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

SAFETY EVALUATION REPORT BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

EQUIPMENT QUALIFICATION BRANCH

FOR GEORGIA POWER COMPANY

HATCH UNIT 1

DOCKET NO. 50-321

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	4
	3.5 Submergence	5
	3.6 Chemical Spray	5
	3.7 Aging	5
	3.8 Radiation	6
4	Qualification of Equipment	6
	4.1 Equipment Requiring Immediate Corrective Action	7
	4.2 Equipment Requiring Additional Information and/or Corrective Action	7
	4.3 Equipment Considered Acceptable or Conditionally Acceptable	8
5	Deferred Requirements	9
6	Conclusions	9
APPENDIX A	Equipment Requiring Immediate Corrective Action	
APPENDIX B	Equipment Requiring Additional Information and/or Corrective Action	
APPENDIX C	Equipment Considered Acceptable or Conditionally Acceptable	
APPENDIX D	Safety-Related Systems List	

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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 August 22 and October 31, 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 Franklin Research Center performed a preliminary evaluation of the licensee's response, documented in a technical evaluation report (TER). The NRC Office of Inspection and Enforcement performed an onsite verification inspection (November 4-7, 1980) of selected safety-related electrical equipment. The residual heat removal, high pressure coolant injection, safeguard equipment emergency cooling, reactor building closed cooling water, and primary containment purge and inerting 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 50-321/80-43. No deficiencies were noted. For this review, the document referenced above has 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 662 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 for Hatch Unit 1, relative to the temperature and pressure 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	290	47	100
MSLB	(not provided)	(not provided)	100

The staff has concluded that the minimum temperature profile for equipment qualification purposes should include a margin to account for analytical uncertainties in the calculated temperature profiles for postulated accidents. A margin of 20°F above steam saturation temperature is considered to be appropriate 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 290°F does not satisfy the above requirement. The licensee should update his equipment summary tables to reflect a temperature margin of at least 20°F above steam saturation temperature. 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, humidity and applicable environment associated with an HELB outside containment. The following areas outside containment have been addressed:

(1) Floor elevation 130 ft, HPI
(2) Torus room, HPCI
(3) RWCU heat exchanger room
(4) RWCU pump room
(5) Reactor building floor elevation 158 ft
(6) Pipe penetration room
(7) RCIC corner room
(8) Floor elevation 185 ft
(9) Floor elevation 203 ft
(10) Pipe chase
(11) HVAC room floor elevation 164 ft

The staff has verified that the parameters identified by the licensee for the HELB 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 considered flooding inside and outside primary containment. Because all fluid drains to the suppression chamber, no flood level is assumed inside primary containment. Outside primary containment, a flood level of 102 ft 0 in. has been established for the torus chamber room. The licensee states that flooding annunciation in the main control room and sump pump capabilities are provided. Eleven items were identified as being below the flood level outside primary containment. The licensee has provided adequate justification for resolution of the submergence problem. The staff finds the resolutions acceptable.

3.6 Chemical Spray

The licensee stated that demineralized water was considered for components inside containment. A component was considered qualified if it had been tested with a water spray or harsh chemical. The staff finds this acceptable.

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 of 40 years at temperature was established. 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 5.1×10^7 rads. This value envelopes the DOR guideline requirements and is therefore acceptable.

A required value outside containment of greater than 1.52×10^6 rads has been used by the licensee to specify limiting radiation levels near the RHR system in the NE and SE corner rooms of the reactor 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 has not identified any equipment requiring immediate corrective action; therefore, no licensee event reports (LERs) were submitted. In addition, in this review, the staff has not identified any safety-related electrical equipment which is not able to perform its intended safety function during the time in which it must operate.

4.2 Equipment Requiring Additional Information and/or Corrective Action

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

Legend

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

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

(1) Equipment does not perform essential safety functions in the harsh environment, and equipment failure in the harsh environment will not impact safety-related functions or mislead an operator.

(2a) Equipment performs its function before its exposure to the harsh environment, and the adequacy for the time margin provided is adequately justified, and

(2b) Subsequent failure of the equipment as a result of the harsh environment does not degrade other safety functions or mislead the operator.

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

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

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

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

4.3 Equipment Considered Acceptable or Conditionally Acceptable

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

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

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

(2) establish an ongoing program to review the plant surveillance and maintenance records in order to identify equipment degradation which may be age related, and/or

(3) propose a maintenance program and replacement schedule for equipment identified in item 1 or equipment that is qualified for less than the life of the plant.

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

5 DEFERRED REQUIREMENTS

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

6 CONCLUSIONS

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

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

Subsection 4.2 identified deficiencies that must be resolved to establish the qualification of the equipment; the staff requires that the information lacking in this category be provided within 90 days of receipt of this SER. Within this period, the licensee should either provide documentation of the missing qualification information which demonstrates that such equipment meets the DOR guidelines or NUREG-0588 or commit to a corrective action (requalification, replacement, relocation, and so forth) consistent with the requirements to establish qualification by June 30, 1982. If the latter option is chosen, the licensee must provide justification for operation until such corrective action is complete.

Subsection 4.3 identified acceptance and conditional acceptance based on noted deficiencies. Where additional information is required, the licensee should

respond within 90 days of receipt of this SER by providing assurance that these concerns will be satisfactorily resolved by June 30, 1982.

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

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

(1) that there are no outstanding items which would require immediate corrective action to assure safety of plant operation

(2) some of the items found deficient have been or are being replaced or relocated, thus improving the facility's capability to function following a LOCA or HELB

(3) the harsh environmental conditions for which this equipment must be qualified result from low-probability events; events which might reasonably be anticipated during this very limited period would lead to less demanding service conditions for this equipment.

APPENDIX A

Equipment Requiring
Immediate Corrective Action
(Category 4.1)

Item	Equipment	Manufacturer	Model	Deficiency

No equipment was identified in this category.

APPENDIX B

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

LEGEND:

Designation for Deficiency

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

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	B21-MOV F016	A,QM
Motor Operated Valve	Limitorque	E11-MOV F009	A,QM
Motor Operated Valve	Limitorque	E11-MOV F022	A,QM
Motor Operated Valve	Limitorque	E41-MOV F002	A,QM
Motor Operated Valve	Limitorque	E51-MOV F007	A,QM
Motor Operated Valve	Limitorque	E51-MOV F008	QT,T,P,H,A,R,M, QM,QI
Motor Operated Valve	Limitorque	B21-MOV F019	QT,T,P,H,R,A,M, QM,QI

Equipment Description	Manufacturer	Component No.	Deficiency
Instrumentation Cable	Okonite	N1-4	QT,T,P,H,A,R,M, RPS
Instrumentation Cable	Okonite	H1-16	QT,T,P,H,A,R,M, RPS
Pressure Switch	Static-O-Ring	B21-PS N301B, D,G,H	QT,T,P,H,A,R,CS, M,QM,QI
Pressure Switch	Static-O-Ring	B21-PS N301A, F,J,K,L	QT,T,P,H,A,R,CS, M,QM,QI
Limit Switch	Micro Switch	B31-AOV F019	QT,T,P,H,A,R,CS, M,RPN
Pilot Solenoid	ASCO	B31-AOV F019	QT,T,P,H,A,R,CS, M,RPN
Pilot Solenoid	ASCO	P33-AOV F002	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P33-AOV F010	QT,T,P,H,A,R,M, RPN
Limit Switch	Micro Switch	B31-AOV F020	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	B31-AOV F020	QT,T,P,H,R,A,M, RPN
4 kV Switchgear	Westinghouse	RPT Switchgear	QT,T,P,H,R,A,M, QM
Radiation Sensor	Victoreen	D11-RE N003A,B	QT,T,P,R,H,CS,A, M,RPN
Cable	Victoreen	D11-RE N003A,B	QT,T,P,R,H,CS,A, M,RPN
Motor Operated Valve	Limitorque	E11-MOV F003A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F004A,B, C,D	A,QM
Motor Operated Valve	Limitorque	E11-MOV F006A,B, C,D	A,QM
Motor Operated Valve	Limitorque	E11-MOV F007A,B	A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	E11-MOV F011A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F026A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F047A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F048A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F068A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F103A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F104A,B	A,QM
Motor Operated Valve	Limitorque	E21-MOV F001A,B	A,QM
Motor Operated Valve	Limitorque	E21-MOV F015A,B	A,QM
Motor Operated Valve	Limitorque	E21-MOV F031A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F008	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	E11-MOV F010	A,QM
Motor Operated Valve	Limitorque	E11-MOV F024A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F027A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F040	A,QM
Motor Operated Valve	Limitorque	E11-MOV F075A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F091A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F140A,B	A,QM
Motor Operated Valve	Limitorque	E41-MOV F104	A,QM
Motor Operated Valve	Limitorque	E41-MOV F111	A,QM
Motor Operated Valve	Limitorque	E51-MOV F104	A,QM
Motor Operated Valve	Limitorque	E51-MOV F105	A,QM
Motor Operated Valve	Limitorque	P41-MOV F049	A,QM
Motor Operated Valve	Limitorque	P41-MOV F050	A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	E11-MOV F015A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F016A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F017A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F021A,B	A,QM
Motor Operated Valve	Limitorque	E11-MOV F023	A,QM
Motor Operated Valve	Limitorque	E11-MOV F028A,B	QT,T,P,A,M,QM, RPN
Motor Operated Valve	Limitorque	E11-MOV F049	QT,T,P,H,A,R,M, QM,QI
Motor Operated Valve	Limitorque	E51-MOV F013	QT,T,P,H,R,A,M, QM,QI
Solenoid Valve	ASCO	E11-AOV F051A,B	QT,T,P,H,R,A,M, RPN
Solenoid Valve	ASCO	E11-AOV F053A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	E11-AOV F065A,B, C,D	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	E21-AOV F019A,B	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	E41-AOV F051	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	E51-AOV F003	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F103	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F307	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F308	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F309	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F310	QT,T,P,H,R,A,M, RPS

Equipment Description	Manufacturer	Component No.	Deficiency
Limit Switch	NAMCO	T48-AOV F311	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F318	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F324	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F326	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F332A,B	QT,T,P,H,R,A,M, RPS
Limit Switch	NAMCO	T48-AOV F333A,B	QT,T,P,H,R,A,M, RPS
Pilot Solenoid	ASCO	E11-AOV F065A,B, C,D	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	E21-AOV F019A,B	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	E41-AOV F051	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	E51-AOV F003	QT,T,P,H,R,A,M, RPN
Pressure Switch	Static-O-Ring	E11-PS N017A,B	QT,A,M
Terminal Blocks	States	Type NT	S
Insulating Tape	Okonite	Terminal Tape	S
Protective Tape	Okonite	Jacketing Tape	S
Control Cable	Okonite	C4-14T	A,QM
Control Cable	Okonite	C9-14T	A,QM
Control Cable	Okonite	C2-9T	A,QM
Instrumentation Cable	Okonite	H1-16	QT,T,P,H,R,A,M, RPS
Terminal Connection	Burndy	PGG Terminal Connection	S

Equipment Description	Manufacturer	Component No.	Deficiency
Terminal Connection	Thomas & Betts	RB14-10X	QT,T,P,H,R,A,M, QM
Terminal Connection	Thomas & Betts	14RB10X	QT,T,P,H,R,A,M, QM
Wire and Cable Sleeves	Raychem	PVT Heat Shrink	A,QM
Wire and Cable Sleeves	Raychem	PWH Heat Shrink	A,QM
Motor Operated Valve	Limitorque	E21-MOV F004A,B	A,QM
Motor Operated Valve	Limitorque	E21-MOV F005A,B	A,QM
Limit Switch	NAMCO	E21-AOV F006A,B	QT,T,P,H,CS,A,R, M,RPN
Pilot Solenoid	ASCO	E21-AOV F006A,B	QT,T,P,H,CS,A,R, M,RPN
Pilot Solenoid	ASCO	E21-AOV F037A,B	QT,T,P,H,CS,A,R, M,RPN
Limit Switch	Unknown	E21-AOV F037A,B	QT,T,P,H,CS,A,R, M,RPN
Control Cable	Okonite	C7-14T	A,QM
Motor Operated Valve	Limitorque	E41-MOV F001	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	E41-MOV F008	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	E41-MOV F041	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	E41-MOV F042	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	E41-MOV F003	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	E41-MOV F004	A,QM
Motor Operated Valve	Limitorque	E41-MOV F007	A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	E41-MOV F006	QT,T,P,H,R,A,M, QM,QI
Pilot Solenoid	ASCO	E41-AOV F025	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	E41-AOV F026	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	E41-AOV F028	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	E41-AOV F029	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	E41-AOV F026	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	E41-AOV F028	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	E41-AOV F029	QT,T,P,H,R,A,M, RPN
Motor Operated Valve	Limitorque	E41-MOV F059	A,QM
DC Motor Starter	General Electric	R27-S035	A,R
DC Motor Starter	General Electric	R27-S036	QT,P,S,A,M
DC Motor Starter	General Electric	R27-S037	QT,P,S,A,M
Instrumentation Cable	Okonite	H 1-16	QT,T,P,H,R,A,M, RPN
Terminal Blocks	States	Type NT	A,QM
Insulating Tape	Okonite	Terminal Tape	S
Solenoid Valve	Valcor	E41-SV F121	QT,T,P,H,R,A,M, RPN
Solenoid Valve	Valcor	E41-SV F122	QT,T,P,H,R,A,M, RPN
Instrumentation Cable	Brand-Rex	M2-16	QT,T,P,H,R,A,M, RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Motor Operated Valve	Limitorque	E51-MOV F031	QT,T,P,H,R,A,M, QM,QI
Limit Switch	NAMCO	G11-AOV F003	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	G11-AOV F004	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	G11-AOV F019	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	G11-AOV F020	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	G11-AOV F003	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	G11-AOV F004	QT,T,P,H,R,A,M, RPN
Motor Operated Valve	Limitorque	G31-MOV F001	A,QM
Motor Operated Valve	Limitorque	G31-MOV F004	QT,T,P,H,R,A,M, QM,QI
Instrumentation Cable	Okonite	H1-16	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F002	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F003	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F010	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F011	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P33-AOV F033	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F113	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F114	QT,T,P,H,R,A,M, RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Limit Switch	Micro Switch	T48-AOV F115	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F116	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F321	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F322	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F325	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	T48-AOV F327	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F004	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F006	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F007	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F012	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F014	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P33-AOV F015	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P33-AOV F004	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P33-AOV F006	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P33-AOV F007	QT,T,P,H,A,R,M, RPN
Solenoid Valve	Target Rock	P33-SV F005A,B,C	QT,A,M
Pilot Solenoid	ASCO	P33-AOV F011	QT,T,P,H,A,R,M, RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Pilot Solenoid	ASCO	P33-A V F012	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P33-AOV F014	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P33-AOV F015	QT,T,P,H,A,R,M, RPN
H_2 + O_2 Analyzer	Hays	P33-P001A,B	QT,T,P,H,A,R,M, QM,QI
Pilot Solenoid	ASCO	P41-AOV F036A,B	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P41-AOV F037A,B, C,D	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P41-AOV F039A,B	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P41-AOV F040A,B	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	P41-AOV F035A,B	QT,T,P,H,A,R,M, RPN
Limit Switch	Unknown	P41-AOV F066	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P41-AOV F066	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P41-AOV F067	QT,T,P,H,R,A,M, RPN
Motor Operated Valve	Limitorque	P42-MOV F051	A,QM
Motor Operated Valve	Limitorque	P42-MOV F052	A,QM
Limit Switch	Micro Switch	P70-AOV F002	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P70-AOV F003	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P70-AOV F004	QT,T,P,H,R,A,M, RPN
Limit Switch	Micro Switch	P70-AOV F005	QT,T,P,H,R,A,M, RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Limit Switch	Micro Switch	T48-AOV F104	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P70-AOV F002	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P70-AOV F003	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P70-AOV F004	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	P70-AOV F005	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T41-AOV F011B	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T41-AOV F023A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T41-AOV F031A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T41-AOV F032A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T41-AOV F044A,B	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F334A,B	QT,T,P,H,A,M,RPN
Pilot Solenoid	ASCO	T48-AOV F335A,B	QT,T,P,H,A,M,RPN
Pilot Solenoid	ASCO	T41-AOV F011B	QT,T,P,H,A,M,RPN
Pilot Solenoid	ASCO	T41-AOV F023A,B	QT,T,P,H,A,M,RPN
Pilot Solenoid	ASCO	T41-AOV F031A,B	QT,T,P,H,A,M,RPN
Pilot Solenoid	ASCO	T41-AOV F032A,B	QT,T,P,H,A,M,RPN
Pilot Solenoid	ASCO	T41-AOV F044A,B	QT,T,P,H,A,M,RPN
Cooling Fan Motor	Joy/Reliance	T41-B004A,B	QT,S,M
Cooling Fan Motor	Joy/Reliance	T41-B002A,B	QT,S,M
Cooling Fan Motor	Joy/Reliance	T41-B003A,B	QT,S,M

Equipment Description	Manufacturer	Component No.	Deficiency
Cooling Fan Motor	Joy/Reliance	T41-B005,A,B	QT,S,M
Flow Switch	Dietz	T41-FS N002,A,B	QT,T,P,H,A,M,R, QM,QI
Flow Switch	Dietz	T41-FS N003,A,B	QT,T,P,H,A,M,R, QM,QI
Flow Switch	Dietz	T41-FS N004,A,B	QT,T,P,H,A,M,R, QM,QI
Flow Switch	Dietz	T41-FS N005,A,B	QT,T,P,H,A,M,R, QM,QI
Temperature Switch	Honeywell	T41-TIS N020A,B	QT,T,P,H,A,M,R, QM,QI
Temperature Switch	Honeywell	T41-TIS N021A,B	QT,T,P,H,A,M,R, QM,QI
Temperature Switch	Honeywell	T41-TIS N019A,B	QT,T,P,H,A,M,R, QM,QI
Temperature Switch	Honeywell	T41-TIS N022A,B	QT,T,P,H,A,M,R, QM,QI
Fan Motor	Joy/Reliance	T46-C001A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	Unknown	T46-AOV-F001A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	Unknown	T46-AOV-F002A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	Unknown	T46-AOV-F003A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	Unknown	T46-AOV-F004A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	Unknown	T46-AOV-F005	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T46-AOV-F001A,B	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T46-AOV-F002A,B	QT,T,P,H,R,A,M, RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Pilot Solenoid	ASCO	T46-AOV-F005	QT,T,P,H,R,A,M, RPN
Flow Switch	Micro Switch	T46-FS N011A,B	QT,T,P,H,R,A,M, QM,QI
Motor Operated Valve	Limitorque	T48-MOV F013A,B	QT,A,M
Pilot Solenoid	ASCO	T48-AOV F103	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F104	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F319	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F320	QT,T,P,H,A,R,M, RPN
Valve Hydraulic Operator	Fisher	T48-HOV F112A,B	QT,T,P,H,A,R,M, QM,QI
Pilot Solenoid	ASCO	T48-AOV F116	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F321	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F322	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F325	QT,T,P,H,A,R,M, RPN
Pilot Solenoid	ASCO	T48-AOV F327	QT,T,P,H,A,R,M, RPN
Solenoid Valve	Target Rock	T48-SV F118A,B	A,QM
Pilot Solenoid	ASCO	T48-AOV F307	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F308	QT,T,P,H,R,A,M, RPN

Equipment Description	Manufacturer	Component No.	Deficiency
Pilot Solenoid	ASCO	T48-AOV F309	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F318	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F310	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F311	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T48-AOV F319	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T48-AOV F320	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T48-AOV F334A,B	QT,T,P,H,R,A,M, RPN
Limit Switch	NAMCO	T48-AOV F335A,B	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F332A,B	QT,T,P,H,R,A,M, RPN
Pilot Solenoid	ASCO	T48-AOV F333A,B	QT,T,P,H,R,A,M, RPN
Solenoid Valve	Target Rock	T48-SV F338	A,QM
Solenoid Valve	Target Rock	T48-SV F339	A,QM
Solenoid Valve	Target Rock	T48-SV F340	A,QM
Solenoid Valve	Target Rock	T48-SV F341	A,QM
Power Supply	Brooks	T48-E/S K011A,B	QT,T,P,H,A,R,M, QM,QI
Flow Indication Transmitter	Brooks	T48-FIT N014A,B	QT,T,P,H,A,R,M, QM,QI
Differential Pressure Switch	Barksdale	T48-DPS N210	QT,T,P,H,A,R,M, QM,QI
Differential Pressure Switch	Barksdale	T48-DPS N211	QT,T,P,H,A,R,M, QM,QI

Equipment Description	Manufacturer	Component No.	Deficiency
Power Supply	G.E./MAC	T48-E/S K007A,B	QT,T,P,H,A,R,M, QM,QI
Power Supply	G.E./MAC	T48-E/S K008B	QT,T,P,H,A,R,M, QM,QI
Power Supply	G.E./MAC	T48-E/S K009B	QT,T,P,H,A,R,M, QM,QI
Power Supply	G.E./MAC	T48-E/S K019A,B	QT,T,P,H,A,R,M, QM,QI
Power Supply	G.E./MAC	T48-E/S K020A,B	QT,T,P,H,A,R,M, QM,QI
Pressure Transmitter	Rosemount	T48-PT N003A,B	QT,T,P,H,A,R,M, QM,QI
Pressure Transmitter	G.E./MAC	T48-PT N008B	QT,T,P,H,A,R,M, QM,QI
Pressure Transmitter	G.E./MAC	T48-PT N009B	QT,T,P,H,A,R,M, QM,QI
Level Transmitter	G.E./MAC	T48-LT N010A,B	QT,T,P,H,A,R,M, QM,QI
Pressure Transmitter	G.E./MAC	T48-PT N020A,B	QT,T,P,H,A,R,M, QM,QI
Level Transmitter	Rosemount	T48-LT N021A,B	QT,T,P,H,A,R,M, QM,QI
A.C. Motor Control Center	Allis Chalmers	R24-S011	A,R,QM
A.C. Motor Control Center	Allis Chalmers	R24-S012	A,R,QM
A.C. Motor Control Center	Allis Chalmers	R24-S013	A,R,QM
A.C. Motor Control Center	Allis Chalmers	R24-S018A	A,R,QM
A.C. Motor Control Center	Allis Chalmers	R24-S018B	A,R,QM

Equipment Description	Manufacturer	Component No.	Deficiency
D.C. Motor Control Center	Cutler Hammer	R24-S021	QT,T,R,A,M,QM, RPN
D.C. Motor Control Center	Cutler Hammer	R24-S022	A,R,QM
Electrical Penetration	General Electric	T52	CS,QM,A
Terminal Block	States	Type NT	A,QM
Dry Type Transformer	Sorgel	R11-S039	P,A
Dry Type	Sorgel	R11-S040	P,A
Terminal Block	States	Type NT (outside drywell)	A,QM
Power Cable	Okonite	A1-2508	A,QM
Power Cable	Okonite	B3-350A	A,QM
Power Cable	Okonite	B3-250A	A,QM
Power Cable	Okonite	B1-250	A,QM
Power Cable	Okonite	B3-2A	A,QM
Power Cable	Okonite	A1-03S	A,QM
Power Cable	Okonite	B22	A,QM
Power Cable	Okonite	B3-6A	A,QM
Power Cable	Okonite	B1-6	A,QM
Power Cable	Okonite	B3-9A	A,QM
Power Cable	Okonite	C1-02	A,QM
Power Cable	Okonite	C4-6T	A,QM
Power Cable	Okonite	C7-9T	A,QM
Power Cable	Okonite	C4-9T	A,QM
Power Cable	Okonite	D3-500A	A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Power Cable	Okonite	D1-02	A,QM
Power Cable	Okonite	D1-04	A,QM
Power Cable	Okonite	D1-6	A,QM
Power Cable	Okonite	B3-9A	A,QM
Power Cable	Okonite	N2-09	A,QM
Control Cable	Okonite	C2-12T	A,QM
Control Cable	Okonite	C4-12T	A,QM
Control Cable	Okonite	C7-12T	A,QM
Control Cable	Okonite	C7-14T	A,QM
Control Cable	Okonite	C4-14T	A,QM
Control Cable	Okonite	C2-14T	A,QM
Control Cable	Okonite	C4-16T	A,QM
Control Cable	Okonite	N2-5	A,QM
Control Cable	Okonite	C9-14T	A,QM
Control Cable	Okonite	C7-14T	A,QM
Control Cable	Okonite	N2-7	A,QM
Control Cable	Okonite	C4-14T	A,QM
Control Cable	Okonite	C2-14T	A,QM
Control Cable	Okonite	N2-5	A,QM
Instrumentation Cable	Boston Insulated Wire & Cable Co.	K1-01	T,QM
Control Cable	Boston Insulated Wire & Cable Co.	M27-16T	T,QM
Internal Panel Wiring	General Electric	14S1S Vulkene	A,QM
Internal Panel Wiring	Continental Wire & Cable	14S1S Anaconda	A,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Insulated Wire Splice	Thomas & Betts	T&B #2RB14	QT,T,P,H,R,A,QM
Insulated Wire Splice	Thomas & Betts	T&B #2RB14X	QT,T,P,H,R,A,QM
Insulated Wire Splice	Thomas & Betts	T&B #2RC10	QT,T,P,H,R,A,QM
Insulated Wire Splice	Thomas & Betts	T&B #2RC10X	QT,T,P,H,R,A,QM
Insulated Wire Splice	Thomas & Betts	T&B #RCC217-250	QT,T,P,H,R,A,QM
Insulated Wire Splice	Thomas & Betts	AMP #320562	QT,T,P,H,R,A,QM
Protective Tape	Okonite	Jacketing Tape	A,QM
Insulating Tape	Okonite	Insulating Tape	A,QM
Wire and Cable Sleeves	Raychem	PVT Heat Shrink	A,QM
Wire and Cable Sleeves	Raychem	PWH Heat Shrink	A,QM
Wire and Cable Sleeves	Raychem	PWB Heat Shrink	A,QM
Wire and Cable Sleeves	Raychem	PWI Heat Shrink	A,QM
Wire and Cable Sleeves	Raychem	PWJ Heat Shrink	A,QM
Wire and Cable Sleeves	Raychem	PWK Heat Shrink	A,QM
Insulated Terminal Connection	Thomas & Betts	T&B #RA18-10	QT,T,P,H,R,A, M,QM
Insulated Terminal Connection	Thomas & Betts	T&B #RA877-170	QT,T,P,H,R,A, M,QM
Insulated Terminal Connection	Thomas & Betts	T&B #RB14-10X	QT,T,P,H,R,A, M,QM

Equipment Description	Manufacturer	Component No.	Deficiency
Insulated Terminal Connection	Thomas & Betts	T&B #14RB10X	QT,T,P,H,R,A,M,QM
Insulated Terminal Connection	Thomas & Betts	T&B #RC364	QT,T,P,H,R,A,M,QM
Insulated Terminal Connection	Thomas & Betts	T&B #RC367-250	QT,T,P,H,R,A,M,QM
Insulated Terminal Connections	AMP Special Industries	AMP #53983-1	A,QM
Uninsulated Terminal Connections	Burndy	PGC Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGD Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGF Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGJ Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGK Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGL Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGN Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGP Terminal Conn.	QT,T,P,H,R,A,M,QM
Uninsulated Terminal Connections	Burndy	PGY Terminal Conn.	QT,T,P,H,R,A,M,QM
Control Switch	Electro Switch	C82 Control Switch	T,P,H,A,M,QM
Control Switch	Electro Switch	C82 Transfer Switch	T,P,H,A,M,QM
Limit Switch	NAMCO	B21-AOV F022A,B,C,D	A,QM,QI
Pilot Solenoid	AVCO	B21-AOV F022A,B,C,D	QT,T,P,H,A,R,M,RPN,CS

Equipment Description	Manufacturer	Component No.	Deficiency
Limit Switch	NAMCO	B21-AOV F028A C, C,D	A,QM,QI
Pilot Solenoid	AVCO	B21-AOV F028A,B, C,D	QT,T,P,H,A,R,M, RPN
Differential Pressure Indicator Switch	Barton	B21-DPIS N006A,B, C,D	A,T,P,QM,M
Differential Pressure Indicator Switch	Barton	B21-DPIS N007A,B, C,D	A,T,P,QM,M
Differential Pressure Indicator Switch	Barton	B21-DPIS N008A,B, C,D	A,T,P,QM,M
Differential Pressure Indicator Switch	Barton	B21-DPIS N009A,B, C,D	A,T,P,QM,M
Temperature Switch	Fenwall	B21-TS N010A,B,C,D	T,P,H,QM,M,A
Temperature Switch	Fenwall	B21-TS N011A,B,C,D	T,P,H,QM,M,A
Temperature Switch	Fenwall	B21-TS N012A,B,C,D	T,P,H,QM,M,A
Temperature Switch	Fenwall	B21-TS N013A,B,C,D	T,P,H,QM,M,A
Level Indicator Switch	Barton	B21-LIS N017A,B, C,D	QT,P,QM,A,M
Pressure Switch	Barksdale	B21-PS N021A,E	QT,P,QM,A,M
Pressure Switch	Barton	B21-PS N021B	QT,P,QM,A,M
Pressure Switch	Barton	B21-PS N021C	QT,T,P,QM,A,M
Pressure Switch	Barksdale	B21-PS N021D,F	QT,T,P,QM,A,M
Level Indicator Switch	Yarway	B21-LIS N024A,B	P,QM,A
Level Indicator Switch	Yarway	B21-LIS N025A,B	P,QM,A
Level Indicator Switch	Yarway	B21-LIS N031A,B, C,D	P,QM,A
Level Indicator Switch	Yarway	B21-LIS N042A,B	P,QM,A

Equipment Description	Manufacturer	Component No.	Deficiency
Level Indicator Switch	Yarway	B21-LITS N026A,B	QT,P,QM,A
Level Indicator Switch	Yarway	B21-LITS N036	QT,P,QM,A
Level Indicator Switch	Yarway	B21-LITS N037	QT,P,QM,A
Insulated Terminal Connector	AMP Special Industries	AMP #322238	QT,T,P,R,H,A,M, QM
Insulated Terminal Connector	AMP Special Industries	AMP #320863	QT,T,P,R,H,A,M, QM
Insulated Terminal Connector	AMP Special Industries	AMP #32060	QT,T,P,R,H,A,M, QM
Insulated Terminal Connector	AMP Special Industries	AMP #326869	QT,T,P,R,H,A,M, QM
Insulated Terminal Connector	AMP Special Industries	AMP #36160	QT,T,P,R,H,A,M, QM
Insulated Terminal Connector	AMP Special Industries	AMP #31903	QT,T,P,R,H,A,M, QM
Internal Panel Wire	General Electric	#14 SIS Vulkene	A,QM
Internal Panel Wire	Unknown	Instrument Cable	QT,T,P,H,R,A,M, QM
Pilot Solenoid	Target Rock	B21-AOV F013A,C,E, F,J,K,L	QT,CS,A,M
Motor Operated Valve	Limitorque	B31-MOV F031A,B	QT,T,P,H,CS,QM,QI
Solenoid Valve	ASCO	C11-SV D117	T,P,M,A
Solenoid Valve	ASCO	C11-SV D118	T,P,M,A
Solenoid Valve	ASCO	C11-SV F009	T,P,M,A
Pressure Switch	Static-O-Ring	C71-PS N002A,B,C,D	T,P,M,A,QM
Temperature Element	PYCO	G31-TE N023B,C,E,F	T,P,M,A,QM
Radiation Sensor	General Electric	D11-RE N022A	QT,T,P,H,R,A,M, QM,QI

Equipment Description	Manufacturer	Component No.	Deficiency
Radiation Sensor	General Electric	D11-RE N022B	QT,T,P,H,R,A,M, QM,QI
Pump Motor	General Electric	E11-C002A,B,C,D	QT,T,P,H,A,R,M, QM
Pump Motor	General Electric	211-C001A,B	QT,T,P,H,A,R,M, QM
Differential Pressure Transmitter	Rosemount	E11-DPT N002A,B	QT,T,P,H,A,R,M, QM
Pressure Switch	Static-O-Ring	E11-PS N010A,B,C,D	QT,P,A,M
Pressure Switch	Static-O-Ring	E11-PS N011A,B,C,D	QT,P,A,M
Pressure Switch	Barksdale	E11-PS N016A,C	QT,P,A,M
Pressure Switch	Barksdale	E11-PS N020A,C	QT,P,A,M
Pressure Switch	Static-O-Ring	E11-PS N016B,D	QT,P,A,M
Pressure Switch	Static-O-Ring	E11-PS N020B,D	QT,P,A,M
Differential Pressure Indicator Switch	Barton	E11-DPIS N021A	QT,T,P,H,R,A,M, QM,QI
Differential Pressure Indicator Switch	Barton	E21-DPIS N006A,B	QT,T,P,H,R,A,M, QM,QI
Pressure Switch	Static-O-Ring	E21-PS N008A,B	QT,A,M
Pressure Switch	Barksdale	E21-PS N009A,B	QT,A,M
Turbine	Terry	E41-C002	QT,T,P,H,R,A,M, QM
Motor Operated Valve	Limitorque	E41 MOV F012	QT,T,P,H,R,A,M, QM,QI
Pressure Switch	Barksdale	E41-PS N001A,B,C,D	QT,P,T,A,M
Pressure Switch	Barksdale	E51-PS N019A,B,C,D	QT,P,T,A,M
Pressure Switch	Barton	E51-DPIS N017	QT,T,P,A,M
Pressure Switch	Barton	E51-DPIS N018	QT,T,P,A,M

Equipment Description	Manufacturer	Component No.	Deficiency
Pressure Switch	Barton	E41-PS N004	QT,T,P,A,M
Pressure Switch	Barton	E41-PS N005	QT,T,P,A,M
Flow Switch	Barton	E41-FS N006	P,A,M
Flow Transmitter	Bailey Meter	E41-FT N008	P,A,M
Pressure Switch	Static-O-Ring	E41-PS N010	QT,P,A,M
Pressure Switch	Static-O-Ring	E41-PS N012A,B,C,D	QT,P,A,M
Level Switch	Robertshaw	E41-LS N015A,B	QT,T,P,H,A,R,M
Pressure Switch	Static-O-Ring	E41-PS N017A,B	QT,P,A,M
Pressure Switch	Barksdale	E41-PS N027	QT,P,A,M
Temperature Element	PYCO	E41-TE N028A,B	P,A,M
Temperature Element	PYCO	E41-TE N029A,B	P,A,M
Temperature Element	PYCO	E41-TE N030A,B	P,A,M
Temperature Element	PYCO	E41-TE N046A,B	P,A,M
Temperature Element	PYCO	E51-TE N021A,B	T,P,A,M
Temperature Element	PYCO	E51-TE N022A,B	T,P,A,M
Temperature Element	PYCO	E51-TE N023A,B	T,P,A,M
Temperature Element	PYCO	E51-TE N026A,C	T,P,A,M
Temperature Element	PYCO	E51-TE N025A,B,C,D	T,P,A,M
Internal Panel Wire	General Electric	#14SIS Vulkene	T,A,M
Pressure Switch	Barksdale	E51-PS N012A,B,C,D	T,P,A,M
Temperature Element	PYCO	E51-TE N027A,B,C,D	T,P,A,M
Flow Transmitter	G.E./MAC	G31-FT N012	T,P,A,M
Flow Transmitter	G.E./MAC	G31-FT N036	T,P,A,M
Flow Transmitter	G.E./MAC	G31-FT N041	T,P,A,M
Temperature Element	PYCO	G31-TE N016A,B,D,E	T,P,A,M

Equipment Description	Manufacturer	Component No.	Deficiency
Temperature Element	PYCO	G31-TE N022A,D	T,P,A,M
Temperature Element	PYCO	G31-TE N023A,D	T,P,A,M
Temperature Element	PYCO	G31-TE N016C,F	T,P,A,M
Temperature Element	PYCO	G31-TE N022B,C,E,F	T,P,A,M

APPENDIX C

Equipment Considered Acceptable
or Conditionally Acceptable
(Category 4.3)

LEGEND:

Designation for Deficiency

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

Equipment Description	Manufacturer	Component No.	Deficiency
Solenoid Valve	Target Rock	E11-SV F074A,B	A
A.C. Motor Switch	Allis-Chalmers	R27-S005	A
A.C. Motor Switch	Allis-Chalmers	R27-S006	A
Solenoid Valve	Target Rock	E41 SV F053	A
Control Cable	Okonite	C17	A
Temperature Element	PYCO	E51-TE N026B,D	A

APPENDIX D

Safety-Related Systems List[1]

Function	System
Emergency Reactor Shutdown	Reactor Protection Safeguards Actuation Control Rod Drive
Containment Isolation	Main Steam Reactor Recirculation Reactor Core Isolation Cooling Radwaste Reactor Water Cleanup Torus Drainage and Purification Reactor Building Closed Cooling Water Primary Containment Chilled Water Drywell Pneumatic Reactor Zone Ventilation Refueling Floor Ventilation Primary Containment Purge And Inerting Nitrogen Inerting Post LOCA Recombiner Primary Containment Isolation[2]
Reactor Core Cooling	Core Spray High Pressure Coolant Injection Low Pressure Coolant Injection (RHR) Automatic Depressurization
Containment Heat Removal	Residual Heat Removal (Torus Cooling Mode) Service Water Reactor Building Closed Cooling Water Primary Containment Chilled Water
Core Residual Heat Removal	Residual Heat Removal Reactor Core Isolation Cooling Service Water

[1]The NRC staff recognized that there are differences in nomenclature of 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 system(s) function with the responsible IE regional reviewer and/or the licensee.

[2]Includes isolation valves in other systems not given above.

Function	System
Prevention of Significant Release of Radioactive Material to Environment	Standby Gas Treatment Nitrogen Inerting System (CAD) Primary Containment Atmosphere H_2 and O_2 Analyzer Process Radiation Monitoring Primary Containment Purge
Supporting Systems	Safeguard Equipment Cooling Emergency Diesels Control Room Habitability