

SAFETY EVALUATION REPORT BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
EQUIPMENT QUALIFICATION BRANCH
FOR MAINE YANKEE ATOMIC POWER COMPANY
DOCKET NO. 50-309

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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 DCR guidelines and portions of NUREG-0538 (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 amendment 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 15, 1979 and June 2 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 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 (September 8-11, 1980) of selected safety-related electrical equipment. An inspection of equipment associated with the main steam system, high-pressure safety injection system, and containment spray system was conducted during the site visit. The inspection at the Maine Yankee plant 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 environmental qualification work sheets of the licensee's report. The site inspection is documented for the Maine Yankee plant in report IE 50-309/80-14. No deficiencies were noted. For this review, the documents referenced above have been factored into the overall staff evaluation.

3.1 Completeness of Safety-Related Equipment

In accordance with IEB 79-018, the licensee was directed to (1) establish a list of systems and equipment that are required to mitigate a LOCA and an HELB and (2) identify the most limiting environmental conditions the equipment may be exposed to and still be required to perform its safety function.

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 473 separate safety-related equipment items, 193 of which are required to perform a safety-related function in a LOCA or a HELB environment. The licensee provided a summary of the qualification documentation and methodology used to qualify safety-related equipment which is required to function in hostile environments. The remaining bulk of the safety-related equipment was not qualified to the hostile environments on the basis that it is:

- (1) required to function only in nonharsh environments, or
- (2) not required to function for any accident, or
- (3) not required to function for the accident producing the harsh environmental conditions.

Based on its review of the information provided by the licensee, the staff concludes that this information is incomplete. The licensee is asked to verify that failure of the equipment identified in the above categories would not be detrimental to safety as a result of a harsh environment. Failures of this equipment that could lead to disabling a safety function or provide incorrect information to the operator during accident mitigation should be addressed. In addition, the licensee's response did not identify or provide qualification documentation for cable splices or connectors, instrument and terminal box sealant material, and terminal and penetration connection boxes. The licensee is asked to provide this information or to justify exemption of this equipment from qualification on some other defined basis. Also, the licensee has excluded the following safety-related equipment:

- (1) pressurizer spray control valve
- (2) compressed air system

- (3) PORVs
- (4) containment air recirculation dampers.

The staff requires that the applicant justify excluding this equipment or modify the design accordingly.

Based on the staff review of the equipment and systems identified by the licensee and subject to the satisfactory resolution of the items identified above, the staff concludes that the systems identified by the licensee (listed in Appendix D) are acceptable, with the exceptions of those items discussed in Section 5 of this report.

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 the Maine Yankee plant, 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.

Equipment submergence has also been addressed where the possibility exists that flooding of equipment may result from HELBs.

3.3 Temperature, Pressure, and Humidity Conditions Inside Containment

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

	<u>Max Temp (°F)</u>	<u>Max Press (psig)</u>	<u>Humidity (%)</u>
LOCA	278	54	100
MSLB	340	43	100

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

The licensee's specified temperature (service condition) of 278°F does not satisfy the above requirement. A saturation temperature corresponding to the peak profile (302°F peak temperature at 54 psig) should be used instead. The

licensee should update his equipment summary tables to reflect this change. If there is any equipment that does not meet the staff position, the licensee must provide either justification that the equipment will perform its intended function under the specified conditions or propose corrective action.

3.4 Temperature, Pressure, and Humidity Conditions Outside Containment

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

- (1) Primary auxiliary building
- (2) Auxiliary feedwater pump area
- (3) Spray pump area
- (4) Steam and feedwater valve area
- (5) Turbine building

The licensee has used 205°F and ambient pressure conditions for areas outside containment. The staff considers saturation temperature at the peak pressure resulting from a HELB as the minimum level for acceptance. The licensee should update his summary tables to reflect this change. If there is any equipment that does not meet the staff position, the licensee must provide justification that the equipment will perform its intended function under saturation conditions or propose corrective action.

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 1.7 ft. Equipment below this level has been identified by the licensee, along with the proposed corrective action. The licensee identified seven safety-related electrical components as having the potential for becoming submerged after a postulated event. As a corrective action, the licensee proposes replacing these components; in some cases, the licensee is considering relocation of the components. Based on its review of the information submittals by the licensee, the staff concurs with the proposed resolution. However, because the licensee indicated, in part, that some of the above items complete their safety function before submergence, the staff requires that the licensee supplement this information and provide the time margins before submergence is assumed in his analysis for all the items identified; the licensee must also verify that subsequent failure of this equipment should not be detrimental to plant safety. Equipment failure which would result in incorrect information being provided to the operator should also be addressed.

The licensee identified the following two items as not subjected to submergence testing:

<u>Item</u>	<u>Manufacturer</u>	<u>Model</u>
PAM-5 level transmitter	GEMS	XM-36495
CVCS-1 motor operator	Limitorque	SMB-00

Based on its review of the information submitted, the staff concludes that the justification for not testing the equipment is incomplete in part. The staff requires that the licensee either verify that in the event the equipment is flooded, subsequent failure of the equipment would not be detrimental to safety, or modify the design accordingly. The licensee's response should include an assessment of equipment failure which results in incorrect information being provided to the operator. 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.

On the condition that the open items identified above are satisfactorily resolved, the staff concludes that the applicant's response satisfies the Commission requirements identified in IEB 79-01 and is acceptable. The staff will address the resolution of the items identified above in a supplement to this report.

3.6 Chemical Spray

The licensee's FSAR value for the chemical concentration is 1750 ppm boric acid solution at a pH of 9.5. During the review, the staff identified several items of equipment that were tested with caustic spray concentrations significantly less than that which may be used in the plant. The licensee is therefore required to justify the adequacy of this design on some defined basis or modify the design accordingly. The staff will review the applicant's response when it is submitted and present its resolution in a supplemental report.

3.7 Aging

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

- (1) Make a detailed comparison of existing equipment and the materials identified in Appendix C of the DOR guidelines. The first supplement to IEB-79-01B requires licensees to utilize the table in Appendix C and identify any additional materials as the result of their effort.
- (2) Establish an ongoing program to review surveillance and maintenance records to identify potential age-related degradations.
- (3) Establish component maintenance and replacement schedules which include considerations of aging characteristics of the installed components.

The licensee identified a number of equipment items for which a specified qualified life was established (for example, 7.7 years, 20 years, or 40 years). In its assessment of these submittals, the staff did not review the adequacy of the methodology nor the basis used to arrive at these values; the staff has assumed that the established values are based on state-of-the-art technology and are acceptable.

For this review, however, the staff requires that the licensee submit supplemental information to identify and verify the degree of conformance to the

above requirements. The response should include all the equipment identified as required to maintain functional operability in harsh environments.

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-79-018, Supplement 2. Therefore, for this review, the staff has assumed that, unless otherwise noted, the values provided have been determined in accordance with the prescribed criteria. The staff review determined that the values to which equipment was qualified enveloped the requirements identified by the licensee.

The value required by the licensee inside containment is between 1.1×10^6 to 1×10^8 rads for the integrated dose. These values do not envelope the OCR guideline requirements (4×10^7 rads) and therefore are not acceptable. The radiation service condition provided by the licensee is lower than provided in the guidelines for gamma and beta radiation. The licensee is requested to either provide justification for using the lower service condition or use the guidelines for both gamma and beta radiation. If the former option is chosen, then the analysis, including the basis and assumptions used in the analysis and a sample calculation, should be provided.

The licensee stated that the radiation doses to equipment in areas where radioactive fluids are recirculated from inside the containment for long-term core cooling have been calculated in accordance with IEB 79-01 Supplement 2 and the "For Comment" NUREG-0588. In addition, the licensee stated that because of preliminary results from recent HELB and heat-up studies, many areas previously believed to be nonharsh have now been determined to be harsh. The licensee is in the process of reevaluating the adequacy of the equipment qualification for these outside containment areas. The staff will review the licensee's resolution when it is submitted and discuss the evaluation in a supplemental report.

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 79-018, Supplement 3 has relaxed the time constraints for the submission of the information associated with cold shutdown equipment and TMI lessons-learned modifications. The staff has required that this information be provided by February 1, 1981. The staff will provide a supplemental safety evaluation addressing these concerns.

6 CONCLUSIONS

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

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

Subsection 4.2 identified deficiencies that must be resolved to establish the qualification of the equipment; the staff requires that the information lacking in this category be provided within 90 days of receipt of this SER. Within this period, the licensee should either provide documentation of the missing qualification information which demonstrates that such equipment meets the DCR guidelines or NUREG-0588 or commit to a corrective action (requalification, replacement, relocation, and so forth) consistent with the requirements to establish qualification of 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 action. 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 and HELB
- (3) the harsh environmental conditions for which this equipment must be qualified result from low-probability events; events which might reasonably be anticipated during this very limited period would lead to less demanding service conditions for this equipment.

APPENDIX A

Equipment Requiring
Immediate Corrective Action
(Category 4.1)

Equipment Description	Manufacturer	Component No.
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No equipment in this category for Maine Yankee.

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

Item	Equipment	Manufacturer	Model	Deficiency
CVCS-1	Motor Operator	Limitorque	SMB-00	R,CS,A
CAR-1	Fan Motor	Reliance	324308-1X,2X	CS,A
CS-1	Motor	Allis Chalmers	507-UP	R,T,QT,A,I
CS-2	Motor Operator	Limitorque	SMB-00	R,CS,I,A
RC-3,4	Motor Operator	Limitorque	SMB-000, SMB-08C	R,CS,I,A
EPS-1	Motor Control Center	Westinghouse	W	QM,QI,I,A

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
HPSI-1	Motor	Westinghouse	5089-S	T,I,A
HPSI-2	Motor Operator	Limitorque	SMB-0	R,I,A
HPSI-5	Flow Transmitter	Fischer & Porter	SMB-1	R,I,SEN,A
HPSI-6	Motor	General Electric	5K37JG403	T,QT,RT,A,I
HPSI-7	Motor	Westinghouse	7001,7002, 7003	T,QT,RT,A,I
HPSI-8	Pressure Switch	Fischer & Porter	1401V013-NS	R,QT,A,I,SEN
LPSI-4	Motor	Limitorque	SMB-1	R,CS,RT,M,CS,A
LPSI-5	Flow Transmitter	Fischer & Porter	1082496	QT,RT,A,I, QM,SEN
PAM-7	Pressure Transmitter	Fischer & Porter	50EP1070	A,I,SEN,QM
RC-6	Temperature Detector	Rosemount	104VC	R,T,CS,A,QM
RC-7	Control Cabinet	Westinghouse		T,QT,M,A,I
ELEC-4	Instrument Cable	Continental Wire	CC-2210(2230)	CS,A
ELEC-14	Terminal Block	Square D	1288-C19	R,T,QT,RT,P,H, CS,A,S,M,QM,I
ELEC-15	Press. Heater Power Cable	General Electric		R,T,QT,RT,P,H, CS,A,S,M,QM,I
RC-1	Pressure Transmitter	Fischer & Porter		SEN,QM,A
PAM-5	Pressure Transmitter	Fischer & Porter	50EP1041	SEN,QM,A
FW-1	Pressure Transmitter	Fischer & Porter	50EP1000	SEN,QM,A
FW-1	Level Transmitter	Fischer & Porter	1302495	SEN,QM,A
CVCS-2	Solenoid Valve	ASCO	EH8X8320	RPN,QM
CVCS-2	Solenoid Valve	ASCO	3311A31F	RPN,QM

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
CVCS-3	Solenoid Valve	ASCO	8311A31F	RPN,QM
CAAS-1	Solenoid Valve	ASCO	8311A31F	RPN,QM
FP-1	Solenoid Valve	ASCO	8311A31F	RPN,QM
HPSI-3	Solenoid Valve	ASCO	8311A31F	RPN,QM
HPSI-4	Solenoid Valve	ASCO	8311A31F	RPN,QM
LPSI-3	Solenoid Valve	ASCO	8311A31F	RPN,QM
PAM-6	Level Transmitter	GEM	XM-36495	CS,QT,A,S,M RPN
PCC-1	Solenoid Valve	ASCO	EHBX8320	RPN,QM
PS-1	Solenoid Valve	ASCO	EHBX8320	RPN,QM
PV-1	Solenoid Valve	ASCO	EHBX8320	RPN,QM
PV-2	Solenoid Valve	ASCO	EHBX8320	RPN,QM
ELEC-7	Terminal Block	Square D	1828-C19	R,T,QT,P,CS,QM, RPN,A
ELEC-8	Control Cable	Collyer	DE/PVC/PVC	T,QT,CS,S,QM, RPN
ELEC-13	Unit Switch	NAMCO	EA740-80,000	R,T,QT,CS,S,RPN
ELEC-16	Unit Switch	NAMCO	D2400X	RPN,QM
ELEC-17	Unit Switch	Micro-Switch	DTE-2RN2	RPN,QM
ELEC-19	Unit Switch	Micro-Switch	DTE-2RN2	RPN,QM
ELEC-6	Penetration Assembly	D.G. O'Brien		SEN,QM
ELEC-10	Control Cable	Collyer	DE/PVC/PVC	I,QM
PAM-1	Hydrogen Analyzer	COMSIP Inc	K-III	QM,QI,I
PAM-2	Radiation Detector	General Atomic	RD-23	QM,QI,I

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
PAM-8	Pressure Transmitter	Rosemount	11530	QM,QI,I
PAM-9	Acoustic Transmitter	Babcock & Wilcox		QM,QI
PAM-10	Acoustic Accelerometer	Babcock & Wilcox		QM,QI
PCC-2	Component Cooling Pumps	Allis-Chalmers	507-US	A,T,QT,RT,P, F,H,QM,I,QI
RC-5	Pressurizer Heater Dist. Cabinet	Westinghouse	EHB-3070	QM,QI,I
SCC-1	Component Cooling Pumps	Allis Chalmers	507-US	T,QT,A,I,QI
P-25A	Pump Motor	N/A	N/A	EXN
P-25C	Pump Motor	N/A	N/A	EXN
FT-1201A	Flow Transmitter	N/A	N/A	EXN
FT-1201B	Flow Transmitter	N/A	N/A	EXN
FT-1201C	Flow Transmitter	N/A	N/A	EXN
PI-1203B	Pressure Indicator	N/A	N/A	EXN
PI-1204B	Pressure Indicator	N/A	N/A	EXN
PI-1205B	Pressure Indicator	N/A	N/A	EXN
SOV-1102	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1106Y	Solenoid-Pilot Valve	N/A	N/A	EXN
PI-1203A	Pressure Indicator	N/A	N/A	EXN
PI-1204A	Pressure Indicator	N/A	N/A	EXN
PI-1205A	Pressure Indicator	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
HIC-1201A	Flow Controller	N/A	N/A	EXN
HIC-1201B	Flow Controller	N/A	N/A	EXN
HIC-1201C	Flow Controller	N/A	N/A	EXN
PI-1203C	Pressure Indicator	N/A	N/A	EXN
PI-1204C	Pressure Indicator	N/A	N/A	EXN
PI-1205C	Pressure Indicator	N/A	N/A	EXN
LI-1201	Level Indicator	N/A	N/A	EXN
LI-1202	Level Indicator	N/A	N/A	EXN
LI-1203	Level Indicator	N/A	N/A	EXN
LI-1204	Level Indicator	N/A	N/A	EXN
HCV-242	Valve-Motor Operator	N/A	N/A	EXN
SOV-201K	Solenoid-Pilot Valve	N/A	N/A	EXN
HCV-251	Valve-Motor Operator	N/A	N/A	EXN
HCV-251	Valve-Motor Operator	N/A	N/A	EXN
HVC-271	Valve-Motor Operator	N/A	N/A	EXN
SOV-257	Solenoid-Pilot Valve	N/A	N/A	EXN
FT-216	Flow Transmitter	N/A	N/A	EXN
FT-212	Flow Transmitter	N/A	N/A	EXN
SOV-212	Solenoid-Pilot Valve	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
HIC-212	Flow Controller	N/A	N/A	EXN
LT-207K	Level Transmitter	N/A	N/A	EXN
LS-207BK	Level Switch	N/A	N/A	EXN
LS-207CK	Level Switch	N/A	N/A	EXN
P-6A	Pump Motor	N/A	N/A	EXN
P-6B	Pump Motor	N/A	N/A	EXN
P-6C	Pump Motor	N/A	N/A	EXN
LCV-204V	Valve-Motor Operator	N/A	N/A	EXN
TK-201K	Temperature Controller	N/A	N/A	EXN
SOV-216	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-259K	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-206Q	Solenoid-Pilot Valve	N/A	N/A	EXN
LCV-204S	Valve-Motor Operator	N/A	N/A	EXN
LCV-204R	Valve-Motor Operator	N/A	N/A	EXN
SOV-101P	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-101Q	Solenoid-Pilot Valve	N/A	N/A	EXN
1AEB-A	Heat-Trace Breaker	N/A	N/A	EXN
6CH-A	Heat-Trace Breaker	N/A	N/A	EXN
1AEB-B	Heat-Trace Breaker	N/A	N/A	EXN
6CH-B	Heat-Trace Breaker	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
SOV-210Z	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-211	Solenoid-Pilot Valve	N/A	N/A	EXN
HCV-262	Valve-Motor Operator	N/A	N/A	EXN
HCV-252	Valve-Motor Operator	N/A	N/A	EXN
HVC-253	Valve-Motor Operator	N/A	N/A	EXN
SOV-2002	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-2006	Solenoid-Pilot Valve	N/A	N/A	EXN
PS-2012A	Pressure Switch	N/A	N/A	EXN
PS-2012B	Pressure Switch	N/A	N/A	EXN
PS-2012C	Pressure Switch	N/A	N/A	EXN
PS-2012D	Pressure Switch	N/A	N/A	EXN
PS-2003A	Pressure Switch	N/A	N/A	EXN
PS-2003B	Pressure Switch	N/A	N/A	EXN
PS-2003C	Pressure Switch	N/A	N/A	EXN
PS-2003D	Pressure Switch	N/A	N/A	EXN
PS-2033D	Pressure Switch	N/A	N/A	EXN
PS-2003E	Pressure Switch	N/A	N/A	EXN
PS-2009A	Pressure Switch	N/A	N/A	EXN
PS-2009B	Pressure Switch	N/A	N/A	EXN
PS-2009C	Pressure Switch	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
PS-2009D	Pressure Switch	N/A	N/A	EXN
PS-2009E	Pressure Switch	N/A	N/A	EXN
PS-2009F	Pressure Switch	N/A	N/A	EXN
PS-2010A	Pressure Switch	N/A	N/A	EXN
SOV-2003	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-2004	Solenoid-Pilot Valve	N/A	N/A	EXN
PS-2010B	Pressure Switch	N/A	N/A	EXN
PS-2010C	Pressure Switch	N/A	N/A	EXN
PS-2010D	Pressure Switch	N/A	N/A	EXN
PT-2012	Pressure Transmitter	N/A	N/A	EXN
PT-2013	Pressure Transmitter	N/A	N/A	EXN
TE-352K	Temperature Element	N/A	N/A	EXN
TE-353K	Temperature Element	N/A	N/A	EXN
MOV-3213	Valve-Motor Operator	N/A	N/A	EXN
MOV-3214	Valve-Motor Operator	N/A	N/A	EXN
PI-3201A	Pressure Indicator	N/A	N/A	EXN
PI-3201B	Pressure Indicator	N/A	N/A	EXN
PI-3201C	Pressure Indicator	N/A	N/A	EXN
LS-303AK	Level Switch	N/A	N/A	EXN
LS-303BK	Level Switch	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
LS-303CK	Level Switch	N/A	N/A	EXN
LS-304AK	Level Switch	N/A	N/A	EXN
LS-304BK	Level Switch	N/A	N/A	EXN
LS-304CK	Level Switch	N/A	N/A	EXN
SOV-3217A	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-3217B	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1211	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1221	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1231	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1212	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1222	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1232	Solenoid-Pilot Valve	N/A	N/A	EXN
RI-1801	Radiation Monitor	N/A	N/A	EXN
FN-7A	Fan Motor	N/A	N/A	EXN
FN-11A	Fan Motor	N/A	N/A	EXN
FN-44A	Fan Motor	N/A	N/A	EXN
FN-7B	Fan Motor	N/A	N/A	EXN
FN-11B	Fan Motor	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
FN-448	Fan Motor	N/A	N/A	EXN
FN-31	Fan Motor	N/A	N/A	EXN
AC-1A	Air Conditioner	N/A	N/A	EXN
AC-1B	Air Conditioner	N/A	N/A	EXN
MOV-6013	Valve-Motor Operator	N/A	N/A	EXN
MOV-6014	Valve-Motor Operator	N/A	N/A	EXN
MOV-6010	Valve-Motor Operator	N/A	N/A	EXN
MOV-6017	Valve-Motor Operator	N/A	N/A	EXN
MOV-6016	Valve-Motor Operator	N/A	N/A	EXN
PT-311	Pressure Transmitter	N/A	N/A	EXN
PT-321	Pressure Transmitter	N/A	N/A	EXN
PT-331	Pressure Transmitter	N/A	N/A	EXN
PT-312	Pressure Switch	N/A	N/A	EXN
PT-313	Pressure Switch	N/A	N/A	EXN
PS-322	Pressure Switch	N/A	N/A	EXN
PS-323	Pressure Switch	N/A	N/A	EXN
PS-332	Pressure Switch	N/A	N/A	EXN
PS-333	Pressure Switch	N/A	N/A	EXN
LT-311	Level Transmitter	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
LT-321	Level Transmitter	N/A	N/A	EXN
LT-331	Level Transmitter	N/A	N/A	EXN
LS-312	Level Switch	N/A	N/A	EXN
LS-313	Level Switch	N/A	N/A	EXN
LS-322	Level Switch	N/A	N/A	EXN
LS-323	Level Switch	N/A	N/A	EXN
LS-332	Level Switch	N/A	N/A	EXN
LS-333	Level Switch	N/A	N/A	EXN
PT-301	Pressure Transmitter	N/A	N/A	EXN
PT-303	Pressure Transmitter	N/A	N/A	EXN
HCV-204T	Valve-Motor Operator	N/A	N/A	EXN
HCV-204U	Valve-Motor Operator	N/A	N/A	EXN
MOV-3202	Valve-Motor Operator	N/A	N/A	EXN
MOV-3204	Valve-Motor Operator	N/A	N/A	EXN
MOV-3205	Valve-Motor Operator	N/A	N/A	EXN
MOV-3206	Valve-Motor Operator	N/A	N/A	EXN
PT-354K	Pressure Transmitter	N/A	N/A	EXN
HCV-312	Valve-Motor Operator	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
HCV-322	Valve-Motor Operator	N/A	N/A	EXN
HCV-332	Valve-Motor Operator	N/A	N/A	EXN
SOV-1001A	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001B	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001C	Solenoid-Pilot Valve	N/A	N/A	EXN
PT-1013A	Pressure Transmitter	N/A	N/A	EXN
PT-1013B	Pressure Transmitter	N/A	N/A	EXN
PT-1013C	Pressure Transmitter	N/A	N/A	EXN
PT-1013D	Pressure Transmitter	N/A	N/A	EXN
PT-1023A	Pressure Transmitter	N/A	N/A	EXN
PT-1023B	Pressure Transmitter	N/A	N/A	EXN
PT-1023C	Pressure Transmitter	N/A	N/A	EXN
PT-1023D	Pressure Transmitter	N/A	N/A	EXN
PT-1033A	Pressure Transmitter	N/A	N/A	EXN
PT-1033B	Pressure Transmitter	N/A	N/A	EXN
PT-1033C	Pressure Transmitter	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
PT-10330	Pressure Transmitter	N/A	N/A	EXN
SOV-2601	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-2602	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-2603	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001	Solenoid-Pilot Valve	N/A	N/A	EXN
RM-2601	Radiation Monitor	N/A	N/A	EXN
RM-2602	Radiation Monitor	N/A	N/A	EXN
RM-2603	Radiation Monitor	N/A	N/A	EXN
SOV-1001B	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001K	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001H	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001F	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001D	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001B	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001A	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001J	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001G	Solenoid-Pilot Valve	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
SOV-1001E	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001C	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1001A	Solenoid-Pilot Valve	N/A	N/A	EXN
MOV-3402	Valve-Motor Operator	N/A	N/A	EXN
MOV-3403	Valve-Motor Operator	N/A	N/A	EXN
MOV-3404	Valve-Motor Operator	N/A	N/A	EXN
MOV-3401	Valve-Motor Operator	N/A	N/A	EXN
MOV-3402	Valve-Motor Operator	N/A	N/A	EXN
TV-3417	Valve-Motor Operator	N/A	N/A	EXN
TV-3411	Valve-Motor Operator	N/A	N/A	EXN
TV-3413	Valve-Motor Operator	N/A	N/A	EXN
SOV-3506	Solenoid-Valve Operator	N/A	N/A	EXN
SOV-3507B	Solenoid-Valve Operator	N/A	N/A	EXN
SOV-3507A	Solenoid-Valve Operator	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
SOV-3302	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-3304	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-3001	Solenoid-Pilot Valve	N/A	N/A	EXN
T/C-S11	Thermocouple	N/A	N/A	EXN
T/C-E13	Thermocouple	N/A	N/A	EXN
T/C-G6	Thermocouple	N/A	N/A	EXN
T/C-T4	Thermocouple	N/A	N/A	EXN
HCV-113	Valve-Motor Operator	N/A	N/A	EXN
HCV-114	Valve-Motor Operator	N/A	N/A	EXN
HCV-115	Valve-Motor Operator	N/A	N/A	EXN
HCV-253	Valve-Motor Operator	N/A	N/A	EXN
SOV-3007	Solenoid-Pilot Valve	N/A	N/A	EXN
HCV-121	Valve-Motor Operator	N/A	N/A	EXN
HCV-122	Valve-Motor Operator	N/A	N/A	EXN
HCV-123	Valve-Motor Operator	N/A	N/A	EXN
HCV-124	Valve-Motor Operator	N/A	N/A	EXN
HCV-125	Valve-Motor Operator	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
HVC-126	Valve-Motor Operator	N/A	N/A	EXN
P-1-1	Pump Motor	N/A	N/A	EXN
P-1-2	Pump Motor	N/A	N/A	EXN
P-1-3	Pump Motor	N/A	N/A	EXN
POT-111A	Pressure Transmitter	N/A	N/A	EXN
POT-111B	Pressure Transmitter	N/A	N/A	EXN
POT-111C	Pressure Transmitter	N/A	N/A	EXN
POT-111D	Pressure Transmitter	N/A	N/A	EXN
POT-121A	Pressure Transmitter	N/A	N/A	EXN
POT-121B	Pressure Transmitter	N/A	N/A	EXN
POT-121C	Pressure Transmitter	N/A	N/A	EXN
POT-121D	Pressure Transmitter	N/A	N/A	EXN
POT-131A	Pressure Transmitter	N/A	N/A	EXN
POT-131B	Pressure Transmitter	N/A	N/A	EXN
POT-131C	Pressure Transmitter	N/A	N/A	EXN
POT-131D	Pressure Transmitter	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
PCV-101T	Valve-Motor Operator	N/A	N/A	EXN
PCV-101U	Valve-Motor Operator	N/A	N/A	EXN
TE-112CA	Temperature Element	N/A	N/A	EXN
TE-112CB	Temperature Element	N/A	N/A	EXN
TE-112CC	Temperature Element	N/A	N/A	EXN
TE-112CD	Temperature Element	N/A	N/A	EXN
TE-112HA	Temperature Element	N/A	N/A	EXN
TE-112HB	Temperature Element	N/A	N/A	EXN
TE-112HC	Temperature Element	N/A	N/A	EXN
TE-112HD	Temperature Element	N/A	N/A	EXN
TE-122CA	Temperature Element	N/A	N/A	EXN
TE-122CB	Temperature Element	N/A	N/A	EXN
TE-122CC	Temperature Element	N/A	N/A	EXN
TE-122CD	Temperature Element	N/A	N/A	EXN
TE-122HA	Temperature Element	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
TE-122HB	Temperature Element	N/A	N/A	EXN
TE-122HC	Temperature Element	N/A	N/A	EXN
TE-122HD	Temperature Element	N/A	N/A	EXN
TE-132CA	Temperature Element	N/A	N/A	EXN
TE-132CB	Temperature Element	N/A	N/A	EXN
TE-132CC	Temperature Element	N/A	N/A	EXN
TE-132CD	Temperature Element	N/A	N/A	EXN
TE-132HA	Temperature Element	N/A	N/A	EXN
TE-132HB	Temperature Element	N/A	N/A	EXN
TE-132HC	Temperature Element	N/A	N/A	EXN
TE-132HD	Temperature Element	N/A	N/A	EXN
TE-115X	Temperature Element	N/A	N/A	EXN
TE-115Y	Temperature Element	N/A	N/A	EXN
TE-125X	Temperature Element	N/A	N/A	EXN
TE-125Y	Temperature Element	N/A	N/A	EXN

APPENDIX B (Continued)

Item	Equipment	Manufacturer	Model	Deficiency
TE-135X	Temperature Element	N/A	N/A	EXN
TE-135Y	Temperature Element	N/A	N/A	EXN
MOV-701	Valve-Motor Operator	N/A	N/A	EXN
SOV-1724A	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1724B	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1725A	Solenoid-Pilot Valve	N/A	N/A	EXN
SOV-1725B	Solenoid-Pilot Valve	N/A	N/A	EXN
P-29A	Pump Motor	N/A	N/A	EXN
P-29B	Pump Motor	N/A	N/A	EXN
P-29C	Pump Motor	N/A	N/A	EXN
P-29D	Pump Motor	N/A	N/A	EXN

APPENDIX C

Equipment Considered Acceptable
or Conditionally Acceptable
(Category 4.3)

Item	Equipment	Manufacturer	Model	Deficiency
LPSI-1	Motor	Westinghouse	5885P24	A
RC-2	Level Transmitter	Rosemount	1153HA5	A
RC-2	Pressure Transmitter	Rosemount	1153GA9	A
ELEC-1	Power Cable	Cerro Wire	N/A	A
ELEC-2	Power and Control Cable	Anaconda	EPR/Hypalon	A
ELEC-3	Instrumentation Cable	Rockbestos Co.	Firewall III	A
ELEC-5	Terminal Block	General Electric	CR151B	A
ELEC-9	Power Cable	Okonite	Okonite/ Okoprene	A
ELEC-11	Power Cable	Okonite	EPR/Armor/PVC	A
ELEC-12	Power Cable	Anaconda	EPR/Neoprene	A
CVCS-2	Solenoid Valve	ASCO	NP-1	A
CVCS-3	Solenoid Valve	ASCO	NP-1	A
CAAS-1	Solenoid Valve	ASCO	NP-1	A
FP-1	Solenoid Valve	ASCO	NP-1	A
HPSI-3	Solenoid Valve	ASCO	NP-1	A
HPSI-4	Solenoid Valve	ASCO	NP-1	A
LPSI-3	Solenoid Valve	ASCO	NP-1	A

APPENDIX C (cont'd)

Item	Equipment	Manufacturer	Model	Deficiency
PCC-1	Solenoid Valve	ASCO	NP-1	A
PS-1	Solenoid Valve	ASCO	NP-1	A
PV-1	Solenoid Valve	ASCO	NP-1	A
PV-2	Solenoid Valve	ASCO	NP-1	A

APPENDIX D
Safety-Related Systems List¹
(Category 4.4)

Function	System
Emergency Reactor Shutdown	Reactor Coolant
	Chemical and Volume Control
	Reactor Protection ⁽¹⁾
	Safeguards Actuation ⁽¹⁾
Containment Isolation	Main Steam
	Main Feedwater
	High Pressure Injection
	Low Pressure Injection
	Containment Spray
	Residual Heat Removal
	Auxiliary Feedwater
	Component Cooling Water
Reactor Core Cooling	Primary Vent and Drain
	Low Pressure Safety Injection
	High Pressure Safety Injection
	Safety Injection Tanks

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

Note (1): Not specifically identified; components contained in several systems including the reactor coolant system.

APPENDIX D (Continued)

Function	System
Containment Heat Removal	Containment Spray Primary Containment Cooling Low Pressure Safety Injection
Core Residual Heat Removal	Power Operated Relief and Block Valves ⁽²⁾ Main Feedwater Auxiliary Feedwater Main Steam Steam Dump Component Cooling Water Service Water Low Pressure Safety Injection
Prevention of Significant Release of Radioactive Material to Environment	Containment Spray (Iodine Removal) Containment Comustible Gas Control ⁽²⁾ Post-Accident Monitoring ⁽²⁾ Primary Sampling Containment Air Activity Sampling
Supporting Systems	Emergency Power Heating, Ventilation, and Air Conditioning

Note (2): Covered as part of TMI-2 lessons learned.