



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

APR 3 1981

Docket No.: 50-369

Duke Power Company
ATTN: William O. Parker, Jr.
Vice President - Steam Production
P. O. Box 33189
Charlotte, North Carolina 28242



Dear Mr. Parker:

Subject: Environmental Qualification of Safety-Related Electrical
Equipment - Equipment Evaluation Report
(McGuire Nuclear Station, Unit 1)

In our letter to you dated February 24, 1981, we provided the results to date of our environmental qualification review for safety related electrical equipment. We neglected to indicate that the February 24, 1981 enclosure was considered to be a draft document and from that viewpoint should not have included Sections 1, 2, and 6. This matter was discussed by the staff at the recent McGuire ASLB hearing at which time the staff stated that we would provide you and the parties to the hearing a revised report which would be properly entitled Equipment Evaluation Report (enclosure) and only contain Sections 3, 4 and 5 (Tr. 4552). As stated at the hearing, this Report does not address the issue of equipment qualification for a postulated hydrogen burn (Tr. 4554-55). That issue was addressed during the course of the recently-completed hearing (Tr. 4554-55).

The enclosure provides the preliminary results of our review of environmental qualifications of safety-related electrical equipment at the McGuire Station. This evaluation was based on your submittals received over the past months.

You are requested to review our identified deficiencies, and their ramifications, and provide us, within 10 days of the date of this letter, your overall finding under oath or affirmation, supporting the safe operation of your facility with regard to compliance with General Design Criterion 4, that takes into account the NRC staff's preliminary list of deficiencies. Compliance with

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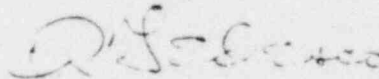
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GDC 4 must be established prior to the issuance of a full power operating license. Corrective action of the deficiency stated in Appendix A must be accomplished prior to power operation. A complete response to the enclosure including your detailed assessment of the indicated deficiencies will be required after the staff has issued its Safety Evaluation Report on Environmental Qualification.

In accordance with the guidance of the Commission's Memorandum and Order dated May 23, 1980, all electrical equipment subject to this review should be in compliance with NUREG-0588 no later than June 30, 1982.

Sincerely,



Robert L. Tedesco, Assistant Director
for Licensing
Division of Licensing

Enclosure:
Equipment Evaluation Report,
March 24, 1981

cc: See next page

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ENCLOSURE

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

FOR DUKE POWER COMPANY

McGUIRE UNIT 1

DOCKET NO. 50-369

EQUIPMENT EVALUATION REPORT BY THE
OFFICE OF NUCLEAR REACTOR REGULATION
EQUIPMENT QUALIFICATION BRANCH
FOR DUKE POWER COMPANY
McGUIRE UNIT 1
DOCKET NO. 50-369

3 STAFF EQUIPMENT EVALUATION

The staff evaluation of the licensee's response included an onsite inspection of selected Class IE equipment, audits of environmental qualification documentation, 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 an onsite verification inspection (April 30 through May 2, 1980) of selected safety-related electrical equipment. Selected components in the pressurizer, reactor coolant sample, containment pressure, and cabling systems were inspected at Unit 1. 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 50-369/80-7. No deficiencies were noted. For this review, the documents referenced above have been factored into the overall staff evaluation. NRR performed an audit on November 19 and 20, 1980 of environmental qualification documentation and/or test data for 11 items. No significant concerns were identified during the IE inspection or the NRR audits.

3.1 Completeness of Safety-Related Equipment

In accordance with IEB 79-01B and NUREG-0588, 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. However, the licensee did not include the main steam isolation system. The licensee should address or justify the omission of this system.

The staff therefore concludes that the systems identified by the licensee (listed in Appendix D) are acceptable, with the exception of those items noted above and discussed in Section 5 of this report.

The licensee identified 115 types of equipment items which were assessed by the staff.

3.2 Service Conditions

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

On this basis, the staff has assumed, unless otherwise noted, that the analysis for developing the environmental envelopes, relative to the temperature, pressure, and the containment spray caustics, has been performed in accordance with the requirements stated above. The staff has reviewed the qualification documentation to ensure that the qualification specifications envelope the conditions established by the licensee. In addition, the staff assumed, and requires the licensee to verify, that the containment spray system is not subjected to a disabling single-component failure.

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: Lower compartment	230	14.8	100
Upper compartment	180	14.8	100
MSLB: Lower compartment	327	not provided	100

The staff has concluded that there is reasonable assurance that the actual temperatures and pressures in the plant will not exceed the curves provided for locations anywhere within the containment for these postulated events. Margins for the test conditions are addressed in Section 3.9 of this evaluation.

The licensee's minimum temperature profile for qualification purposes is based on a conservative MSLB analytical model that results in temperatures higher than what might realistically be expected; it is therefore acceptable.

The licensee has not provided a temperature and pressure profile for MSLB accidents in the upper compartment. The staff will accept the same temperature profile used for LOCA conditions in the upper compartment. The licensee should either update his equipment summary tables to reflect this change or provide justification for not using this value. If the latter option is chosen then the licensee should provide the analysis--including the basis, assumptions, and the results in the form of temperature and pressure profile. If the licensee agrees with the staff's 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 area outside containment has been addressed:

(1) Auxiliary building

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

3.5 Submergence

The maximum submergence levels have been established and assessed by the licensee. Unless otherwise noted, the staff assumed for this review that the methodology employed by the licensee is in accordance with the appropriate criteria as established by Commission Memorandum and Order CLI-80-01.

The licensee's value for maximum submergence is 740 ft. 0 in. Equipment below this level has been identified by the licensee, along with some justification. The licensee identified 27 safety-related electrical equipment items as having the potential for becoming submerged after a postulated event.

In these cases, the licensee indicated that these components perform their function prior to submergence and are not required to operate after a LOCA. The licensee should provide an assessment of the failure modes associated with the submergence of these components. The licensee should also provide assurance that the subsequent failure of these components will not adversely affect any other safety functions or mislead an operator. Additionally, the licensee should discuss operating time, across the spectrum of events, in relation to the time of submergence. If the results of the licensee's assessment are acceptable, then these components may be exempt from the submergence parameter of qualification.

3.6 Chemical Spray

The licensee's FSAR value for the chemical concentration is 2000 ppm boric acid solution; the exact volume percent used by the vendor for qualification testing should be verified by the licensee. Therefore, for the purpose of this review, the effects of chemical spray will be considered unresolved. The staff will review the licensee's response when it is submitted and discuss the resolution in a supplemental report.

3.7 Aging

NUREG-0588 Category II delineates two aging-program requirements. Valve operators committed to IEEE Standard 382-1972 and motors committed to IEEE Standard 334-1971 must meet the Category I requirements of the NUREG. This requires the establishment of a qualified life, with maintenance/replacement schedules based on the findings. All other equipment must be subjected to an aging program which identifies aging-susceptible materials within the component. Additionally, the staff requires the licensee to

- (1) establish an ongoing program to review surveillance and maintenance records to identify potential age-related degradations
- (2) establish component maintenance and replacement schedules which include considerations of aging characteristics of the installed components

The licensee identified a number of equipment items for which a specified qualified life was established (for example, 5 years, 15 years, or 40 years). In its assessment of these submittals, the staff did not review the adequacy of the methodology nor the basis used to arrive at these values; the staff has assumed that the established values are based on state-of-the-art technology and are acceptable.

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

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 ranging from 4×10^5 to 1×10^8 rads. The radiation service condition provided by the licensee is lower (4×10^7 rads) than provided in the DOR guidelines for gamma and beta radiation. The licensee is requested to either provide justification for using the lower service condition or use the service condition provided in the DOR guidelines for both gamma and beta radiation. If the former option is chosen, then the analysis--including the basis, assumptions, and a sample calculation--should be provided.

A required value outside containment of 1×10^6 rads has been used by the licensee to specify limiting radiation levels for the annulus ventilation system fans in the auxiliary building. This value appears to consider the radiation levels influenced by the source term methodology associated with post-LOCA recirculation fluid lines and is therefore acceptable.

3.9 Margin

The staff in its review has determined that the licensee did not in all cases appropriately consider margin. Therefore, the licensee should review the margin requirements of NUREG-0588, Category II, and upgrade the environmental qualification submittal and component works sheets accordingly, or provide adequate justification for not considering margin.

4 QUALIFICATION OF EQUIPMENT

The following subsections present the staff's assessment, based on the licensee's submittal and staff audits, 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 identified one equipment type requiring

immediate corrective action; these items are solenoid valves. In Significant Deficiency Report SD 369/80-18, the licensee documented that the corrective action for these solenoid valves will be to replace their coils with a coil of a new design which will undergo qualification testing. The staff will review and evaluate the results of this qualification testing for the new coil design. With the exception of the above, 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

- (1) complete and document the equipment material review and evaluation 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.

APPENDIX A

Equipment Requiring Immediate Corrective Action (Category 4.1)

LEGEND:

Designation for Deficiency

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

Equipment Description	Manufacturer	Component No.	Deficiency
*Valve Solenoid Operator	VALCOR	V70900-21-1 V70900-21-3	T,H,A,M

*Items for which NRR conducted an audit of environmental qualification documentation

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

<u>Equipment Description</u>	<u>Manufacturer</u>	<u>Component No.</u>	<u>Deficiency</u>
Pressure Transmitters	Barton	Lot 2	CS,A,M
Level Transmitters	Barton	Lot 2	CS,A,M
Level Transmitters (NR)	Barton	Lot 2	CS,A,M
*Resistance Temperature Detectors (NR)	Rosemount	176KF	CS,A,M
*Resistance Temperature Detectors (WR)	Rosemount	176KS	CS,A,M
Hydrogen Recombiner	Westinghouse-Sturtevant	A	CS,A,M

*Items for which NRR conducted an audit of environmental qualification documentation

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Containment Air Return Fans	Joy/Reliance	2XF-330081	CS,A,M
*Hydrogen Skimmer Fans	Joy/Reliance	1YF-882315	CS,A,M
*Valve Motor Operators	Rotork	NA1	QT,A,CS,M
Valve Motor Operators	Limitorque	SMB	QT,A,CS,M
Valve Solenoid Operators	ASCO	NP8316E34E	CS,QT,A,M
Valve Solenoid Operators	ASCO	NP8316E36E	CS,QT,A,M
*Valve Solenoid Operators	Target Rock	77CC	CS,A,M
Containment Air Return Isolation Damper Motors	Rotork	11NAZ1	CS,A,M
Differential Pressure Switch	Solon	7PSIADW	CS,A,M
Electrical Penetrations	D.G. O'Brien	Types A,B,C,D,E,F, G,H,J,K,L,M	QT,CS,A,M
Control, Instrumentation and Power Cables	Okonite	EP Insulation	CS,A,M
Instrumentation Cables	Okonite	Tefzel 280 Insulation	QT,CS,A,M
*Control and Power Cables	Anaconda	EP and EP/Hypalon Insulation	CS,A,M
Control Cables	Brand Rex	XLPE Insulation	QT,CS,A,M
*Instrumentation Cables	Samuel Moore	EP/Hypalon Insulation	QT,CS,A,M
Cable Terminations/ Splices Material	Raychem	WCSF-N	QT,CS,A,M
*Cable Entrance Seals	3M Co.	XR-5240	QT,CS,A,M
Stem Mounted Limit Switches	NAMCO	EA-180 EA-740	QT,CS,A,M

*Items for which NRR conducted an audit of environmental qualification documentation

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Radiation Monitor	General Atomics	RD-23	T,P,H,R,A,C, QT,M,QM,QI
Radiation Monitor Cables	Rockbestos	RSS-6-104	T,P,H,R,A,CS, QT,M,QM,QI
Acoustic Monitor	TEC	914	T,P,H,A,R,CS, QT,QM,M,QI
Pump Motors	Westinghouse	72F44587-1S73	H,P,A,M,QM
Pump Motors	Westinghouse	72F44587-2S73	H,P,A,M,QM
Pump Motors	Westinghouse	72F44587-3S73	H,P,A,M,QM
Pump Motors	Westinghouse	72F44587-4S73	H,P,A,M,QM
Pump Motors	Westinghouse	72F44689-1S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44689-2S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44689-3S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44689-4S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44690-1S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44690-2S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44690-3S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44690-4S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F36530-1S75	R,H,A,M,QM,P
Pump Motors	Westinghouse	72F36531-1S75	R,H,A,M,QM,P
Pump Motors	Westinghouse	72L10936-1S75	R,H,A,M,QM,P
Pump Motors	Westinghouse	72L10937-1S75	R,H,A,M,QM,P
Pump Motors	Westinghouse	73F69618-1S75	H,A,M,QM,P
Pump Motors	Westinghouse	73F69618-2S75	H,A,M,QM,P

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Pump Motors	Westinghouse	73F69618-3S75	H,A,M,QM,P
Pump Motors	Westinghouse	73F69618-4S75	H,A,M,QM,P
Pump Motors	Westinghouse	72F44649-1S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44649-2S74	H,A,M,QM,P
Pump Motors	Westinghouse	72F44650-1S76	H,A,M,QM,P
Pump Motors	Westinghouse	72F44650-2S76	H,A,M,QM,P
Air Handling Unit	Reliance	3YF-882311	H,A,M,QM
Current/Voltage Alarm	Rochester Inst.	ET1215	R,H,P,A,M,QM, QT,QI
Fuse	Bussmann	FNA	R,H,P,A,M,QM, QT,QI
Fuse	Bussmann	KTK	R,H,P,A,M,QM
Fuseblock	Bussmann	3792	R,H,P,A,M,QM
Fuseblock	Bussmann	3839	R,H,P,A,M,QM
*Fuseblock	Bussmann	4439	R,H,P,A,M,QM
Fuseblock	Bussmann	4575	R,H,P,A,M,QM
Indicating Light	Cutler-Hammer	E29	R,H,P,A,M,QM
Optical Isolator	Electro-Max	175D123	R,H,P,A,M,QM
Power Supply	Lambda	LCS	R,H,P,A,M,QM, QT,QI
Relay	Cutler-Hammer	D23	R,H,P,A,M,QM
Relay	Cutler-Hammer	D26	R,H,P,A,M,QM
Relay	Struthers-Dunn	219	R,H,P,A,M, QM,T,

*Items for which NRR conducted an audit of environmental qualification documentation

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
Relay	Agastat	7000 Series	R,H,P,A,M, QM,T,QT
Resistor	Ohmite	Brown Devil	R,H,P,A,M, QM,T,QT
Surge Suppressor	General Semi-conductor	Tranzorb	R,H,P,A,M, QM
*Switch and Indicating Light	Cutler-Hammer	E30	R,H,P,A,M, QM
Switch	Cutler-Hammer	10250T	R,H,P,A,M, QM
Terminal Block	States	ZWM	R,H,P,A,M, QM
Terminal Block	Buchanan	Unknown	R,H,P,A,M, QM,QT
Valve Solenoid Operators	ASCO	NP8316E36E	QT,H,P,A, M,QM
Valve Motor Operators	Limiterque	SMB	H,P,A,M,QM
Valve Motor Operators	Rotork	NA1	H,P,A,M,QM
Valve Motor Operators	Rotork	NA2	H,P,A,M,QM
*Limit Switches	NAMCO	EA-170	T,H,P,A,M, QM
*Limit Switches	NAMCO	EA-180	QT,A,M
Valve Solenoid Operators	Valcor	V526 V573	QT,A,CS,M
Solenoid Valve	Powers	265-0002	R,A
Annulus Vent Fan Unit Control Panel	Unknown	Unknown	R,A

*Items for which NRR conducted an audit of environmental qualification documentation

APPENDIX B (Continued)

Equipment Description	Manufacturer	Component No.	Deficiency
AVFU Allison Control Panel	Unknown	Unknown	R,A
Temperature Controller	Love Controls	54	R,A
Temperature Controller	Love Controls	834	R,A
Temperature Controller	Love Controls	838	R,A
Temperature Controller	Love Controls	8134	R,A
Temperature Controller	Love Controls	8160	R,A
Temperature Controller	Love Controls	8165	R,A
Temperature Controller	Love Controls	8173	R,A
Temperature Controller	Love Controls	8174	R,A
Thermostat	United Electric	8006-6CS	R,A
RTD	Weed	101-1 2N-A-3-C-6-2-1	R,A
Differential Pressure Switch	Solon	7PS1DW	R,A
Differential Pressure Switch	Solon	7PS1ADW	R,A
Diesel Batteries	Nife	H1P-4	R,A

APPENDIX C

Equipment Considered Acceptable
or Conditionally Acceptable
(Category 4.3)

Equipment Description	Manufacturer	Component No.	Deficiency
Pump Motors	Westinghouse	71F13494-1S72	A
Pump Motors	Westinghouse	71F13494-2S72	A
Pump Motors	Westinghouse	71F13495-1S72	A
Pump Motors	Westinghouse	71F13495-2S72	A
Pump Motors	Allis-Chalmers	Unknown	A
Fan Motors	Reliance	2YF-273608	A
Fan Motors	Reliance	1YF-882812	A
Fan Motors	Reliance	1YF-273608	A
Fan Motors	Reliance	2YF-882311	A
600 Volt Load Centers	Could	K-Line	A
Motor Control Centers	Nelson Electric	Class 10350	A
Potential Transformers, RCP Switch Gear	Westinghouse	PTM-75	A
Motor Operated Dampers	Rotork	7A/3MW	A
Limit Switch	Micro Switch	LSM4N	A
Level Transmitters	Barton	386A	A

APPENDIX D
Safety-Related Systems List¹

Function	System
Emergency Reactor Shutdown	Reactor Coolant Reactor Protection Safeguards Actuation Chemical and Volume Control
Containment Isolation	Containment Isolation Main Feedwater Chemical and Volume Control Component Cooling Residual Heat Removal Auxiliary Feedwater Sampling Safety Injection
Reactor Core Cooling	Upper Head Injection Residual Heat Removal Accumulators Safety Injection Charging
Containment Heat Removal	Ice Condenser Containment Spray Residual Heat Removal
Core Residual Heat Removal	Residual Heat Removal Power Operated Relief Valves Main Feedwater Auxiliary Feedwater Component Cooling Water Service Water
Prevention of Significant Release of Radioactive Material to the Environment	Ice Condenser Hydrogen Recombiners Containment Radiation Sampling
Supporting Systems	Emergency Power Safety Equipment Area Ventilation Control Room Habitability

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.