SAFETY EVALUATION REPORT BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

EQUIPMENT QUALIFICATION BRANCH

FOR VIRGINIA ELECTRIC AND POWER COMPANY

NORTH ANNA UNIT 1

DOCKET NO. 50-338

8105220336

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	6
	3.8 Radiation (Inside and Outside Containment)	6
4	Qualification of Equipment	7
	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	9
5	Deferred Requirements	9
6	Conclusions	9

APPENDIX A Equipment Requiring Immediate Corrective Action

APPENDIX B Equipment Requiring Additional Information and/or Corrective Action

APPENDIX C Equipment Considered Acceptable or Conditionally Acceptable

APPENDIX D Safety-Related Systems List

Attachment 1 Letter from the Foxboro Company dated March 12, 1981, regarding the deficiencies in Model E11 and E13 transmitters

SAFETY EVALUATION REPORT BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
EQUIPMENT QUALIFICATION BRANCH
FOR VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA UNIT 1
DOCKET NO. 50-338

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 June 16, August 18, October 14, November 1, and December 1, 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 (during the week of October 20, 1980) of selected safety-related electrical equipment. The casing cooling/recirculation spray, containment purge/containment isolation, outside recirculation spray, and quench spray systems were inspected. The inspection verified proper installation of equipment, overall interface integrity, and manufacturers' nameplate data. The manufacturer's name and model number from the nameplate data were compared to information given in the Component Evaluation Work Sheets (CES) of the licensee's report. The site inspection is documented in report IE 50-338/80-36. 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 79-01B, 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 upon information in the licensee's submittal, the equipment location references, and in some cases subsequent conversations with the licensee, the staff has verified and determined that the systems included in the licensee's submittal are those required to achieve or support: (1) emergency reactor shutdown, (2) containment isolation, (3) reactor core cooling, (4) containment heat removal, (5) core residual heat removal, and (6) prevention of significant release of radioactive material to the environment. The staff therefore concludes that the systems identified by the licensee (listed in Appendix D) are acceptable, with the exception of those items discussed in Section 5 of this report.

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

The licensee identified 412 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:

	Max Temp (°F)	Max Press (psig)	Humidity (%)
LOCA	280	45	100
MSLB	430*	45	100

The staff has concluded that the minimum temperature profile for equipment qualification purposes should include a margin to account for higher-than-average temperatures in the upper regions of the containment that can exist due to stratification, especially following a postulated MSLB. Use of the steam saturation temperature corresponding to the total building pressure (partial pressure of steam plus partial pressure of air) versus time until the sprays become effective 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 280°F does not satisfy the above requirement. A saturation temperature corresponding to the pressure profile (292°F peak temperature at 45 psig) should be used instead. The licensee should update his equipment summary tables to reflect this change. If there is any equipment that does not meet the staff position, the licensee must provide either justification that the equipment will perform its intended function under the specified conditions or propose corrective action.

The staff notes that for the EEQ review the accidents which were used to evaluate equipment were LOCAs inside containment. As stated in Section 3.2 of this report, this plant is equipped with an automatic containment spray system. However, the temperature for the MLSB inside containment exceeds the LOCA profile by 150°F for a short time (about two minutes). The licensee should provide the analysis to verify that the effects of this short-term peak temperature do not affect the environmental qualification of the safety-related equipment which was qualified using the LOCA profile.

*Taken from the licensee's submittal (CES); this temperature will last for 2 minutes.

3.4 Temperature, Pressure, and Humidity Conditions Outside Containment

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

(1) Auxiliary building
(2) Service 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's value for maximum submergence is at elevation 225 ft 7 in. Equipment below this level has been identified by the licensee, along with the proposed corrective action. The licensee identified two safety-related electrical components (pump motors 1-RS-P-1A and 1B) as having the potential for becoming submerged after a postulated event. However, no a corrective action is proposed by the licensee. Therefore, for the purpose of this review, the effect of submergence will be considered as unresolved. The staff will review the licensee's response when it is submitted. The staff will discuss its resolution in a subsequent report.

The staff considers that a component may be exempt from qualification for potential submergence if the licensee can submit an assessment of the failure modes associated with the submergence of the component. 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 the component 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 FSAR value for the chemical concentration is 2000 to 2100 ppm boric acid solution buffered to a pH of 8.5 to 11 with sodium hydroxide (NaOH). However, the exact volume percent used by the vendor for qualification testing is not provided. Therefore, for the purpose of this review, the effects of chemical spray will be considered unresolved. The staff will review the licensee's response when it is submitted and discuss the resolution in a supplemental report.

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, 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 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 4.8×10^7 rads. This value envelopes the DOR guideline requirements and is therefore acceptable.

A required value outside containment of 5.6×10^6 rads has been used by the licensee to specify limiting radiation levels within the auxiliary room. 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.

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

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

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.

) Equipment performs its function before its exposure to the harsh environment, and the adequacy for the time margin provided is adequately justified, and

) Subsequent failure of the equipment as a result of the harsh environment does not degrade other safety functions or mislead the operator.

The safety-related function can be accomplished by some other designated equipment that has been adequately qualified and satisfies the single-failure criterion.

Equipment will not be subjected to a harsh environment as a result of the postulated accident.

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

should be noted that in cases where testing is being conducted, a condition 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 ramification, 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:

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.
Level Indicating Transmitter (Containment Sump Level Signal Processor)	Gems Sensor Div., Delaval turbine	LIT-RS-151A LIT-RS-151B
Transmitters relocated to non-harsh environment location.		

APPENDIX B

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

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

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid Operated Valve	ASCO	SOV-SV-102-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-SV-103	QT,A,QM,RPS
Ambient Temp. Monitor	Rosemount	TE-AM-100A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-101A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-102A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-103A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-104A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-105A	QT,R,A,QM,RT

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Ambient Temp. Monitor	Rosemount	TE-AM-106A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-107A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-108A	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-100B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-101B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-102B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-103B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-104B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-105B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-106B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-107B	QT,R,A,QM,RT
Ambient Temp. Monitor	Rosemount	TE-AM-108B	QT,R,A,QM,RT
Motor Operated Valve	Limitorque	MOV-RS-100A	QT,R,A,QM
Motor Operated Valve	Limitorque	MOV-RS-100B	QT,R,A,QM
Motor Operated Valve	Limitorque	MOV-RS-101A	QT,R,A,QM
Motor Operated Valve	Limitorque	MOV-RS-101B	QT,R,A,QM,QI
Pump Motor	Westinghouse	1-CH-P-1A	QT,R,A,T,P,H,QI, QM,RT
Pump Motor	Westinghouse	1-CH-P-1B	QT,R,A,T,P,H,QI, QM,RT
Pump Motor	Westinghouse	1-CH-P-1C	QT,R,A,T,P,H,QI, QM,RT
Motor Operated Valve	Limitorque	MOV-1115B	QT,P,A,QM,QI,RT
Motor Operated Valve	Limitorque	MOV-1115C	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-1115D	QT,P,A,QM,QI,RT

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	MOV-1115E	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-1275A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1275B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1275C	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1286A	QT,R,A,T,P,QI QM,RT
Motor Operated Valve	Limitorque	MOV-1286B	QT,R,A,RT,QT,P, QM,QI
Motor Operated Valve	Limitorque	MOV-1286C	QT,R,A,T,P,QI, QM,RT
Motor Operated Valve	Limitorque	MOV-1287A	QT,R,A,T,P,QI, QM,RT
Motor Operated Valve	Limitorque	MOV-1287B	QT,R,A,T,P,QI, QM,RT
Motor Operated Valve	Limitorque	MOV-1287C	QT,R,A,T,P,QI, QM,RT
Motor Operated Valve	Limitorque	MOV-1289A	QT,A,RT,P,QM
Motor Operated Valve	Limitorque	MOV-1289B	QT,A,RT,P,QM
Motor Operated Valve	Limitorque	MOV-1350	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1373	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1381	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1867A	QT,A,RT,P,QM
Motor Operated Valve	Limitorque	MOV-1867B	QT,A,RT,P,QM
Motor Operated Valve	Limitorque	MOV-1867C	QT,A,RT,P,QM
Motor Operated Valve	Limitorque	MOV-1867D	QT,A,RT,P,QM
Solenoid Valve	ASCO	SOV-1200A-2	QT,T,P,H,CS,R,A, QM,S,RPS

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid Valve	ASCO	SOV-1200B-2	QT,T,P,H,CS,R,A, QM,S,RPS
Solenoid Valve	ASCO	SOV-1200C-2	QT,T,P,H,CS,R,A, QM,S,RPS
Solenoid Valve	ASCO	SOV-1204	QT,R,A,QM,RPS
Motor Operated Valve	Limitorque	MOV-1370	QT,A,QM
Solenoid Valve	ASCO	SOV-1200A-1	QT,T,P,H,CS,R, A,QM,RPS
Solenoid Valve	ASCO	SOV-1200B-1	QT,T,P,H,CS,R, A,QM,RPS
Solenoid Valve	ASCO	SOV-1200C-1	QT,T,P,H,CS,R, A,QM,RPS
Electric Penetration	Conax Corp.	Type 1A	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type 1B	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type 1C	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type IIA	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type IIB	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type IIC	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type IID	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type IIE	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type III	T,P,CS,A,QM
Electric Penetration	Conax Corp.	Type IV	T,P,CS,A,QM
Tape	Okonite	T-95	T,P,CS,M,A,QM
Tape	Okonite	T-35	T,P,CS,M,A,QM
Terminal Block	Connectron, Inc.	Connectron	T,P,CS,R,A,QM
Splicing Material	Raychem	WCSF-N	T,P,CS,M,A,QM

Equipment Description	Manufacturer	Component No	Deficiency
Splicing Material	Conax Corp.	Conax	T,P,CS,A,QM
Terminations/Connectors	Raychem	HVT/HVMC	QT,A,QM
Terminal Block	Marathon	Series 200 & 1500	QT,A,QM
Terminal Block	Connectron	Type NSE-3, NSS-3, PSU	QT,R,M,A,QM
Terminal Block	Thermo-Electric	No. 3225	QT,A,QM
Terminal Block	GE	EB5, EB25	QT,A,QM
Terminal Block	Westinghouse	Type TBAL	QT,R,M,A,QM
Cable	General Cable	Spec. No. 108, NGA-3, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-4, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-5, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-6, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-9, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-10, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-12, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 108, NGA-13, NA-1255	QT,A,P,QM
Cable	General Cable	Spec. No. 116, NGB-5, NA-256	QT,T,P,CS, M,A,QM
Cable	General Cable	Spec. No. 116, NGB-7, NA-256	QT,T,P,CS, M,A,QM

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Cable	General Cable	Spec. No. 116, NGB-11, NA-256	QT,T,P,CS, M,A,QM
Cable	General Cable	Spec. No. 116, NGB-12, NA-256	QT,T,P,CS, M,A,QM
Cable	Okonite	Spec. No. 116A, NGA-20, NA-1128	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 116A, NGA-21, NA-1128	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 116A, NGB-15, NA-1128	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 116A, NGB-16, NA-1128	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 116A, NGB-17, NA-1128	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 116A, NGB-18, NA-1128	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 116A, NGB-19, NA-1128	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-19, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-34, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-35, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-36, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-37, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-38, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-39, NA-312	QT,T,P,CS,A,QM

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-40, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-44, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-45, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-47, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-49, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-57, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGA-77, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGB-43, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGB-44, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 120, NGB-45, NA-312	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable Co.	Spec. No. 122, NGA-15	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGA-67	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGA-68	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGA-69	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGA-70	QT,T,P,CS,A,QM

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGB-35	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGB-39	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGB-40	QT,T,P,CS,A,QM
Cable	Boston Insulated Wire & Cable	Spec. No. 128, NGB-55	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 428, NGA-3, P.O. No. NA-375	QT,A,P,QM
Cable	Okonite	Spec. No. 428, NGA-4, P.O. No. NA-375	QT,A,P,QM
Cable	Okonite	Spec. No. 428, NGA-13, P.O. No. NA-375	QT,A,P,QM
Cable	Okonite	Spec. No. 428, NGA-14, P.O. No. NA-375	QT,A,P,QM
Cable	Okonite	Spec. No. 429, NGB-5, P.O. No. NA-384	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 429, NGB-7, P.O. No. NA-384	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 429, NGB-11, P.O. No. NA-384	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 429, NGB-12, P.O. No. NA-384	QT,T,P,CS,A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Cable	Cerro Wire & Cable	Spec. No. 430, NGA-67, P.O. No. NA-392	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable	Spec. No. 430, NGA-68, P.O. No. NA-392	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable	Spec. No. 430, NGA-70, P.O. No. NA-392	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable	Spec. No. 430, NGB-35, P.O. No. NA-392	QT,T,P,CS,A,QM
Cable	Cerro Wire & Cable	Spec. No. 430, NGB-39, P.O. No. NA-392	QT,T,P,CS,A,QM
Cable	Okonite	Spec. No. 431, NGB-01	QT,T,P,CS,A,QM
Motor Control Center	Klockner-Moeller	1-EP-MC-19	QT,A,QM
Motor Control Center	Klockner-Moeller	1-EP-MC-20	QT,A,QM
Motor Control Center	Klockner-Moeller	1-EP-MC-21	QT,A,QM
Motor Control Center	Klockner-Moeller	1-EP-MC-22	QT,A,QM
480V Switchgear	ITE Imperial Corporation	1-EE-SS-04	QT,A,QI,QM
480V Transformer	ITE Imperial Corporation	1-EE-ST-02	QT,A,QI,QM
Motor Control Center	Klockner-Moeller	2-EP-MC-19	QT,A,QM
Motor Control Center	Klockner-Moeller	2-EP-MC-20	QT,A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Control Center	Klockner-Moeller	2-EP-MC-22	QT,A,QM
Solenoid Operated Valve	ASCO	SOV-CC-100A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-100B	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-100C	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-101A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-101B	QT,T,P,H,CS,A, QM,R
Solenoid Operated Valve	ASCO	SOV-CC-102A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-102B	QT,T,P,CS,A, QM,R
Solenoid Operated Valve	ASCO	SOV-CC-102C	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-102D	QT,T,P,H,CS,A, QM,R
Solenoid Operated Valve	ASCO	SOV-CC-102E	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-102F	QT,T,P,H,CS, A,QM,R
Solenoid Operated Valve	ASCO	SOV-CC-103A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-103B	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-104A-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-104A-2	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-104B-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-104B-2	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-104C-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-CC-104C-2	QT,A,QM,RPS
Solenoid	ASCO	SOV-CC-105A	QT,T,P,H,CS, A,QM,R

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid	ASCO	SOV-CC-105B	QT,T,P,H,CS, A,QM,R
Solenoid	ASCO	SOV-CC-105C	QT,T,P,H,CS, A,QM,R
Solenoid Operator	ASCO	SOV-CV-150A	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-CV-150B	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-CV-150C	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-CV-150D	QT,A,QM,RPS
Level Transmitter	Rosemount	LT-1474	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1475	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1476	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1484	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1485	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1486	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1494	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1495	QT,T,P,H,CS, R,A,QM,RPN
Level Transmitter	Rosemount	LT-1496	QT,T,P,H,CS, R,A,QM,RPN
A/C Chiller	Westinghouse	1-HV-E-4A	QT,T,H,A,QM
A/C Chiller	Westinghouse	1-HV-E-4B	QT,T,H,A,QM
A/C Chiller	Westinghouse	1-HV-E-4C	QT,T,H,A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Propeller Fan	Aerovent Fan Co., Inc.	1-HV-F-24	QT,T,H,A,QM
Pump Motor	Bingham-Winiamette Co.	1-HV-P-20A	QT,T,H,A,QM
Pump Motor	Bingham-Winiamette Co.	1-HV-P-20B	QT,T,H,A,QM
Pump Motor	Bingham-Winiamette Co.	1-HV-P-20C	QT,T,H,A,QM
Pump Motor	Bingham-Winiamette Co.	1-HV-P-22A	QT,T,H,A,QM
Pump Motor	Bingham-Winiamette Co.	1-HV-P-22B	QT,T,H,A,QM
Pump Motor	Bingham-Winiamette Co.	1-HV-P-22C	QT,T,H,A,QM
Air Conditioning Self Cleaning Strainer	Elliot Co.	1-HV-S-1A	QT,T,H,A,QM
Air Conditioning Self Cleaning Strainer	Elliot Co.	1-HV-S-1B	QT,T,H,A,QM
Motor Operated Valve	Elliot Co.	MOV-HV-115-1	QT,T,H,A,QM
Motor Operated Valve	Elliot Co.	MOV-HV-115-2	QT,T,H,A,QM
Motor Operated Valve	Elliot Co.	MOV-HV-116-1	QT,T,H,A,QM
Motor Operated Valve	Elliot Co.	MOV-HV-116-2	QT,T,H,A,QM
Fan Motor	Westinghouse	1-HV-F-8A	QT,T,P,H,R,A, QM,RPN
Fan Motor	Westinghouse	1-HV-F-8B	QT,T,P,H,R,A, QM,RPN
Fan Motor	Westinghouse	1-HV-F-8C	QT,T,P,H,R,A, QM,RPN
Motor Operated Damper -Damper Operator	Honeywell	MOD-HV-163A	QT,T,P,A,QM,RPN
Motor Operated Damper -Damper Operator	Honeywell	MOD-HV-163B	QT,T,P,A,QM,RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Damper -Damper Operator	Honeywell	MOD-HV-163C	QT,T,P,A,QM,RPN
Temperature Switch	Honeywell	TS-HV-1230	QT,R,A,QM,QI
Axial Flow Fans	Jay Manufacturing Co.	I-HV-F-71A	QT,R,A,QM,RPN
Axial Flow Fans	Jay Manufacturing Co.	I-HV-F-71B	QT,R,A,QM,RPN
Solenoid Operated Damper	ASCO	SOV-HV-115B-1	QT,R,A,QM,RPS
Solenoid Operated Damper	ASCO	SOV-HV-115B-2	QT,R,A,QM,RPS
Hydrogen Recombiner	Rockwell International	1-HC-HC-1	QT,R,M,A,QM
Hydrogen Recombiner	Rockwell International	2-HC-HC-1	QT,R,M,A,QM
Hydrogen Analyzer	Bendix	H_2A-HC-100	QT,R,A,QM,RPS
Hydrogen Analyzer	Bendix	H_2A-HC-200	QT,R,A,QM,RPS
Pump Motor	GE	1-RS-P-1A	QT,T,P,CS,A,QM,S
Pump Motor	GE	1-RS-P-1B	QT,T,P,CS,A,QM,S
Level Transmitter	Delaval Turbine	LT-RS-151A	QT,T,P,C,M,A,QM,QI
Level Transmitter	Delaval Turbine	LT-RS-151B	QT,T,P,C,M,A,QM,QI
Solenoid Operated Valve	ASCO	SOV-IA-102A	QT,A,QM,R
Solenoid Operated Valve	ASCO	SOV-IA-102B	QT,A,QM,R
*Pressure Transmitter	Foxboro	PT-LM-100A	QT,A,QM,R
*Pressure Transmitter	Foxboro	PT-LM-100B	QT,A,QM,R

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

Equipment Description	Manufacturer	Component No.	Deficiency
*Pressure Transmitter	Foxboro	PT-LM-100C	QT,A,QM,R
*Pressure Transmitter	Foxboro	PT-LM-100D	QT,A,QM,R
Solenoid Operated Valve	ASCO	SOV-LM-100A	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100B	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100C	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100D	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100E	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100F	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100G	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-100H	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-101A	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-101B	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-101C	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-LM-101D	QT,R,A,QM,RPS
Flow Transmitter	Rosemount	FT-1474	QT,T,P,H,CS,R,A, QM,RPN
Flow Transmitter	Rosemount	FT-1475	QT,T,P,H,CS,R,A, QM,RPN
Flow Transmitter	Rosemount	FT-1484	QT,T,P,H,CS,R,A, QM,RPN
Flow Transmitter	Rosemount	FT-1485	QT,T,P,H,CS,R,A, QM,RPN
Flow Transmitter	Rosemount	FT-1494	QT,T,P,H,CS,R,A, QM,RPN
Flow Transmitter	Rosemount	FT-1495	QT,T,P,H,CS,R,A, QM,RPN

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

Equipment Description	Manufacturer	Component No.	Deficiency
*Pressure Transmitter	Foxboro	PT-1474	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1475	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1476	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1484	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1485	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1486	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1494	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1495	QT,A,QM,RPN,R
*Pressure Transmitter	Foxboro	PT-1496	QT,A,QM,RPN,R
Solenoid Operated Valve	ASCO	SOV-MS-101A-1	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101A-2	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101A-4	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101A-5	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101B-1	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101B-2	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101B-4	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101B-5	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101C-1	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101C-2	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101C-4	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-101C-5	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-109A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-109B	QT,A,QM,RPS

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

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid Operated Valve	ASCO	SOV-MS-111A	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-111B	QT,R,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-113A-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-113A-2	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-113B-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-113B-2	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-113C-1	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-MS-113C-2	QT,A,QM,RPS
Recirculation Spray Pump Motors	GE	1-RS-P-2A	QT,A,QM,QI
Recirculation Spray Pump Motors	GE	1-RS-P-2B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-RS-155A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-RS-155B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-RS-156A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-RS-156B	QT,A,QM
Solenoid Operator	ASCO	SOV-DA-100A	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-DA-100B	QT,A,QM,CS,R
Solenoid Operated Valve	ASCO	SOV-DG-100A	QT,A,R,QM
Solenoid Operated Valve	ASCO	SOV-DG-100B	QT,T,P,H,CS,A,R,QM
Solenoid Operator	ASCO	SOV-VG-100A	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-VG-100B	QT,T,P,H,CS,A,R,QM
Motor Operated Valve	Limitorque	MOV-QS-100A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-QS-100B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-QS-101A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-QS-101B	QT,A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid Operator	ASCO	SOV-RM-100A	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-RM-100B	QT,A,QM,RPS
Solenoid Valve	ASCO	SOV-RM-100C	QT,T,P,H,CS,A,R,QM
Solenoid Valve	ASCO	SOV-RM-100D	QT,A,QM,RPS
Motor Operated Valve	Limitorque	MOV-1380	T,CS,A,QI,QM
Level Transmitter	Barton	LT-1459	T,P,CS,A,QM,RPN
Level Transmitter	Barton	LT-1460	T,P,CS,A,QM,RPN
Level Transmitter	Barton	LT-1461	T,P,CS,A,QM,RPN
Level Transmitter	Barton	PT-1455	T,P,CS,A,QM,RPN
Level Transmitter	Barton	PT-1456	T,P,CS,A,QM,RPN
Level Transmitter	Barton	PT-1457	T,P,CS,A,QM,RPN
Solenoid Operated Valve	ASCO	SOV-1519	QT,R,A,QM,RPS
RTD	Rosemount	TE-1410	QT,M,T,CS,A,QM
Temperature Element	Rosemount	TE-1412B	QT,M,T,CS,A,QM,RPN
Temperature Element	Rosemount	TE-1412D	QT,M,T,CS,A,QM,RPN
RTD	Rosemount	TE-1413	QT,M,T,CS,A,QM,RPN
RTD	Rosemount	TE-1420	QT,M,T,CS,A,QM,RPN
Temperature Element	Rosemount	TE-1422B	QT,M,T,CS,A,QM,RPN
Temperature Element	Rosemount	TE-1422D	QT,M,T,CS,A,QM,RPN
RTD	Rosemount	TE-1423	QT,M,T,CS,A,QM,RPN
RTD	Rosemount	TE-1430	QT,M,T,CS,A,QM,RPN
Temperature Element	Rosemount	TE-1432B	QT,M,T,CS,A,QM,RPN
Temperature Element	Rosemount	TE-1432D	QT,M,T,CS,A,QM,RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Temperature Element	Rosemount	TE-1433	QT,M,T,CS,A,QM,RPN
Sump Pumps	Johnston Pump Company	1-DB-P-10A	QT,T,H,A,QM
Sump Pumps	Johnston Pump Company	1-DB-P-10B	QT,T,H,A,QM
Pump Motor	Westinghouse	1-SI-P-01A	QT,A,QM
Pump Motor	Westinghouse	1-SI-P-01B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1267A	QT,A,QM,T,P
Motor Operated Valve	Limitorque	MOV-1267B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1269A	QT,P,A,QM,QI
Motor Operated Valve	Limitorque	MOV-1269B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1270A	QT,T,P,A,QM
Motor Operated Valve	Limitorque	MOV-1270B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1836	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1860A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1860B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1862A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1862B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1863A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1863B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1864A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1864B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1869A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1869B	QT,A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	MOV-1885A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1885B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1885C	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1885D	QT,A,QM
Motor Operated Valve	Limitorque	MOV-1890A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-1890B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-1890C	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-1890D	QT,A,QM,QI
Solenoid Operator	ASCO	SOV-SI-100A	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-SI-100B	QT,A,QM,RPS
Solenoid Operator	ASCO	SOV-SI-101	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-1936	QT,T,P,H,CS,R,A, QM,RPS
Solenoid Operated Valve	ASCO	SOV-1842	QT,T,P,H,CS,R,A, QM,RPS
Solenoid Operated Valve	ASCO	SOV-1859	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-1884A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-1884B	QT,A,R,QM,RPS
Solenoid Operated Valve	ASCO	SOV-1884C	QT,A,R,QM,RPS
Solenoid	ASCO	SOV-SS-100A	QT,T,P,H,CS,A,R,QM
Solenoid	ASCO	SOV-SS-100B	QT,A,R,QM
Solenoid	ASCO	SOV-SS-101A	QT,T,P,H,CS,A,R,QM
Solenoid	ASCO	SOV-SS-101B	QT,A,R,QM
Solenoid	ASCO	SOV-SS-102A	QT,T,P,H,CS,A,R,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid	ASCO	SOV-SS-102B	QT,A,R,QM
Solenoid	ASCO	SOV-SS-103A	QT,A,R,QM
Solenoid	ASCO	SOV-SS-103B	QT,A,R,QM
Solenoid	ASCO	SOV-SS-104A	QT,T,P,H,CS,A,R,QM
Solenoid	ASCO	SOV-SS-104B	QT,A,R,QM
Solenoid	ASCO	SOV-SS-106A	QT,T,P,H,CS,A,R,QM
Solenoid	ASCO	SOV-SS-106B	QT,A,R,QM
Solenoid	ASCO	SOV-SS-112A	QT,T,P,H,CS,A,R,QM
Solenoid	ASCO	SOV-SS-112B	QT,A,R,QM
Pump Motor	Marathon Electric	1-SW-P-5	QT,R,A,QM,RPS
Pump Motor	Marathon Electric	1-SW-P-6	QT,R,A,QM,RPS
Pump Motor	Marathon Electric	1-SW-P-7	QT,R,A,QM,RPS
Pump Motor	Marathon Electric	1-SW-P-8	QT,R,A,QM,RPS
Motor Operated Valve	Limitorque	MOV-SW-101A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-101B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-101C	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-101D	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-103A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-103B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-103C	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-103D	QT,A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	MOV-SW-104A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-104B	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-104D	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-105A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-105B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-105C	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-105D	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-106A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-106B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-108A	QT,A,QM
Motor Operated Valve	Limitorque	MOV-SW-108B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-113A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-113B	QT,A,QM
Solenoid Operated Valve	ASCO	SOV-SW-101A-1	QT,A,R,QM
Solenoid Operated Valve	ASCO	SOV-SW-101A-2	QT,A,R,QM
Solenoid Operated Valve	ASCO	SOV-SW-101B-1	QT,A,R,QM
Solenoid Operated Valve	ASCO	SOV-SW-101B-2	QT,A,R,QM
Motor Operated Valve	Limitorque	MOV-SW-114A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-114B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-110A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-110B	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-210A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-210B	QT,A,QM,QI

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	MOV-SW-214A	QT,A,QM,QI
Motor Operated Valve	Limitorque	MOV-SW-214B	QT,A,QM,QI
Solenoid Operated Valve	ASCO	SOV-BD-100A	QT,A,QM,RPS
Solenoid Operated Valve	ASCO	SOV-BD-100B	QT,T,P,H,CS,A,QM,R
Solenoid Operated Valve	ASCO	SOV-BD-100E	QT,A,QM,R,RPS
Solenoid Operated Valve	ASCO	SOV-BD-100D	QT,T,P,H,CS,A,QM,R
Solenoid Operated Valve	ASCO	SOV-BD-100E	QT,A,QM,R,RPS
Solenoid Operated Valve	ASCO	SOV-BD-100F	QT,T,P,H,CS,A,QM,R
Solenoid Operated Valve	ASCO	SOV-BD-100G	QT,T,P,H,CS,A,QM,R
Solenoid Operated Valve	ASCO	SOV-BD-100H	QT,T,P,H,CS,A,QM,R
Solenoid Operated Valve	ASCO	SOV-BD-100J	QT,T,P,H,CS,A, QM,R

APPENDIX C

Equipment Considered Acceptable or
Conditionally Acceptable
(Category 4.3)

Equipment Description	Manufacturer	Component No.	Deficiency

No equipment in this category for North Anna Unit 1.

APPENDIX D

Safety-Related Systems List[1]

Function	System
Emergency Reactor Shutdown	Reactor Coolant
	Reactor Protection
	Safeguards Actuation
	Chemical and Volume Control
Containment Isolation	Main Steam Isolation
	Main Feedwater Isolation
	Containment Isolation
	Safety Injection
	Chemical and Volume Control
	Containment Spray
	Component Cooling Water
	Sampling
Reactor Core Cooling	Chemical Volume and Control
	Safety Injection
Containment Heat Removal	Containment Spray
	Recirculation Spray

[1]The NRC staff recognizes that there are differences in nomenclature of systems because of plant vintage and engineering design; consequently, some systems performing identical or similar functions may have different names. In those instances, it was necessary to verify the function of the system(s) with the responsible IE regional reviewer and/or the licensee.

Function	System
Core Residual Heat Removal	Main Feedwater
	Auxiliary Feedwater
	Main Steam
	Component Cooling Water
	Service Water
Prevention of Significant Release of Radioactive Material to Environment	Containment Air Purification/Cleanup
	Hydrogen Recombiners
	Containment Radiation Monitoring
	Containment Spray
Supporting Systems	Emergency Power
	Heating and Ventilation

ATTACHMENT 1

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 your 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-Duebilier 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. CDE 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 is 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

FOXBORO