porter	LS38365	LS2075	QT,T,P,H,CS,R, A,S,QM,RPS
I/P Converter	Fischer	546	FY606	QT,T,P,H,R,A,QM, QI,RPS
I/P Converter	Fischer	546	FY607	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004A1	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004A2	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004B1	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004B2	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004C1	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004C2	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004D1	QT,T,P,H,R,A,QM, QI,RPS
Flow Indicating Switch	Barton	288A	FIS3004D2	QT,T,P,H,R,A,QM, QI,RPS

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
*Pressure Transmitter Foxboro		E130H	LT459	T,P,H,CS,A,QM, QI,RPS,R
*Pressure Transmitter Foxboro		E130H	LT460	T,P,H,CS,A,QM, QI,RPS,R
*Pressure Transmitter Foxboro		E130H	LT461	T,P,H,CS,A,QM, QI,RPS,R
RTD	Burns	POR-320	TE463	QT,T,P,H,CS,R, A,QM,QI,RPS
RTD	Burns	POR-320	TE464	QT,T,P,H,CS,R, A,QM,QI,RPS
RTD	Burns	POR-320	TE465	QT,T,P,H,CS,R, A,QM,QI,RPS
RTD	Burns	POR-320	TE466	QT,T,P,H,CS,R, A,QM,QI,RPS
Acoustic Monitor	TEC	500	SE1189A	QT,T,P,H,CS,R, A,QM,QI
Acoustic Monitor	TEC	500	SE1189B	QT,T,P,H,CS,R, A,QM,QI
Acoustic Monitor	TEC	500	SE1189C	QT,T,P,H,CS,R, A,QM,QI
Radiation Monitor	Victoreen	847-1	RE6101	QT,T,P,H,R,A,QM, QI,RPS
Radiation Monitor	Victoreen	847-1	RE6102	QT,T,P,H,R,A,QM, QI,RPS
Hydrogen Recombiner	Westinghouse	Electric	RE318A	QT,P,H,CS,A,QI, RPS
Hydrogen Recombiner	Westinghouse	Electric	RE318B	QT,P,H,CS,A,QI, RPS
Fan Motor	Westinghouse	Type S80P	MV251A	QT,T,P,H,A,QM, QI,RPS

*See Attachment 1: Foxboro letter (3/12/81), "Potential Deficiency Affecting Foxboro Transmitters," for corrective action.

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Fan Motor	Westinghouse	Type S80P	MV251B	QT,T,P,H,A,QM, QI,RPS
Fan Motor	Westinghouse	Type S80F	MV252A	QT,T,P,H,A,QM, QI,RPS
Fan Motor	Westinghouse	Type S80P	MV252B	QT,T,P,H,A,QM, QI,RPS
Fan Motor	Westinghouse	Type S80P	MV253A	QT,T,P,H,A,QM, QI,RPS
Fan Motor	Westinghouse	Type S80P	MV253B	QT,T,P,H,A,QM, QI,RPS
Fan Motor	Westinghouse	Type S80P	MV254A	QT,T,P,H,A,QM, QI,RPS
Fan Motor	Westinghouse	Type S80P	MV254B	QT,T,P,H,A,QM, QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2216A	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2216B	QT,T,P,H,R,A, QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2216C	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2216D	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2236A	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2236B	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2236C	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2236D	QT,T,P,H,R,A, QM,QI,RPS
Solenoid Valves	R.G. Laurence	125434W	SV2256A	QT,T,P,H,R,A, QM,QI,RPS

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Solenoid Valves	R.G. Laurence	125434W	SV22568	QT, T, P, H, R, A, QM, QI, RPS
Solenoid Valves	R.G. Laurence	125434W	SV2256C	QT, T, P, H, R, A, QM, QI, RPS
Solenoid Valves	R.G. Laurence	125434W	SV2256D	QT, T, P, H, R, A, QM, QI, RPS
Solenoid Valves	R.G. Laurence	125434W	SV2276A	QT, T, P, H, R, A, QM, QI, RPS
Solenoid Valves	R.G. Laurence	125434W	SV2276B	QT, T, P, H, R, A, QM, QI, RPS
Solenoid Valves	R.G. Laurence	125434W	SV2276C	QT, T, P, H, R, A, QM, QI, RPS
Solenoid Valves	R.G. Laurence	125434W	SV2276D	QT, T, P, H, R, A, QM, QI, RPS
Terminal Board	GE	EB-5	DTB465	T, P, H, CS, R, A, QI
Terminal Board	Square D	828	ATB203	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB204	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB205	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB206	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB207	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB208	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB209	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	828	ATB210	QT, T, P, H, CS, R, A, QM, QI, RPS

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Terminal Board	Square D	328	BTB203	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB204	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB205	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB206	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB207	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB208	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB209	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	BTB210	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	CTB203	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	CTB204	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	CTB205	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	CTB206	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	DTB203	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	DTB204	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	DTB205	QT, T, P, H, CS, R, A, QM, QI, RPS
Terminal Board	Square D	328	DTB206	QT, T, P, H, CS, R, A, QM, QI, RPS

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor	Westinghouse	Type HSDP	MP202A	QT, T, P, H, A, QM, QI*
Motor	Westinghouse	Type HSDP	MP202B	QT, T, P, H, A, QM, QI*
Motor	Westinghouse	Type HSDP	MP205A	QT, T, P, H, A, QM, QI*
Motor	Westinghouse	Type HSDP	MP205B	QT, T, P, H, A, QM, QI*
Motor	Westinghouse	Type HSDP	MP203A	QT, T, P, H, A, QM, QI*
Motor	Westinghouse	Type HSDP	MP203B	QT, T, P, H, A, QM, QI*
Motor	Reliance	Series 2000	M220A	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M220B	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M201A	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M201B	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M202A	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M202B	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M203A	QT, T, P, H, CS, A, QM, QI*

Note: *Replace lubricant and insulation with qualified ones by June 1982.

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor	Reliance	Series 2000	M203B	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M204A	QT, T, P, H, CS, A, QM, QI*
Motor	Reliance	Series 2000	M204B	QT, T, P, H, CS, A, QM, QI*
Motor Operated Valve	Limitorque	SMB-00	CV3004A1	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004A2	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004B1	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004B2	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004C1	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004C2	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004D1	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	CV3004D2	QT, T, P, H, R, A, QM, RPS
Motor Operated Valve	Limitorque	SMB-00	M03306A	T, CS, A, RPS, QI
Motor Operated Valve	Limitorque	SMB-00	M03310A	T, CS, A, RPS, QI
Motor Operated Valve	Limitorque	SMB-2	M08702	T, CS, A, RPS, QI
Motor Operated Valve	Limitorque	SMB-000	M03293	T, P, R, M, A, QI, RPS

Note: *Replace lubricant and insulation with qualified ones by June 1982.

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-000	M03298A	T,P,R,M,A,QI, RPS
Motor Operated Valve	Limitorque	SMB-000	M03298B	T,P,R,M,A,QI, RPS
Motor Operated Valve	Limitorque	SMB-000	M03298C	T,P,R,M,A,QI, RPS
Motor Operated Valve	Limitorque	SMB-000	M03298D	T,P,R,M,A,QI, RPS
Motor Operated Valve	Limitorque	SMB-000	M08112	T,P,CS,R,M,A,QI, RPS
Motor Operated Valve	Limitorque	SMB-000	M05653	T,P,CS,R,M,A, QI,RPS
Level Transmitter	Barton	764	LT527	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT512	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT513	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT522	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT523	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT532	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT533	T,P,H,CS,A,QM, QI
Flow Transmitter	Barton	764	FT543	T,P,H,CS,A,QM, QI
Tape	Scotch	23	N/A	QT,T,P,H,R, A,QM,QI

APPENDIX B (continued)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Tape	Scotch	70	N/A	QT, T, P, H, R, A, QM, QI
Flow Transmitter	Barton	384	FT917	QT, T, P, H, QM, R, A, QI, RPS
Pressure Transmitter	Barton	345	PT947	QT, T, P, H, R, A, QM, RPS

APPENDIX C

Equipment Considered Acceptable or Conditionally Acceptable (Category 4.3)

Equipment Description	Manufacturer	Model No.	Component No.	Deficiency
Motor Operated Valve	Limitorque	SMB-0	M08803A	A
Motor Operated Valve	Limitorque	SMB-0	M08803B	A
Motor Operated Valve	Limitorque	SMB-00	M03290	A
Motor Operated Valve	Limitorque	SMB-00	M03291	A
Motor Operated Valve	Limitorque	SMB-00	M03292	A
Motor Operated Valve	Limitorque	SMB-00	M03346	A
Motor Operated Valve	Limitorque	SMB-00	M0112B	A
Motor Operated Valve	Limitorque	SMB-00	M0112C	A
Motor Operated Valve	Limitorque	SMB-00	M08100	A
Motor Operated Valve	Limitorque	SMB-00	M08105	A
Motor Operated Valve	Limitorque	SMB-00	M08106	A
Motor Operated Valve	Limitorque	SMB-00	M08110	A
Motor Operated Valve	Limitorque	SMB-00	M08111	A
Motor Operated Valve	Limitorque	SMB-00	M08813	A
Motor Operated Valve	Limitorque	SMB-00	M08814	A
Motor Operated Valve	Limitorque	SMB-00	M08821A	A
Motor Operated Valve	Limitorque	SMB-00	M08821B	A
Motor Operated Valve	Limitorque	SMB-000	M02056A	A
Motor Operated Valve	Limitorque	SMB-000	M02056B	A

APPENDIX D

Safety-Related Systems List

System Generic (components common to many systems)
Component Cooling Water System
Heating and Ventilating Fuel and Reactor Auxiliary Buildings
Feedwater System
RHR System
Chemical and Volume Control System
Safety Injection System
Engineered Safeguards Actuating System
Primary Containment
Heating and Ventilating Containment
Containment Spray System
Steam Generators
RCS, Including Pressurizer
Primary Makeup Water System
Clean Radwaste System
Dirty Radwaste System
Gaseous Radwaste System
Process Sampling System
Radiation Monitoring System
Reactor Nonnuclear Instrumentation
Main Steam System

The Foxboro Company

Foxboro, MA 02035 U.S.A.
(617) 543-8750

12 March 1981

Subject: Potential Deficiency Affecting Foxboro Transmitters,
Model Numbers N-E11, N-E13 or E11, E13 with suffix
Codes /MCA, /MCA/RRW, or /MCA/RR

Gentlemen:

Our records indicate that you have received one or more of the Foxboro model numbered transmitters listed above. This letter is to notify you that two deficiencies have been discovered in some of these transmitters which may exist in the units shipped to you. The transmitters in question operate at a signal level of 10-50mA. Similar model numbered units operating at 4-20mA are not affected.

The first issue involves the possible use of incorrect insulating sleeving on transistor and zener diode lead wires in the amplifier. The second issue involves the use of a specific vendor's capacitor which is not hermetically sealed (although claimed to be so). As a result, the capacitor electrolyte can leak under adverse service conditions, specifically heat and time. The failure mode is a decrease in resistance across the capacitor resulting in electrical leakage. The transmitter operation can be affected by limiting the output to something less than full value which, in time, can degrade to no output at all.

Insulating Sleeving - Radiation resistant sleeving consisting of a silicone coated glass fiber braid has been substituted by a teflon sleeving in some transmitters. Tests have shown that teflon will become brittle and deteriorate with a substantial integrated radiation dose. Foxboro testing has demonstrated that the teflon sleeving used in these devices will withstand an integrated dose of 10 megarads with no noticeable deterioration. Tests to 200 megarads produce the brittle conditions which can result in the teflon flaking from the wires. Based on these tests, operating plants not expected to exceed an integrated dose of 10 megarads have no potential problem and no action is required.

Where the integrated dose rate could exceed 10 megarads, then units in service should be inspected to determine if the proper insulating material has been used. This can be accomplished by opening the transmitter in accordance with Foxboro Master Instruction MI 20-145. The amplifier cover must be removed exposing the amplifier assembly. At one end of the assembly, a transistor and a zener diode are mounted in the base casting which serves as a heat sink. The insulating material in question is a sleeving slipped over the lead wires from these two components. The proper material is white and heavy looking. Positive

FOXBORO

Subject:

identification can be made by inspecting one end of the material to establish that the outer material covers an inner braid. Teflon, if used, will be a single layer material and could be either clear or white.

If improper insulation is present, then the corrective action is to replace the amplifier (Foxboro P/N NO148PW). Replacement amplifiers can be purchased from you. local Foxboro Sales or Service Representatives. If you prefer to have Foxboro Service Personnel inspect the equipment and, if necessary, replace the amplifier, this can be arranged at standard service rates.

Capacitor - The capacitor degradation problem was discovered over time through tracking failure situations. Internal corrective action has been taken to remove the vendor involved from the qualified vendor list and to purge all stock of capacitors from this vendor. Degradation of this capacitor is a function of time and service conditions with heat being a primary contributor. This phenomenon was observed in recent tests of transmitters using these capacitors. The capacitor in question is manufactured by Cornell-Duebiller and can be specifically identified by a type number in the form TX-65-XXXX as well as a monogram in a box followed by a date code, e.g. CDZ 0874. It is assigned Foxboro part number NO141MF.

To determine if this capacitor is present requires a visual inspection of the amplifier which can be accomplished as described above for the insulating sleeving inspection. The recommended corrective action should the above described capacitor be present is to replace the amplifier (Foxboro P/N NO148PW) although it is possible to replace the capacitor with a Foxboro provided substitute. Use of Foxboro Service personnel to perform the inspection and replacement, if necessary, can be arranged at standard service rates as described above.

Due to lack of knowledge of specific application, redundancy, and the like, Foxboro cannot determine if the NRC reporting requirements of 10CFR Part 21 are applicable. This determination is the responsibility of the user and any such reporting would be made by them after completing their evaluation of the situation.

If you have any questions regarding the above, please contact the undersigned directly.

Very truly yours,

THE FOXBORO COMPANY

W Calder
William Calder, Manager
Corporate Quality Assurance

joy
120381

Enclosure MI 20-145

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