DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

October 14, 1980

Mr. H. R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. B. J. Youngblood, Chief
Licensing Projects Branch No. 1

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: McGuire Nuclear Station
Docket No. 50-369 A

Dear Mr. Denton:

The attached information updates that provided in my letter of August 13, 1980. For convenience, the entire package of information has been resubmitted with revised material and pages marked Revision 1. This information constitutes Duke Power Company's response to NRC letters dated October 15, 1979 and February 15, 1980, concerning equipment qualifications.

This submittal includes:

1. Five copies of Information Related to Electrical Equipment Qualification (Proprietary).

2. Five copies of Information Related to Electrical Equipment Qualification (Non-Proprietary).

Also enclosed is:

1. One (1) copy of Westinghouse Affidavit, CAW-80-31 (Non-Proprietary).

As this submittal contains information proprietary to Westinghouse Electric Corporation, it is supported by an affidavit signed by Westinghouse, the owners of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations.

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Mr. H. R. Denton, Director
October 14, 1980
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Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations. Correspondence with respect to the proprietary aspects of this application for withholding or the supporting Westinghouse affidavit should reference CAW-80-31, and should be addressed to R. A. Wiesemann, Manager, Regulatory and Legislative Affairs, Westinghouse Electric Corporation, P. O. Box 355, Pittsburgh, Pennsylvania 15230.

Very truly yours,

William O. Parker, Jr.

William O. Parker, Jr. by WAH

GAC:scs
Attachments

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

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COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Robert A. Wiesemann, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Robert A. Wiesemann
Robert A. Wiesemann, Manager
Regulatory and Legislative Affairs

Sworn to and subscribed before me this 11 day of June 1980.

[illegible]
Notary Public

(1) I am Manager, Regulatory and Legislative Affairs, in the Nuclear Technology Division, of Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing or rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Water Reactor Divisions.

(2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Nuclear Energy Systems in designating information as a trade secret, privileged or as confidential commerical or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(g) It is not the property of Westinghouse, but must be treated as proprietary by Westinghouse according to agreements with the owner.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition in those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is appropriately marked information provided to Westinghouse utility customers in WCAP-9745 entitled "Results of Westinghouse Review of Environmental Qualification References for WRD Supplied Category II Equipment with Respect to the Staff Positions in NUREG-0588" for their use in responding to the NRC request to review their qualification programs against the standards established in NUREG-0588.

This information enables Westinghouse to:

(a) Develop test inputs and procedures to satisfactorily verify the design of Westinghouse supplied equipment.

(b) Assist its customers to obtain licenses.

Further, the information has substantial commercial value as follows:

(a) Westinghouse can sell the use of this information to customers.

(b) Westinghouse uses the information to verify the design of equipment which is sold to customers.

(c) Westinghouse can sell testing services based upon the experience gained and the test equipment and methods developed.

Public disclosure of this information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to design, manufacture, verify, and sell electrical equipment for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others having the same or similar equipment to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the equipment described in part by the information is the result of many years of development by Westinghouse and the expenditure of a considerable sum of money.

This could only be duplicated by a competitor if he were to invest similar sums of money and provided he had the appropriate talent available and could somehow obtain the requisite experience.

Further the deponent sayeth not.

McGuire Nuclear Station - Unit 1
Environmental Qualification of Class 1E Equipment

NRC letters dated October 15, 1979 and February 15, 1980 concerning the environmental qualification of Class 1E equipment defined the NRC Staff's requirements with respect to NUREG 0588, Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment. Basically, the Staff's requirements were as follows:

1) Provide a table listing by generic type all Class 1E equipment including the appropriate qualification data for the equipment. The format for this table was provided in the Staff's October 15, 1979 letter.

2) Review the adequacy of the environmental qualification for the equipment identified in Item 1 above with respect to the Staff's position described in NUREG 0588, document the degree of conformance, and justify any deviations.

Further, the NRC issued a Memorandum and Order on May 23, 1980 establishing NUREG 0588 as the requirement which applicants must meet in order to satisfy General Design Criterion 4 relating to the environmental qualification of Class 1E equipment.

In response to the NRC Staff's requests for information in this matter, Duke Power Company is providing the following:

Attachment 1 - Summary of Environmental Qualification of Class 1E Equipment Located Inside Containment

Attachment 2 - Summary of Environmental Qualification of Class 1E Equipment Located Outside Containment and Exposed to HELB Environment

Attachment 3 - Summary of Environmental Qualification of Class 1E Equipment Located Outside Containment and Exposed to the Post-LOCA Recirculation Radiation Environment 1

Attachment 4 - Duke Power Company Position on the Category II Guidelines of NUREG 0588

Attachment 5 - Comparison of the Environmental Qualification of Class 1E Equipment Located Inside Containment to the Duke Position on the Category II Guidelines of NUREG 0588

Attachment 6 - Comparison of the Environmental Qualification of Class 1E Equipment Located Outside Containment and Exposed to HELB Environment to the Duke Position on the Category II Guidelines of NUREG 0588

Attachment 7 - Comparison of the Environmental Qualification of Class 1E Equipment Located Outside Containment and Exposed to the Post-LOCA Recirculation Radiation Environment to the Duke Position on the Category II Guidelines of NUREG 0588 1

Attachments 1, 2, and 3 provide the tabular listing of Class 1E equipment exposed to a harsh environment and includes appropriate qualification data for the equipment. Attachments 4, 5, 6, and 7 document the degree of conformance of the equipment qualification programs with the Category II guidelines of NUREG 0588.

ATTACHMENT 1

SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED INSIDE CONTAINMENT

IPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	ACCIDENT ENVIRONMENT (2)	ENVIRONMENT TO WHICH QUALIFIED	ERABILITY QUIRED IN ACCIDENT ENVIRONMENT (3)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED (% of Span)	ACCURACY DEMONSTRATED (% of Span)	QUALIFICATION REPORT AND METHOD (4)
Transmitter - Pressurizer Pressure (Lower containment)	Barton	[ ] a,c	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $4X10^5$R Chem Spray: N/A	Temp: [ ] a,b,c Press: RH: Rad: Chem Spray: Boric acid and sodium hydroxide soln.	SI Initiation	5 minutes post DBE	+ 10%	[ ] a,b,c	NS-TMA-2184 Anderson to Stolz NS-TMA-2248 Anderson to Miller Method: Test
Transmitter - Pressurizer Level (Lower containment)	Barton	[ ] a,c	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $2.5X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: [ ] a,b,c Press: RH: Rad: Chem Spray: Boric acid and sodium hydroxide soln.	2 weeks post DBE	4 months post DBE	± 25%	[ ] a,b,c	NS-TMA-2184 Anderson to Stolz NS-TMA-2248 Anderson to Miller Method: Test
Transmitter - S/G Level (NR) (Lower containment)	Barton	[ ] a,c	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $4.3X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: [ ] a,b,c Press: RH: Rad: Chem Spray: Boric acid and sodium hydroxide soln.	Reactor trip plus 4 months post DBE	4 months post DBE	Trip Function: + 5% (5 min) PAM Function: ± 25% (4 mo)	[ ] a,b,c (Note 5)	NS-TMA-2184 Anderson to Stolz NS-TMA-2248 Anderson to Miller Method: Test
Transmitter - RCS Flow (Lower containment)	Veritrak	[ ] a,c	------------------	The RCS flow signals are not required for accidents that cause a change in the normal containment operating environment. ------------------					

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT

...IPMENT ...IFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	ACCIDENT ENVIRONMENT (2)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN ACCIDENT ENVIRONMENT (3)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED (% of Span)	ACCURACY DEMONSTRATED (% of Span)	QUALIFICATION REPORT AND METHOD (4)
RTD - RCS Temperature (NR) (Lower containment)	Rosemount	[ ] a,c	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $1X10^8$R Chem Spray: N/A	[ ] a,b,c Temp: Press: RH: Rad: Chem Spray: Boric acid and sodium hydroxide soln.	Reactor Trip (post SLB)	40 year life plus 1 hr post SLB (40 year life based on rad effects only)	± 0.2%	[ ] a,b,c	WCAP 9157 and Duke letter Parker to Denton dated December 19, 1979 Method: Test/Analysis
RTD - RCS Temperature (WR) (Lower containment)	Rosemount	[ ] a,c	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $1X10^8$R Chem Spray: Boric acid and sodium tetraborate soln.	[ ] a,b,c Temp: 332 F Press: RH: Rad: Chem Spray: Boric acid and sodium hydroxide soln.	2 weeks post SLB	11 year life plus 100 days post SLB (11 year life based on rad effects only)	± 0.2%	[ ] a,b,c	WCAP 9157 and Duke letter Parker to Denton dated December 19, 1979 Method: Comparison to Model 176 KF Test/Analysis
Excore Neutron Detectors (Power Range) (Lower containment)	W IGTD	[ ] a,c	------------------	The power range neutron detectors are not required for accidents that cause a change in the normal containment operating environment.					------------------
Electric Hydrogen Recombiner (Upper containment)	W Sturtevant	A	Temp: 180 F Press: 14.8 psig RH: 100% Rad: $8.1X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	[ ] a,b,c Temp: Press: RH: Rad: Chem Spray: Boric acid and sodium hydroxide soln.	3 months post DBE	1 year post DBE	N/A	N/A	WCAP 7820 and Supplements 1-4 WCAP 7709-L and Supplements 1-4 Method: Test
Containment Air Return Fan Motors (Upper containment)	Joy/Reliance	2XF-330081	Temp: 180 F Press: 14.8 psig RH: 100% Rad: $7.6X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 330 F Press: 85 psig RH: 100% Rad: $1X10^9$R Chem Spray: Boric acid and sodium hydroxide soln.	2 months post DBE	1 year post DBE	N/A	N/A	Test Report FF-14282 and Supplemental Technical Paper TA-4081 Test Report X-604 Test Report NUC-9 and Supplement 4/14/80 Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	ACCIDENT ENVIRONMENT (2)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN ACCIDENT ENVIRONMENT (3)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD (4)
Hydrogen Skimmer Fan Motors (Upper containment)	Joy/Reliance	1 YF-882315	Temp: 180 F Press: 14.8 psig RH: 100% Rad: $7.6X10^{7}R$ Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 330 F Press: 85 psig RH: 100% Rad: $1X10^{9}R$ Chem Spray: Boric acid and sodium hydroxide soln.	2 months post DBE	1 year post DBE	N/A	N/A	Test Report FF-14282 and Supplemental Technical paper TA-4081 Test Report X-604 Test Report NUC-9 and Supplement 4/14/80 Method: Test
Valve Motor Operators (Lower containment)	Rotork	7 NA1, 11 NA1, 14 NA1, 16 NA1, 30 NA1, 40 NA1, 70 NA1, 90 NA1	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $6.7X10^{7}R$ Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 340 F Press: 75 psig RH: 100% Rad: $2x10^{8}R$ Chem Spray: Boric acid and sodium hydroxide soln.	5 min (Notes 8 and 9)	30 days post DBE	N/A	N/A	Test Reports: N11/4, December 1970 TR 116, October 1973 TR 222, June 1975 Method: Test
Valve Motor Operators (Lower containment)	Limitorque	SMB	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $6.7X10^{7}R$ Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 340 F Press: 105 psig RH: 100% Rad: $2x10^{8}$ Chem Spray: Boric acid and sodium hydroxide soln.	5 min (Notes 8 and 9)	30 days post DBE	N/A	N/A	Test Report: 600-376-A September 1972 Test Report: 600-456 December 1975 Method: Test
Valve Solenoid Operators (Lower containment)	Valcor	V526 V573 V70900-21-1 V70900-21-3	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $1.8X10^{6}R$ Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 346 F Press: 113 psig RH: 100% Rad: $2x10^{8}R$ Chem Spray: Boric acid and sodium hydroxide soln.	Operate upon receipt of a safety signal	31 days post DBE	N/A	N/A	Test Reports QR-52600-515 and QR-70900-21-1 Method: Test
Containment Air Return Isolation Damper Motor (Upper containment)	Rotork	11NAZ1	Temp: 140 F Press: 14.8 psig RH: 100% Rad: $8.1X10^{5}R$ Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 340 F Press: 75 psig RH: 100% Rad: $2x10^{8}R$ Chem Spray: Boric acid and sodium hydroxide soln.	5 min (max) post DBE	30 days post DBE	N/A	N/A	Test Report N11/4 December 1970 Test Report TR116 October 1973 Method: Test

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	ACCIDENT ENVIRONMENT (2)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED ACCIDENT ENVIRONMENT (3)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD (4)
Valve Solenoid Operators (Lower containment)	Asco	NP8316E34E NP8316E36E	Temp: 327 F Press: 14.8 psig RH: 100% Rad: 1.8×10^6R Chem Spray: N/A	Temp: 346 F Press: 110 psig RH: 100% Rad: 2×10^8R Chem Spray: Boric acid and sodium hydroxide soln.	Operate upon receipt of a safety signal.	30 days post DBE	N/A	N/A	Test Report AQS21678/TR Method: Test
Valve Solenoid Operators	Target Rock	77CC Model	Temp: 327 F Press: 14.8 psig RH: 100% Rad: 5.7×10^7R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 385 F Press: 66 psig RH: 100% Rad: 1.3×10^8R Chem Spray: Boric acid and hydrozine	(Note 10)	14 days post DBE	N/A	N/A	Test Report 2375, 9/26/79 Method: Test
Differential Pressure Switch for Damper Control (Upper containment)	Solon	7PS1ADW	Temp: 140 F Press: 14.8 psig RH: 100% Rad: 8.1×10^5R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 150 F Press: 15 psig RH: 100% Rad: 1.1×10^6R Chem Spray: Boric acid and sodium tetraborate soln.	1 min post DBE	5 min post DBE	± 0.5 psig	± 0.3 psig	Test Report A293-80 Test Report A294-80 Method: Test
Electrical Penetrations (Lower containment)	D.G. O'Brien	Types A,B,C, D,E,F,G,H,J, K,L,M, and cathodic protection penetration (Note 11)	Temp: 327 F Press: 14.8 psig RH: 100% Rad: 8.5×10^7R Chem Spray: Boric acid and sodium tetraborate soln. (Note 12)	Temp: 340 F Press: 15 psig RH: 100% Rad: 2×10^8R Chem Spray: Boric acid and sodium hydroxide soln.	4 months post DBE	4 months post DBE	N/A	N/A	Test Reports ER-247, ER-252, and ER-227 Method: Test/Analysis
Cable - Control, Instrumentation, and 2 KV power (Lower containment)	Okonite	EP Insulation	Temp: 327 F Press: 14.8 psig RH: 100% Rad: 6.7×10^7R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 345 F Press: 104 psig RH: 100% Rad: 2×10^8R Chem Spray: Boric acid and sodium hydroxide soln.	30 days post DBE	130 days post DBE	N/A	N/A	Test Reports FN-1, N-1, G-3, 110E, and 141 Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED INSIDE CONTAINMENT

UIPMENT ENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	ACCIDENT ENVIRONMENT (2)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN ACCIDENT ENVIRONMENT (3)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD (4)
Cable - Instrumentation (Lower containment)	Okonite	Tefzel 280 Insulation	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $8.5X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 341 F Press: 112 psig. RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	4 months post DBE	120 days	N/A	N/A	Test Report R-0-1 (September 1979) Method: Test
Cable - Control and 2KV power (Lower containment)	Anaconda	EP Insulation and EP/Hypalon Insulation	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $8.1X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 346 F Press: 113 psig RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	3 months post DBE	4 months post DBE	N/A	N/A	Test Reports F-C4350-2 and F-C4350-3, and Supplement Method: Test
Cable - Control (Lower containment)	Brand Rex	XLPE Insulation	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $6.7X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 346 F Press: 113 psig RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	30 days post DBE	30 days post DBE	N/A	N/A	Test Report F-C4113 Method: Test
Cable - Instrumentation (Lower containment)	Samuel Moore	EP/Hypalon Insulation	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $6.7X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 340 F Press: 105 psig RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	30 days post DBE	30 days post DBE	N/A	N/A	Test Report F-C3683 Method: Test
Cable Termination/ Splice Material (Lower containment)	Raychem	WCSF-N Sleeves and Breakouts	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $8.5X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 357 F Press: 70 psig RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	4 months post DBE	4 months post DBE	N/A	N/A	Test Reports F-C4033-3 and 71100 Method: Test/Analysis

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	ACCIDENT ENVIRONMENT (2)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN ACCIDENT ENVIRONMENT (3)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD (4)
Stem-Mounted Limit Switches (Lower containment)	Namco	EA 180 EA 740	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $6.7X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 340 F Press: 63 psig RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	5 min (Note 9)	30 days post DBE	N/A	N/A	Namco Test Reports dated March 3, 1978 and February 22, 1979 Method: Test
Seal Material for Cable Entrance Fittings into Stem-Mounted Limit Switches (Lower containment)	3M	Scotch Cast 9 (XR-5240)	Temp: 327 F Press: 14.8 psig RH: 100% Rad: $6.7X10^7$R Chem Spray: Boric acid and sodium tetraborate soln.	Temp: 340 F Press: 15 psig RH: 100% Rad: $2x10^8$R Chem Spray: Boric acid and sodium hydroxide soln.	5 min (Note 9)	30 days post DBE	N/A	N/A	Test Report 44390-1, Rev. 4 Method: Test/Analysis
Containment Radiation Monitors-High Range (Lower Containment)	General Atomics	RD-23 Ionization Chamber	Temp: 327 F Press: 14.8 psig RH: 100% Rad: Note 15 Chem Spray: Boric acid and sodium tetraborate soln.	Note 13	Note 13	Note 13	Note 13	Note 13	Note 13
Cable for Containment Radiation Monitors - High Range (Lower Containment)	Rockbestos	RSS-6-104	Temp: 327 F Press: 14.8 psig RH: 100% Rad: Note 15 Chem Spray: Note 16	Note 13	Note 13	Note 13	Note 13	Note 13	Note 13
Safety Valve Position Indication-Acoustic Monitors (Lower Containment)	TEC	914	Temp: 327 F Press: 14.8 psig RH: 100% Rad: Note 15 Chem Spray: Boric acid and sodium tetraborate soln.	Note 14	Note 14	Note 14	Note 14	Note 14	Note 14

MCGUIRE NUCLEAR STATION - UNIT 1

ENVIRONMENTAL QUALIFICATION OF CLASS 1E
EQUIPMENT LOCATED INSIDE CONTAINMENT

Note 1

All equipment identified in this table is located inside the containment, specifically in the lower compartment except for the electric hydrogen recombiner, containment air return fan motors, hydrogen skimmer fan motors, containment air return isolation damper motors, differential pressure switches for damper control and cables associated with these devices which are located in the upper compartment.

Note 2

The parameters that compose the overall worst-case containment accident environment are as follows:

Temperature (Upper Compartment): 180F peak;time history as shown in FSAR Figure 6.2.1-24 (Rev 36).

Temperature (Lower Compartment): 327F peak;time history as shown in FSAR Supplement 1, Q042.73, Figure 7 Revision 39.

Pressure (Upper and Lower Compartment): 14.8 psig peak;time history as shown in FSAR Figure 6.2.1-23 (Rev. 36).

Relative Humidity: 100%

Radiation: Total integrated radiation dose for the equipment location includes 40 year normal operating dose plus the appropriate accident dose (except for the narrow-range and wide-range RTD's).

Chemical Spray: Boric acid and sodium tetraborate spray resulting from mixing in the containment sump of borated water from the RWST and sodium tetraborate solution from ice bed melt.

Note 3

Equipment operability requirements in the containment accident environment are as identified in FSAR Table 3.11.1-1 (Rev. 25).

Note 4

Environmental qualification test reports for the following equipment have previously been submitted to the NRC Staff:

- Transmitters-Barton (by Westinghouse)
- RTD's-Rosemount (by Westinghouse)
- Electric Hydrogen Recombiner (by Westinghouse)
- Containment Air Return Fan Motors (by Duke)
- Hydrogen Skimmer Fan Motors (by Duke)
- Solenoid Operators-Valcor (by Duke)
- Electric Penetrations (by Duke)
- Cable Termination/Splice Material (by Duke)
- Stem-Mounted Limit Switches (by Duke)
- Cable Entrance Seal Material (by Duke)

Note 5

A requirement for McGuire Unit 1 is to limit the positive error for the trip function of narrow-range steam generator level transmitters to +5%. The original Lot 2 report noted an error of [ ]%^{b,c,e} early in the steam test transient. Additional tests were performed on the same unit using [ ]^{b,c,e}. This caused the temperature of the [ ]^{b,c,e} more closely during the first minute and limited the positive error to less than [ ]%^{b,c,e}. In other words, the temperature difference between the [ ]^{b,c,e} has been reduced to a level compatible to McGuire Unit 1 functional requirements.

Note 6

Deleted

Note 7

Deleted

Note 8

Five minutes is adequate time to assure containment isolation and the required repositioning of other safety-related valves.

Note 9

During the 30 days following a postulated accident, the containment temperature and pressure will approach normal; therefore, additional service can reasonably be expected from this equipment.

Note 10

The Target Rock solenoid valves are used in the reactor head vent system to provide a path for removal of non-condensable gases. Core events leading to the generation of significant amounts of non-condensable gases occur early in the postulated accident sequences and are of short duration; therefore, these valves are only required to operate within the first few days of the accident. The need for venting non-condensable gases is not anticipated beyond the 14 day qualification of the valves.

Note 11

Electric penetration types B,C,F,G and K are the only penetrations required to function electrically in the containment accident environment. All electric penetrations, however, are designed and qualified to maintain their mechanical integrity under normal and postulated accident environmental conditions.

Note 12

The McGuire electric penetrations are protected from direct spray impingement by galvanized steel boxes.

Note 13

This equipment is being installed per NRC requirements stated in NUREG 0660. Qualification data will be provided by October 1, 1981 in accordance with the September 5, 1980 clarifications to the NUREG.

Note 14

This equipment is being installed per NRC requirements stated in NUREG 0660. Qualification testing for this equipment is scheduled for completion in December, 1980. The results of this testing will be provided upon receipt and review of the formal report by Duke Power Company.

Note 15

The radiation environment for this equipment is dependent on operating time in the accident environment. This information will be provided upon receipt and review of formal test reports by Duke Power Company.

Note 16

The cables for the containment radiation monitors (high range) which are located inside the containment are routed in conduit, and, therefore not exposed to chemical spray.

ATTACHMENT 2

SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

EQUIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
Containment Spray Pump - IA and IB Motors	Westinghouse, Buffalo	73F56019-1573 73F56019-2573 73F56019-3573 73F56019-4573 (Note 3)	. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Residual Heat Removal Pump IA and IB Motors	Westinghouse, Buffalo	71F13454-1572 71F13454-2572 71F13495-1572 71F13495-2572 (Note 3)	. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Safety Injection Pump IA and IB Motors	Westinghouse, Buffalo	73F69618-1575 73F69618-2575 73F69618-3575 73F69618-4575 (Note 3)	Temp: 212 F	Temp: 212 F	Continuous	Continuous	NA	NA	WCAP 8754 and Duke analyses on Westinghouse Testing: MCC 1381.05-00-0101 MCC 1381.05-00-0102 Method: Test and Analysis
Centrifugal Charging Pump IA and IB Motors	Westinghouse, Buffalo	72F44587-1573 72F44587-2573 72F44587-3573 72F44587-4573 (Note 3)	Temp: 212 F	Temp: 212 F	Continuous	Continuous	NA	NA	WCAP 8754 and Duke analyses on Westinghouse Testing: MCC 1381.05-00-0101 MCC 1381.05-00-0102 Method: Test and Analysis
Nuclear Service Water Pump IA and IB Motors	Westinghouse, Buffalo	72F36530-1575 72F36531-1575 72L10936-1575 72L10937-1575 (Note 3)	Temp: 212 F	Temp: 212 F	Continuous	Continuous	NA	NA	WCAP 8754 and Duke analyses on Westinghouse Testing: MCC 1381.05-00-0101 MCC 1381.05-00-0102 Method: Test and Analysis
Ground Water Drain Sump Pump	Reliance	2Y-273734	. . . . . The change in ground water sump level is gradual enough to allow repair or replacement of the pump motor after the environment has returned to normal						Duke Report: MDS/PDG-77-1

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

UIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
Component Cooling Pump 1A1, 1A2, 1B1 and 1B2 Motors	Westinghouse, Buffalo	72F44689-1574 72F44689-2574 72F44689-3574 72F44689-4574 72F44690-1574 72F44690-2574 72F44690-3574 72F44690-4574 (Note 3)	Temp: 212 F	Temp: 212 F	Continuous	Continuous	NA	NA	WCAP 8754, and Duke analysis on Westinghouse testing: MCC 1381.05-00-0101 MCC 1381.05-00-0102 Method: Test and Analysis
Boric Acid Transfer Pump 1A and 1B Motors	Chempump/ Westinghouse	Chempump Model GVH-10K-12H-1S	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Boron Injection Recirc Pump 1A and 1B Motors	Chempump/ Westinghouse	Chempump Model GVH-3K-751H-1S	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Spent Fuel Cooling Pump 1A and 1B Motors	Westinghouse, Buffalo	72F44649-1574 72F44649-2574 72F44650-1576 72F44650-2576 (Note 3)	Temp: 132.4 F	Temp: 145 F	Continuous	Continuous	NA	NA	WCAP 8754, and Duke analysis on Westinghouse testing: MCC 1381.05-00-0101 Method: Test and Analysis
Residual Heat Removal Air Handling Unit	Reliance	2YF-882311	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Containment Spray Air Handling Unit	Reliance	1YF-882311	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Fuel Pool Air Handling Unit	Reliance	3YF-882311	Temp: 132.4 F	Temp: 150 F	Continuous	Continuous	NA	NA	M L Ward letter to file MCM 1320.00 dated 7/17/80 Method: Analysis

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

EQUIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
TERMINATION BOXES									
TB 108 - Limiting Component: Surge Suppressor	General Semiconductor	Tranzorb	Temp: 212 F	Temp: 302 F	Continuous	Continuous	NA	NA	Duke Component/ Material Documentation Form Std. Stock #111 C-1 Method: Analysis
TB 109 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 203.5 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 111 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 113 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 Letter from Robert W. Chapman & Co. Method: Test
TB 145 - Limiting Component: Surge Suppressor	General Semiconductor	Tranzorb	Temp: 203.5 F	Temp: 302 F	Continuous	Continuous	NA	NA	Duke Component/ Material Documentation Form Std. Stock #111 C-1 Method: Analysis
TB 146 - Limiting Component: Surge Suppressor	General Semiconductor	Tranzorb	Temp: 132.4 F	Temp: 302 F	Continuous	Continuous	NA	NA	Duke Material/ Component Documentation Form Std. Stock #111 C-1 Method: Analysis
TB 147 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 208.7 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

...ENT ...IFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
...RMINATION BOXES (Cont'd)									
TB 148 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 208.7 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 149 - Limiting Component: Sliding Link Terminal Block	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 150 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 182 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 183 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 184 - Limiting Component: Surge Suppressor	General Semiconductor	Tranzorb	Temp: 212 F	Temp: 302 F	Continuous	Continuous	NA	NA	Duke Material/ Component Documentation Form Std. Stock #111 C-1 Method: Analysis
TB 185 - Limiting Component Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test

McGUIRE NUCLEAR STATION - UNIT I
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

[illegible]HT [illegible]ICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
TERMINATION BOXES (Cont'd)									
TB 188 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 189 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 192 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 196 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 201 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 205 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
TB 211 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman $ Co. Method: Test
TB 212 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

EQUIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
TERMINATION BOXES (Cont'd)									
TB 224 - Limiting Component: Fuseblock	Bussman	3792	Temp: 132.4 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
TB 225 - Limiting Component: Fuseblock	Bussman	3792	Temp: 132.4 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
TB 238 - Limiting Component: Fuseblock	Bussman	3792	Temp: 132.4 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
TB 239 - Limiting Component: Fuseblock	Bussman	3792	Temp: 132.4 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
TB 260 - Limiting Component: Relays	Cutler-Hammer	D26	Temp: 130 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 366 - Limiting Component: Switches and Ind. Lights	Cutler-Hammer	E30	Temp: 212 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 408 - Limiting Component: 1) Relays 2) Switches & Ind. Lights	Cutler-Hammer	1) D23 2) E30	Temp: 212 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 415 - Limiting Component: Fuseblocks	Bussman	3792	Temp: 132.4 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
TB 416 - Limiting Component: Fuseblock	Bussman	3792	Temp: 132.4 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

...UIPMENT ...NTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
TERMINATION BOXES (Cont'd)									
TB 442 - Limiting Components: 1) Relays 2) Switches & Ind. Lights	1) Cutler-Hammer 2) Cutler-Hammer	1) D23 2) E29 & 10250T	Temp: 240 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 443 - Limiting Components: 1) Relays 2) Switches & Ind. Lights	1) Cutler-Hammer 2) Cutler-Hammer	1) D23 2) E29 & 10250T	Temp: 240 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 489 - Limiting Component: Relay	Cutler-Hammer	D26	Temp: 132.4 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 490 - Limiting Component: Analog Optical Isolator	Electro Max	175D123	Temp: 132.4 F	Temp: 140 F	Continuous	Continuous	NA	NA	Specified in Manuals CNM 1338.00-002 CNM 1338.00-003
TB 491 - Limiting Component: Relay	Cutler-Hammer	D26	Temp: 132.4 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Production Qualification & Test Facility Report TR-010 Method: Test
TB 496 - Limiting Component: Fuseblocks	Bussman	1) 3792 2) 4575	Temp: 130 F	Temp: 250 F	Continuous	Continuous	NA	NA	1) Bussman Manufacturing Report 3/13/79 2) Verbal confirmation documentation requested
TB 506 - Limiting Component: Sliding Link Terminal Block	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test

EQUIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
TERMINATION BOXES (Cont'd)									
TB 507 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test
AREA TERMINATION CABINETS									
ATC 2			. . . . . Components in this ATC are not required to function for HELBs that affect their environment						Duke Report MDS/PDG-77-1
ATC 2A - Limiting Component: Fuseblocks	Bussman	1) 3839 & 4439 2) 4575	Temp: 203.5 F	Temp: 250 F	Continuous	Continuous	NA	NA	1) Bussman Manufacturing Report 3/13/79 2) Verbal Confirmation - Documentation Requested
ATC 3 - Limiting Component: Fuseblocks	Bussman	4439	Temp: 212 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
ATC 4 - Limiting Component: Relays	Struthers-Dunn	219	Temp: 212 F	Temp: 212 F	Continuous	Continuous	NA	NA	McGuire Nuclear Station Pipe Rupture Temperature Component Test File No. GS-6 Method: Test
ATC 4A			. . . . . Components in this ATC are not required to function for HELBs that affect their environment						Duke Report MDS/PDG-77-1
ATC 6 - Limiting Component: Sliding Link Terminal Blocks	States	ZWM	Temp: 212 F	Temp: 311 F	Continuous	Continuous	NA	NA	UL Listing, 10/24/75 letter from Robert W. Chapman & Co. Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

EQUIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATIO REPORT AND METHOD
AREA TERMINATION CABINETS (Cont'd)									
ATC 10			. . . . . Components In this ATC are not required to function for HELBs that affect their environment						Report No. [illegible]G-77-1
ATC 21 - Limiting Component: Fuseblocks	Bussman	4439	Temp: 212 F	Temp: 250 F	Continuous	Continuous	NA	NA	Bussman Manufacturing Report 3/13/79
ATC 22 - Limiting Component: Fuseblocks	Bussman	1) 3792 2) 4575	Temp: 212 F	Temp: 250 F	Continuous	Continuous	NA	NA	1) Bussman Manufacturing Report 3/13/, 2) Verbal confirmation - Documentati[illegible] Requested
1SMTC1 - Limiting Component: Relays	Cutler-Hammer	D26	Temp: 204 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Producti[illegible] Qualification & Tes[illegible] Facility Report TR-010 Method: Test
AHU Differential Pressure Switches	Solon Mfg Co.	7PS1DW	. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report MDS/PDG-77-1
Firestat (temperature switch)	United Electric	800G-6CS	. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report MDS/PDG-77-1
ELECTRICAL CONTROL PANELS AND RELAY CABINETS									
NSW (RN) Relay Cabinet 1 - Limiting Component - Relays	Cutler-Hammer	D23	Temp: 203.5 F	Temp: 255 F	Continuous	Continuous	NA	NA	Duke Steam Producti[illegible] Qualification & Tes[illegible] Facility Report TR-010 Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
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EQUIPMENT IDENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
ELECTRICAL CONTROL PANELS AND RELAY CABINETS (Cont'd)									
Refueling Water Tank Level Pnl 1RWLP - Limiting Component - Volt/Current Alarm	Rochester	ET 1215	Temp: 132.4 F	Temp: 140 F	Continuous	Continuous	± 0.1% of span	± 0.1% of span	Duke Component/ Material Documentation Form and Rochester Data Sheet Std. Stock # V A4
1RB-ECP-4A - Limiting Component: Volt/ Current Alarm	Rochester	ET 1215	Temp: 130 F	Temp: 140 F	Continuous	Continuous	± 0.1% of span	± 0.1% of span	Duke Component/ Material Documentation Form and Rochester Data Sheet Std. Stock # V A4
1RB-ECP-5B - Limiting Component: Volt/ Current Alarm	Rochester	ET 1215	Temp: 130 F	Temp: 140 F	Continuous	Continuous	± 0.1% of span	± 0.1% of span	Duke Component/ Material Documentation Form and Rochester Data Sheet Std. Stock # V A4
Aux Bldg Filtered Exh Fan Control Panel ABFXF-CP-1A	Powers		. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
ABFXF - CP-1B	Powers		. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Aux Bldg Filtered Exhaust Filter Unit Fire Protection Panel	Alison		. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Aux Bldg Filtered Exhaust Fan 1A	Reliance	MCS 1320.53-00-0010	. . . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
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...UIPMENT ...ENTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT (1)	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT (2)	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
Aux Bldg Filtered Exhaust Fan 1B	Reliance	MCS 1320.53-00-0010	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Annulus Ventilation Filter Unit 1AVFU-1A	Farr		. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Annulus Ventilation Filter Unit 1AVFU-1B	Farr		. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Annulus Vent. Fan 1A	Joy/Reliance	2YF-27360B	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report: MDS/PDG-77-1
Annulus Vent. Damper Actuators	Rotork	7A/3MW	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report MDS/PDG-77-1
Remote Starter 1N1A	Westinghouse	A201 J3CA	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report MDS/PDG-77-1
Remote Starter 1N1B	Westinghouse	A201 J3CA	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report MDS/PDG-77-1
Contactor 1FW27A	Westinghouse	A201 J3CA	. . . . This equipment is not required to function for HELBs that affect its environment						Duke Report MDS/PDG-77-1
Valve Solenoid Operators	Valcor	1) V70900-21-1 and V70900-21-3 2) V526	Temp: 212 F	Temp: 346 F	Operate upon receipt of a safety signal	Continuous	NA	NA	1) Test Report: QR70900-21-1 By similarity 2) Test Report: QR52600-515 Method: Test
Valve Solenoid Operators	Asco	NP 8316E34E NP 8316E36E	Temp: 212 F	Temp: 346 F	Operate upon receipt of a safety signal	Continuous	NA	NA	Test Report: AQS21678/TR Method: Test

UIPMENT IFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
Valve Motor Operators	Limitorque	SMB Order Numbers: 613-A, 829-A, 831-A, 832-A, 833-A, 834-A, 835-A, 837-A, 375826-A, 385632-A	Temp: 212 F	Temp: 250 F	Continuous	Continuous	NA	NA	Limitorque Test Rep 600461, 6/7/76 Method: Test
		SMB Order Numbers: 383584-A and 391179-A	Temp: 212 F	Temp: 340 F	Continuous	Continuous	NA	NA	Limitorque Test Repo 600376-A, 9/72 600456, 12/9/75 Method: Test
Valve Motor Operators	Rotork	7NA2 30NA2 11NA2 40NA2 14NA2 70NA2 16NA2 90NA2	Temp: 212 F	Temp: 163 F (Note 4)	Continuous	Continuous	NA	NA	Rotork Test Reports: N11/4, December 1970 TR116, October 1973 TR222, June 1975 TR3025, April 1980 Method: Test
		7NA1 30NA1 11NA1 40NA1 14NA1 70NA1 16NA1 90NA1	Temp: 212 F	Temp: 340 F	Continuous	Continuous	NA	NA	Rotork Test Reports: N11/4, December 1970 TR116, October 1973 TR222, June 1975 Method: Test
Cable - Control, Instrumentation, and 2 KV power	Okonite	EP Insulation	Temp: 330 F (Note 5)	Temp: 345 F	Continuous	Continuous	NA	NA	Test Reports FN-1 N-1, G-3, 110E and 1 Method: Test
Cable - Instrumentation	Okonite	Tefzel 280 Insulation	Temp: 330 F (Note 5)	Temp: 341 F	Continuous	Continuous	NA	NA	Test Report R-0-1 (September 1979) Method: Test
Cable - Control and 2 KV power	Anaconda	EP Insulation and EP/Hypalon Insulation	Temp: 330 F (Note 5)	Temp: 346 F	Continuous	Continuous	NA	NA	Test Reports F-C4350-2 and F-C4350-3, and Supplement Method: Test

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

[illegible]UIPMENT [illegible]NTIFICATION	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	HELB ENVIRONMENT	ENVIRONMENT TO WHICH QUALIFIED	OPERABILITY REQUIRED IN HELB ENVIRONMENT	OPERABILITY DEMONSTRATED	ACCURACY REQUIRED	ACCURACY DEMONSTRATED	QUALIFICATION REPORT AND METHOD
Cable - Control	Brand Rex	XLPE Insulation	Temp: 330 F (Note 5)	Temp: 346 F	Continuous	Continuous	NA	NA	Test Report F-C4113 Method: Test
Cable - Instrumentation	Samuel Moore	EP/Hypalon Insulation	Temp: 330 F (Note 5)	Temp: 340 F	Continuous	Continuous	NA	NA	Test Report F-C3683 Method: Test
Stem Mounted Limit Switches	NAMCO	1) EA-170-100 2) EA-170-302	Temp: 212 F	Temp: 212 F	Continuous	Continuous	NA	NA	1) McGuire Nuclear Station Test Report 780214TSIAC00631 2) NAMCO Test Report 1018 and NAMCO 3/18/78 letter

McGUIRE NUCLEAR STATION UNIT 1

ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT

Note 1

The methods employed to evaluate pipebreaks and to determine the resulting environmental parameters are discussed in Duke Power Company Report MDS/PDG-77-1, The Evaluation of the Effects of Postulated Pipe Failures Outside Containment for McGuire Nuclear Station.

Note 2

The HELB environment is assumed to exist for 2½ hours based on 30 minutes at the peak temperature after which action by the operator isolates the break and allows Auxiliary Building temperature to decrease to normal ambient in 2 hours.

Note 3

The motors installed on Unit 1 pumps will be selected from the shop order numbers listed. All motors listed have been qualified in the same manner.

Note 4

Rotork Test Report TR-3025 shows that when the qualified temperature for these valves is exceeded, the torque switches may fail on the next operation of the valve. Since at least one additional operation is available after the valve's temperature qualification has been exceeded, the valve can be relied upon to move to its safety position.

Note 5

The HELB analysis has identified pipe breaks resulting in higher temperatures; however, there are no cables exposed to temperatures above 330°F.

ATTACHMENT 3

SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED THE POST-LOCA
RECIRCULATION RADIATION ENVIRONMENT

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID) (2)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
PUMP MOTORS					
Boric Acid Transfer Pumps 1A and 1B motors	Chempump/Westinghouse, Buffalo	Chempump Model GUH-10K-12H-1B	. . . . These motors are not required to operate in the post - LOCA recirculation radiation environment		
Boron Injection Recirculation Pumps 1A and 1B motors	Chempump/Westinghouse, Buffalo	Chempump Model GUH-3K-751H-1S	. . . . These motors are not required to operate in the post - LOCA recirculation radiation environment		
Centrifugal Charging Pumps 1A and 1B motors	Westinghouse, Buffalo	72F44587-1S73, 72F44587-2S73 72F44587-3S73, 72F44587-4S73 (Note 3)	6.9×10^{4} RAD	2×10^{8} RAD	WCAP 8754 Rev 1 WCAP 7829 Method: Test and Analysis
Containment Spray Pumps 1A and 1B motors	Westinghouse, Buffalo	73F56019-1S73, 73F56019-2S73 73F56019-3S73, 73F56019-4S73 (Note 3)	5.2×10^{5} RAD	2×10^{8} RAD	WCAP 8754 Rev 1 WCAP 7829 Method: Test and Analysis
Fuel Pool Cooling Pumps 1A and 1B motors	Westinghouse, Buffalo	72F44649-1S74, 72F44649-2S74 72F44650-1S74, 72F44650-2S74 (Note 3)	5×10^{3} RAD	2×10^{8} RAD	WCAP 8754 Rev 1 WCAP 7829 Method: Test and Analysis
Residual Heat Removal Pumps 1A and 1B motors	Westinghouse, Buffalo	71F13494-1S72, 71F13494-2S72 71F13495-1S72, 71F13495-2S72 (Note 3)	5.2×10^{5} RAD	2×10^{8} RAD	WCAP 8754 Rev 1 WCAP 7829 Method: Test and Analysis
RHR and Containment Spray Rooms Sump Pumps 1A and 1B motors	Allis-Chalmers		9.1×10^{4} RAD	1×10^{5} RAD	Documentation requested Method: Test
Safety Injection Pumps 1A and 1B motors	Westinghouse, Buffalo	73F69618-1S75, 73F69618-2S75 73F69618-3S75, 73F69618-4S75 (Note 3)	2.8×10^{5} RAD	2×10^{8} RAD	WCAP 8754 Rev 1 WCAP 7829 Method: Test and Analysis
FAN AND AIR HANDLING UNIT MOTORS					
Annulus Ventilation System Fans 1A and 1B motors	Joy/Reliance	2YF-273608	1×10^{6} RAD	1×10^{6} RAD	Reliance Letter dated 8/3/80
Auxiliary Building Filtered Exhaust Fans 1A and 1B motors	Reliance	1YF-882812	5×10^{4} RAD	2×10^{8} RAD	Reliance Report NUC-9, 7/1/78 Method: Test and Analysis

MCGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID) (2)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
FAN AND AIR HANDLING UNIT MOTORS-Continued					
Diesel Generator Ventilation Fans 1A and 1B motors	Joy/Reliance	1YF-273608	2×10^4 RAD	1×10^6 RAD	Reliance Letter dated 8/3/80 Method: Test and Analysis
Fuel Pool Cooling Pump Air Handling Units 1A and 1B motors	Reliance	3YF-882311	5×10^3 RAD	5×10^5 RAD	Duke Report 1320-A 12/18/78 Method: Test and Analysis
RHR Pump Air Handling Units 1A and 1B motors	Reliance	2YF-882311	7×10^5 RAD	2×10^8 RAD	Reliance Report NUC-9, 7/1/78 Method: Test and Analysis
MISCELLANEOUS POWER EQUIPMENT					
600 Volt Load Centers Worst case: 1ELXD	Gould	K-Line	6×10^4 RAD	1×10^5 RAD	Report OM-302-618 (Note 4)
Motor Control Centers Worst case: 1EMXB4 and 1EMXB5	Nelson Electric	Class 1035U	6×10^3 RAD	1×10^5 RAD	Nelson Electric letter 6/27/80 Method: Test and Analysis
Diesel Batteries Worst Case: 1EDGB	Nife	HIP-4	5×10^3 RAD	(Note 5)	(Note 5)
Diesel Battery Chargers Worst Case: 1EDGB	Power Conversion Products	3S-130-100CE	5×10^3 RAD	(Note 5)	(Note 5)
Potential Transformers, RCP Switchgear	Westinghouse	PTM 75	4×10^4 RAD	4×10^4 RAD	Westinghouse Transformer Div. Report 11/11/77, Life Statement 11/14/77 Method: Test and Analysis
TERMINATION CABINETS					
1ATC3-Limiting Component:	(Note 6)	(Note 6)	1.1×10^3 RAD	(Note 6)	(Note 6)
1ATC21-Limiting Component	(Note 6)	(Note 6)	1.1×10^3 RAD	(Note 6)	(Note 6)
TERMINAL BOXES					
TB108-Limiting Component:	(Note 6)	(Note 6)	1×10^4 RAD	(Note 6)	(Note 6)
TB111-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.8×10^6 RAD	(Note 6)	(Note 6)

MCGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
TERMINAL BOXES (Continued)					
TB113-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.1×10^3RAD	(Note 6)	(Note 6)
TB146-Limiting Component:	(Note 6)	(Note 6)	1.6×10^6RAD	(Note 6)	(Note 6)
TB149-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	2.8×10^5RAD	(Note 6)	(Note 6)
TB150-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	3.5×10^4RAD	(Note 6)	(Note 6)
TB182-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	3.7×10^5RAD	(Note 6)	(Note 6)
TB183-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	3.7×10^5RAD	(Note 6)	(Note 6)
TB184-Limiting Component:	(Note 6)	(Note 6)	1.6×10^6RAD	(Note 6)	(Note 6)
TB185-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.6×10^6RAD	(Note 6)	(Note 6)
TB188-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1×10^4RAD	(Note 6)	(Note 6)
TB189-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.6×10^6RAD	(Note 6)	(Note 6)
TB196-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.8×10^6RAD	(Note 6)	(Note 6)
TB205-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	2×10^4RAD	(Note 6)	(Note 6)
TB207-Limiting Component:	(Note 6)	(Note 6)	4.1×10^3RAD	(Note 6)	(Note 6)
TB211-Limiting Component Sliding Link Terminal Blocks	States	ZWM	5.2×10^5RAD	(Note 6)	(Note 6)
TB212-Limiting Component Sliding Link Terminal Blocks	States	ZWM	4.2×10^3RAD	(Note 6)	(Note 6)

McGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID) (2)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
TERMINAL BOXES (Continued)					
TB224-Limiting Component:	(Note 6)	(Note 6)	1.6×10^6 RAD	(Note 6)	(Note 6)
TB225-Limiting Component:	(Note 6)	(Note 6)	3.1×10^5 RAD	(Note 6)	(Note 6)
TB238-Limiting Component:	(Note 6)	(Note 6)	3.1×10^5 RAD	(Note 6)	(Note 6)
TB239-Limiting Component:	(Note 6)	(Note 6)	3.1×10^5 RAD	(Note 6)	(Note 6)
TB260-Limiting Component:	(Note 6)	(Note 6)	3×10^7 RAD	(Note 6)	(Note 6)
TB406-Limiting Component:	(Note 6)	(Note 6)	1.4×10^3 RAD	(Note 6)	(Note 6)
TB408-Limiting Component:	(Note 6)	(Note 6)	1.4×10^3 RAD	(Note 6)	(Note 6)
TB415-Limiting Component:	(Note 6)	(Note 6)	1.7×10^5 RAD	(Note 6)	(Note 6)
TB416-Limiting Component:	(Note 6)	(Note 6)	1.7×10^5 RAD	(Note 6)	(Note 6)
TB442-Limiting Component:	(Note 6)	(Note 6)	3×10^5 RAD	(Note 6)	(Note 6)
TB443-Limiting Component:	(Note 6)	(Note 6)	5×10^5 RAD	(Note 6)	(Note 6)
TB447-Limiting Component: Sliding Link Terminal Block	States	ZWM	1.7×10^4 RAD	(Note 6)	(Note 6)
TB496-Limiting Component:	(Note 6)	(Note 6)	1×10^6 RAD	(Note 6)	(Note 6)
TB506-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.6×10^6 RAD	(Note 6)	(Note 6)
TB507-Limiting Component: Sliding Link Terminal Blocks	States	ZWM	1.6×10^6 RAD	(Note 6)	(Note 6)
MISCELLANEOUS PANELS					
1RB-ECP-5B-Limiting Component:	(Note 6)	(Note 6)	3×10^7 RAD	(Note 6)	(Note 6)

MCGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID) (2)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
VALVE OPERATORS					
Valve Motor Operators	Limitorque	SMB Limitorque Order Numbers: 613-A, 829-A, 831-A, 832-A, 833-A, 834-A, 835-A, 857-A, 375826-A, 385632-A	5×10^6RAD (worst case)	2×10^7RAD	Limitorque Test Report 600461, dated 6/7/76 Method: Test
		SMB Limitorque Order Numbers: 383584-A and 391179-A	5×10^6RAD (worst case)	2×10^8RAD	Limitorque Test Report 600456, dated 12/9/75 Method: Test
Valve Motor Operators	Rotork	7NA2, 11NA2, 14NA2, 16NA2, 30NA2, 40NA2, 70NA2, 90NA2	5×10^6RAD (worst case)	3×10^7RAD	Rotork Test Report N14/2 dated 5/70 Method: Test
		7NA1, 11NA1, 14NA1, 16NA1, 30NA1, 40NA1, 70NA1, 90NA1	5×10^6RAD (worst case)	2×10^8RAD	Rotork Test Report TR-116, dated 10/73 Method: Test
Valve Solenoid Operators	Valcor	V526	5×10^6RAD (worst case)	2×10^8RAD	Valcor Test Report QR-52600-515 Method: Test
		V70900-21-1 and V70900-21-3	1.6×10^6RAD (worst case)	2×10^8RAD	Valcor Test Report QR-70900-21-1 Method: Test and Analysis
Valve Solenoid Operators	ASCO	NP8316E34E and NP8316E36E	1.6×10^6RAD (worst case)	2×10^8RAD	ASCO Test Report AQS21678/TR Method: Test
Valve Stem Mounted Limit	NAMCO	EA-170-302	1×10^6RAD (worst case)	1×10^6RAD	Namco Test Report dated 7/24/78 for EA-170-302 limit switches Method: Test
		EA-180 and EA-740	1×10^6RAD (worst case)	2×10^8RAD	Namco Test Reports dated 9/5/78 and 2/20/78 for EA-180 and EA-740 limit switches Method: Test

MCGUIRE NUCLEAR STATION - UNIT 1
SUMMARY OF ENVIRONMENTAL QUALIFICATION OF CLASS II EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID) (2)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
MISCELLANEOUS HVAC EQUIPMENT Motor Operated Dampers	Rotork	7A/3MW	3×10^7 RAD (worst case)	3×10^7 RAD	Rotork Test Reports N11/4, dated 12/70 and TR-116, dated 10/73 Method: By similarity to Rotork NA2 Operator
Three-Way Solenoid Valve	Powers	265-0002	5×10^5 RAD	(Note 7)	(Note 7)
Annulus Vent Fan Unit Control Panel-Limiting Component:	(Note 6)	(Note 6)	3×10^7 RAD	(Note 6)	(Note 6)
AVFU Allison Control Panel-Limiting Component:	(Note 6)	(Note 6)	3×10^7 RAD	(Note 6)	(Note 6)
Proportional Temperature Controller	Love Controls	54, 834, 838, 8134, 8160, 8165, 8173 and 8174	2×10^4 RAD	(Note 7)	(Note 7)
High Temperature Detection Thermostat	United Electric	8006-6CS	5×10^5 RAD	(Note 7)	(Note 7)
Resistance Temperature Detector	Weed	101-1.2N-A-3-C-6-2-1	2×10^4 RAD	(Note 7)	(Note 7)
Differential Pressure Switch	Solon	7PS1DW	5.2×10^5 RAD	(Note 7)	(Note 7)
Differential Pressure Switch	Solon	7PS1ADW	5×10^5 RAD	(Note 7)	(Note 7)
Limit Switch	Micro Switch	LSM4N	1×10^6 RAD	1.2×10^8 RAD	Micro Switch Report LTR # 15027-1 Method: Test
Terminal Blocks	Buchanan	0721 and R0721	5×10^5 RAD	(Note 7)	(Note 7)
CABLE Control and 2KV Power Cable	Anaconda	EP Insulation and EP/Hypalon Insulation	1.1×10^8 RAD	2×10^8 RAD	Anaconda Test Reports F-C4350-2 and F-C4350-3 Method: Test

EQUIPMENT IDENTIFICATION (1)	MANUFACTURER	MODEL OR IDENTIFICATION NUMBER	RECIRCULATION RADIATION ENVIRONMENT (TID) (2)	RADIATION LEVEL TO WHICH QUALIFIED (TID)	QUALIFICATION REPORT AND METHOD
CABLE (continued)					
Control Cable	Brand Rex	XLPE	1.1×10^8 RAD	2×10^8 RAD	Brand Rex Test Report F-C4113 Method: Test
Control, Instrumentation and 2kV Power Cable	Okonite	EP Insulation	1.1×10^8 RAD	2×10^8 RAD	Okonite Test Reports FN-1, G-3, N-1, 110E and 141 Method: Test
Instrumentation Cable	Okonite	Hypalon	1.1×10^8 RAD	2×10^8 RAD	Okonite Test Report 110E Method: Test
Instrumentation Cable	Okonite	PVC	3×10^7 RAD	5×10^7 RAD	(Note 8)
Instrumentation Cable	Okonite	Tefzel 280	1.1×10^8 RAD	2×10^8 RAD	Okonite Test Report K-0-1 Method: Test
Instrumentation Cable	Samuel Moore	EP/Hypalon Insulation	1.1×10^8 RAD	2×10^8 RAD	Samuel Moore Test Report F-C3683
Instrumentation Cable	Samuel Moore	PVC	3×10^7 RAD	5×10^7 RAD	(Note 8)
TRANSMITTERS					
Containment Sump Level Transmitters	Barton	386A	4.1×10^7 RAD	2×10^8 RAD	Test Report 43904-1 Method: Test

McGUIRE NUCLEAR STATION - UNIT 1

ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO POST-LOCA
RECIRCULATION RADIATION ENVIRONMENT

Note 1

Class 1E equipment that is exposed to the post-LOCA recirculation radiation environment has been evaluated for proper radiation qualification and is included in this table if it is exposed to a total integrated dose equal to or greater than $1x10^3$RAD. A total integrated dose (i.e., forty year normal plus one year accident radiation dose) of less than $1x10^3$RAD is considered negligible since no materials have been identified at McGuire that exhibit a significant aging mechanism when exposed to less than $1x10^3$RAD.

Note 2

The recirculation radiation environment consists of the forty year normal operating radiation dose plus the dose received from one year of post-LOCA reactor coolant recirculation.

Note 3

The motors installed on Unit 1 pumps will be selected from the shop order numbers listed. All motors listed have been qualified in the same manner.

Note 4

The McGuire 600 volt load centers are qualified by similarity to 600 volt load centers at Oconee Nuclear Station as reported in Report Number OM-302-618.

Note 5

Radiation testing of this equipment is not required for levels below $1x10^4$RAD per Section 8.1 of IEEE 535-1979.

Note 6

Documentation of radiation qualification is currently not available for the components used in the termination boxes and area termination cabinets. If documentation cannot be obtained, these components will either be tested, relocated, or replaced by a qualified substitute.

Note 7

A qualification program is currently in progress for these components. The results of this program will be reported upon completion.

Note 8

The level of radiation qualification will be confirmed from testing scheduled for completion by November, 1980. Preliminary radiation qualification level is $5x10^7$ RAD based on IEEE Transactions Paper 68-TP-651-PWR, Vol PAS-88 No 5, May 1969

ATTACHMENT 4

DUKE POWER COMPANY POSITION
ON THE CATEGORY II GUIDELINES OF NUREG 0588

MCGUIRE NUCLEAR STATION

NUREG 0588 CATEGORY II GUIDELINES	DUKE POWER COMPANY POSITION
1.0 ESTABLISHMENT OF THE QUALIFICATION PARAMETERS FOR DESIGN BASIS EVENTS	
1.1 Temperature and Pressure Conditions Inside Containment - Loss-of-Coolant	
1.1.1 The time-dependent temperature and pressure, established for the design of the containment structure and found acceptable by the staff, may be used for environmental qualification of equipment.	The containment structural design has been based on the results on an analysis performed by Westinghouse employing the methodology described below. The results of this analysis are reported in Section 6.2 of the FSAR.
1.1.2 Acceptable methods for calculating and establishing the containment pressure and temperature envelopes to which equipment should be qualified are summarized below. Acceptable methods for calculating mass and energy release rates are summarized in Appendix A.	Westinghouse employs the methodology described in WCAP-8312A for calculating the LOCA mass and energy release. Appendix A to NUREG-0588 indicates that this methodology is acceptable to the Staff.
Pressurized Water Reactors (PWRs)	
Ice Condenser Containment - Calculate LOCA containment environment using LOTIC or equivalent industry codes. Additional guidance is provided in SRP Section 6.2.1.1.B, NUREG-75/087.	Westinghouse conforms to the Staff position for Ice-Condenser Plants by employing LOTIC to calculate the containment transient following LOCA.
1.1.3 In lieu of using the plant-specific containment temperature and pressure design profiles for BWR and ice condenser types of plants, the generic envelope shown in Appendix C may be used for qualification testing.	Plant-specific profiles are the basis for McGuire equipment qualification testing.

	NUREG 0588 CATEGORY II GUIDELINES	DUKE POWER COMPANY POSITION
1.1.4	The test profiles included in Appendix A to IEEE Std. 323-1974 should not be considered an acceptable alternative in lieu of using plant-specific containment temperature and pressure design profiles unless plant-specific analysis is provided to verify the adequacy of those profiles.	Plant specific profiles are the basis for McGuire equipment qualification testing. It should be noted that the IEEE 323-1974, Appendix A temperature and pressure profiles envelope the worst-case McGuire containment accident temperature and pressure conditions and have been used by some manufacturers for generic qualifications.
1.2	<u>Temperature and Pressure Conditions Inside Containment - Main Steam Line Break (MSLB)</u>	
1.2.1	Where qualification has not been completed, the environmental parameters used for equipment qualification should be calculated using a plant-specific model based on the staff-approved assumptions discussed in Item 1 of Appendix B.	The environmental qualification testing for equipment located inside containment has been completed.
1.2.2	Models that are acceptable for calculating containment parameters are listed in Section 1.1.2.	Westinghouse employs the methodology described in WCAP 8822 for calculating the mass and energy release following a Main Steam Line Break (MSLB). At the specific request of Duke, Westinghouse has completed the mass and energy release calculations assuming no entrainment. Westinghouse conforms to the Staff position for Ice-Condenser Plants by employing LOTIC to calculate the containment transient following MSLB.
1.2.3	In lieu of using the plant-specific containment temperature and pressure design profiles for BWR and ice condenser plants, the generic envelope shown in Appendix C may be used.	Plant specific profiles are the basis for McGuire equipment qualification testing.

NUREG 0588 CATEGORY II GUIDELINES		DUKE POWER COMPANY POSITION
1.2.4	The test profiles included in Appendix A to IEEE Std. 323-1974 should not be considered an acceptable alternative in lieu of using plant-specific containment temperature and pressure design profiles unless plant-specific analysis is provided to verify the adequacy of those profiles.	Plant specific profiles are the basis for McGuire equipment qualification testing. It should be noted that the IEEE 323-1974, Appendix A temperature and pressure profiles envelope the worst-case McGuire containment accident temperature and pressure conditions and have been used by some manufacturers for genric qualification.
1.2.5	Where qualification has been completed but only LOCA conditions were considered, then it must be demonstrated that the LOCA qualification conditions exceed or are equivalent to the maximum calculated MSLB conditions.	The environmental qualification tests for equipment installed inside the containment at McGuire that is required to function during and following a MSLB envelope the maximum calculated MSLB conditions.
1.3	Effects of Chemical Spray	
1.3.1	The effects of caustic spray should be addressed for the equipment qualification. The concentration of caustics used for qualification should be equivalent to or more severe than those used in the plant containment spray system.	Chemical spray is included in qualification tests for equipment located inside the containment provided the equipment is required to operate in the spray environment.
1.3.2	If the chemical composition of the caustic spray can be affected by equipment malfunctions, the most severe caustic spray environment that results from a single failure in the spray system should be assumed. See SRP Section 6.5.2 (NUREG-75/087), paragraph II, Item (e) for caustic spray solution guidelines.	In the McGuire containment spray system, no single failure can occur that will result in a more severe spray solution composition than the anticipated composition.

NUREG 0588 CATEGORY II GUIDELINES	DUKE POWER COMPANY POSITION
1.4 <u>Radiation Conditions Inside and Outside Containment</u>	
The radiation environment for qualification of equipment should be based on the normally expected radiation environment over the equipment qualified life, plus that associated with the most severe design basis accident (DBA) during or following which that equipment must remain functional. It should be assumed that the DBA-related environmental conditions occur at the end of the equipment qualified life.	The calculated radiation environment is based on the 40 year normal operating dose plus the appropriate DBA dose.
The sample calculations in Appendix D and the following positions provide an acceptable approach for establishing radiation limits for qualification. Additional radiation margins identified in Section 6.3.1.5 of IEEE Std. 323-1974 for qualification type testing are not required if these methods are used.	
1.4.1 The source term to be used in determining the radiation environment associated with the design basis LOCA should be taken as an instantaneous release from the fuel to the atmosphere of 100 percent of the noble gases, 50 percent of the iodines, and 1 percent of the remaining fission products. For all other non-LOCA design basis accident conditions, a source term involving an instantaneous release from the fuel to the atmosphere of 10 percent of the noble gases (except Kr-85 for which a release of 30 percent should be assumed) and 10 percent of the iodines is acceptable.	The radiation environments throughout the station following a DBA LOCA are determined assuming instantaneous release from the fuel to the containment of 100% of the noble gas inventory, 50% of the core iodine inventory, and 1% of the remaining core fission product inventory. This source term is used to derive radiation levels for all equipment requiring radiation qualification. The release fractions are consistent with TID-14844 and NUREG 0578, Item 2.1.6 b.

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1.4.2	The calculation of the radiation environment associated with design basis accidents should take into account the time-dependent transport of released fission products within various regions of containment and auxiliary structures.	All radioactivity released initially remains within the containment. Airborne radioactivity is assumed to be homogeneously distributed throughout the containment at 10 minutes into the accident because of containment air return fan actuation. Recirculation of water from the containment sump is also assumed to begin at 10 minutes into the accident. Prior to initiation of recirculation, normal radiation environments are assumed to exist throughout the station outside containment. The time-dependent transport mechanisms considered are consistent with NUREG 0578, Item 2.1.6b.
1.4.3	The initial distribution of activity within the containment should be based on a mechanistically rational assumption. Hence, for compartmented containments, such as in a BWR, a large portion of the source should be assumed to be initially contained in the drywell. The assumption of uniform distribution of activity throughout the containment at time zero is not appropriate.	See the response to 1.4.2 above.
1.4.4	Effects of ESF systems, such as containment sprays and containment ventilation and filtration systems, which act to remove airborne activity and redistribute activity within containment, should be calculated using the same assumptions used in the calculation of offsite dose. See SRP Section 15.6.5 (NUREG-75/087) and the related sections referenced in the Appendices to that section.	To increase the conservatism of the calculated radiation values, no credit is taken for removal processes such as containment spray, filters, or natural deposition. The only removal mechanism considered is radioactive decay.

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1.4.5	Natural deposition (i.e., plate-out) of airborne activity should be determined using a mechanistic model and best estimates for the model parameters. The assumption of 50 percent instantaneous plate-out of the iodine released from the core should not be made. Removal of iodine from surfaces by steam condensate flow or washoff by the containment spray may be assumed if such effects can be justified and quantified by analysis or experiment.	The assumption of an instantaneous plate-out of 50% of the iodine released from the core is not used. As stated above, natural deposition is not used in the development of post-LOCA radiation levels.
1.4.6	For unshielded equipment located in the containment, the gamma dose and dose rate should be equal to the dose and dose rate at the centerpoint of the containment plus the contribution from location dependent sources such as the sump water and plate-out, unless it can be shown by analyses that location and shielding of the equipment reduces the dose and dose rate.	The gamma dose in containment is that dose calculated at the centerpoint of the containment. Shielding effects are considered for equipment located outside the crane wall and in the accumulator rooms.
1.4.7	For unshielded equipment, the beta doses at the surface of the equipment should be the sum of the airborne and plate-out sources. The airborne beta dose should be taken as the beta dose calculated for a point at the containment center.	Beta dose calculations are consistent with the gamma dose calculations as discussed above. Also see the response to 1.4.8 below.
1.4.8	Shielded components need be qualified only to the gamma radiation levels required, provided an analysis or test shows that the sensitive portions of the	All Class 1E equipment located inside containment that is required to mitigate a LOCA, MSLB, or HELB inside the containment has sufficient shielding to prevent the exposure of

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1.4.8	(Continued) component or equipment are not exposed to beta radiation or that the effects of beta radiation heating and ionization have no deleterious effects on component performance.	(Continued) any organic materials associated with this equipment to a beta radiation environment.
1.4.9	Cables arranged in cable trays in the containment should be assumed to be exposed to half the beta radiation dose calculated for a point at the center of the containment plus the gamma ray dose calculated in accordance with Section 1.4(6). This reduction in beta dose is allowed because of the localized shielding by other cables plus the cable tray itself.	See the response to 1.4.8 above. Additionally, armored cables are used in safety-related applications inside containment at McGuire; therefore, beta radiation effects on cable insulation is considered negligible.
1.4.10	Paints and coatings should be assumed to be exposed to both beta and gamma rays in assesing their resistance to radiation. Plate-out activity should be assumed to remain on the equipment surface unless the effects of the removal mechanisms, such as spray wash-off or steam condensate flow, can be justified and quantified by analysis or experiment.	See the response to 1.4.6 and 1.4.7 above.
1.4.11	Components of the emergency core cooling system (ECCS) located outside containment (e.g., pumps, valves, seals, and electrical equipment) should be qualified to withstand the radiation	Radiation levels outside containment following a design basis LOCA are based on the release fractions discussed in 1.4.1 above. This released activity is assumed to be retained in and diluted by water from safety

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1.4.11	(Continued) equivalent to that penetrating the containment, plus the exposure from the sump fluid using assumptions consistent with the requirements stated in Appendix K to 10 CFR Part 50.	(Continued) injection and ice bed melt. Where appropriate, radiation penetrating the containment is included. This analysis is consistent with that required by NUREG 0578, Item 2.1.6b.
1.4.12	Equipment that may be exposed to radiation doses below 10^4 rads should not be considered to be exempt from radiation qualification, unless analysis supported by test data is provided to verify that these levels will not degrade the operability of the equipment below acceptable values.	Class 1E equipment that is exposed to a radiation environment is evaluated for proper radiation qualification. 1
1.4.13	The Staff will accept a given component to be qualified provided it can be shown that the component has been qualified to integrated beta and gamma doses which are equal to or higher than those levels resulting from an analysis similar in nature and scope to that included in Appendix D (which uses the source term given in item (1) above), and that the component incorporates appropriate factors pertinent to the plant design and operating characteristics, as given in these general guidelines.	The calculated radiaiton environments for McGuire are comparable to those values presented in Appendix D.
1.4.14	When a conservative analysis has not been provided by the applicant for staff review, the staff will use the radiation environment guidelines contained in Appendix D, suitably corrected for the differences in reactor power level, type, containment size, and other appropriate factors.	See the response to 1.4.13 above.

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1.5 <u>Environmental Conditions For Out-Side Containment</u>	
1.5.1 Equipment located outside containment that could be subjected to high-energy pipe breaks should be qualified to the conditions resulting from the accident for the duration required. The techniques to calculate the environmental parameters described in Sections 1.1 through 1.4 (Category II) above should be applied.	Equipment located outside the containment that could be subjected to a postulated pipe break environment and that is required to either mitigate the break or bring the unit to a safe shutdown condition is qualified for the pipe break environment. The methods employed to evaluate pipe breaks and to determine the resulting environmental parameters are discussed in Duke Power Company Report MDS/PDG - 77 - 1, The Evaluation of the Effects of Postulated Pipe Failures Outside Containment for McGuire Nuclear Station.
1.5.2 Equipment located in general plant areas outside containment where equipment is not subjected to a design basis accident environment should be qualified to the normal and abnormal range of environmental conditions postulated to occur at the equipment location.	Equipment located in general plant areas outside containment and not exposed to a DBA environment is designed and/or qualified for the normal and abnormal range of environmental conditions postulated to occur at the equipment location. For these general areas outside containment except in the control complex, the environment considered is that which results from a loss of the normal powered ventilation system. The environment in the control complex, however, remains within a normal range because the control complex is served by a redundant Class IE HVAC system.
1.5.3 Same as Category I; or, there may be designs where a loss of the environmental support system may expose some equipment to environments that exceed the qualified limits. For these designs, appropriate monitoring devices should be provided to alert the operator that abnormal conditions exist and to permit an assessment of the conditions that occurred in order to determine if corrective action, such as replacing any affected equipment, is warranted.	For general plant areas outside containment where the area temperature could be postulated to exceed the design temperature of the equipment in that area, a temperature monitoring system is provided. This temperature monitoring system is discussed in the McGuire FSAR, Supplement 2.

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2.0 QUALIFICATION METHODS	
2.1 Selection of Methods	
2.1.1 Qualification methods should conform to the requirements defined in IEEE Std. 323-1971.	a. For equipment required to perform a safety function in a postulated LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment, the environmental qualification methods meet the intent of IEEE 323-1971 requirements. 1
	b. For the equipment not required to operate in a harsh accident environment, environmental testing per IEEE 323-1971 was not performed. Rather, the equipment was designed and analyzed to assure that it maintains its required performance capability throughout the specified range of normal and abnormal environmental parameters. In general, factory performance/functional testing at ambient conditions is completed on equipment prior to shipping and, for some items of equipment, a production unit may be tested at the specified maximum ambient temperature. These production tests, together with the design specificaton for the equipment, which specifies the range of normal and abnormal environmental parameters and engineering analysis, provides sufficient assurance of equipment capability in accordance with the Staff position under Item 2.1.4. 1
2.1.2 The choice of the methods selected is largely a matter of technical judgement and availability of information that supports the conclusions reached. Experience has shown that qualification of equipment subjected to an accident envi-	For equipment located inside containment that is required to perform a safety function in a postulated LOCA, MSLB, or HELB environment, environmental qualification is in general by testing. For equipment located outside containment

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2.1.2	(Continued)	(Continued)
	ronment without test data is not adequate to demonstrate functional operability. In general, the staff will not accept analysis in lieu of test data unless (a) testing of the component is impractical due to size limitations, and (b) partial type test data is provided to support the analytical assumptions and conclusions reached.	that is required to perform a safety function in a postulated HELB or post-LOCA recirculation radiation environment, qualification is in general by testing, analysis, manufacturer's specific design, and/or combinations of these methods. 1 The qualification method is provided in the equipment tables.
2.1.3	The environmental qualification of equipment exposed to DBA environments should conform to the following positions:	
	The basis should be provided for the time interval required for operability of this equipment.	The required duration of operability is based on assumptions in the FSAR accident analysis, system requirements, and/or the time the environment is expected to remain outside its normal range following a DBA. The required and demonstrated duration of the safety function of equipment subject to a LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment is provided in the equipment tables. 1
	The operability and failure criteria should be specified and the safety margins defined.	The primary purpose of equipment qualification is to reduce the potential for common-mode failures due to postulated environmental conditions. Equipment will therefore be considered to have failed the test and/or analysis if the functional requirements identified in the attached tables cannot be met, unless an investigation can establish that the failure mechanism is not of common-mode origin or that plant specific analyses can demonstrate that the reduced capability is acceptable. In certain cases, failure criteria, per se, was not specified prior to qualification testing; however, the failure of the equipment would have been an obvious failure (i.e., equipment would not function). Margin is discussed in Section 3.0.

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2.1.3a	Equipment that must function in order to mitigate any accident should be qualified by test to demonstrate its operability for the time required in the environmental conditions resulting from that accident.	Equipment that must perform a safety function in a LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment, is qualified by test and/or analysis. The acceptance criteria for the text and/or analysis is that the safety-related function must be demonstrated for the specified duration of operability in the postulated accident environment.	1
2.1.3b	Any equipment (safety-related or non-safety-related) that need not function in order to mitigate any accident, but that must not fail in a manner detrimental to plant safety should be qualified by test to demonstrate its capability to withstand any accident environment for the time during which it must not fail.	In general, the failure of safety-related equipment that is not required to perform a safety function in a postulated harsh accident environment is not detrimental to plant safety. The effects and consequences of adverse environments on non-safety related equipment has been identified as a Category I item under NUREG-0585 "TMI-2 Lessons Learned Task Force Final Report" and will be resolved as part of the action plan set up to address Recommendation #9. Additionally, the subject of non safety-related control systems was addressed in IE Information Notice 79-22.	
2.1.3c	Equipment that need not function in order to mitigate any accident and whose failure in any mode in any accident environment is not detrimental to plant safety need only be qualified for its non-accident service environment. Although actual type testing is preferred, other methods when justified may be found acceptable. The bases should be provided for concluding that such equipment is not required to function in order to mitigate any accident, and that its failure in any mode in any accident environment is not detrimental to plant safety.	Where an item of safety-related equipment is located in an area such that it may be exposed to a LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment but is not required to perform any safety-function as a result of the breaks, the failure of such equipment, due to the adverse environment, has been determined not to prejudice the safety functions of other equipment claimed in the accident analysis.	1

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2.1.4	For environmental qualification of equipment subject to events other than a DBA, which result in abnormal environmental conditions, actual type testing is preferred. However, analysis or operating history, or any applicable combination thereof, coupled with partial type test data may be found acceptable, subject to the applicability and detail of information provided.	As stated in the response to Item 2.1.1b, the design specification requirements for equipment not required to function in a harsh environment together with factory performance/ functional tests and engineering analyses (including some cases where the testing is performed at maximum ambient conditions) provide the requisite assurance for equipment capability.	1
2.2	Qualification by Test		
2.2.1	The failure criteria should be established prior to testing.	The response to Item 2.1.3 is applicable for equipment required to operate in a LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment.	1
2.2.2	Test results should demonstrate that the equipment can perform its required function for all service conditions postulated (with margin) during its installed life.	As stated in Item 2.1.1a environmental qualification demonstrates the capability of equipment to perform safety-related functions when subject to the consequential adverse environment of LOCA, MSLB, HELB, or post-LOCA recirculation radiation. For equipment not required to operate in a harsh environment, the response to Item 2.1.1b applies. The requirement to demonstrate this capability during the installed life implies an addressment of aging. This subject is discussed under Item 4. The subject of margin is discussed under Item 3.	1
2.2.3	The items described in Section 5.2 of IEEE Std. 323-1971 supplemented by items (4) through (12) below constitute acceptable guidelines for establishing test procedures.	The Duke Power Company position with respect to Section 5 of IEEE 323-1971 is provided in the response to Item 2.3.3.	

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2.2.4 When establishing the simulated environmental profile for qualifying equipment located inside containment, it is preferred that a single profile be used that envelopes the environmental conditions resulting from any design basis event during any mode of plant operation (e.g., a profile that envelopes the conditions produced by the main steamline break and loss-of-coolant accidents).	In general, a single profile, enveloping both MSLB and LOCA, is used for qualification of equipment located inside containment which is required to perform a safety function to mitigate a LOCA or MSLB. The exceptions to the use of a single qualification envelope for LOCA and MSLB are, in general, when: (a) A component is only required to mitigate against either the LOCA or MSLB. In such a case, qualification has been completed to conditions enveloping the possible consequences inside containment from the single event and additionally, it is verified that failure of the component in any other more limiting environment will not prejudice any safety-related function (b) The resulting test conditions would unjustifiably exceed acceptable conservatism.
2.2.5 Equipment should be located above flood level or protected against submergence by locating the equipment in qualified watertight enclosures. Where equipment is located in watertight enclosures, qualification by test or analysis should be used to demonstrate the adequacy of such protection. Where equipment could be submerged, it should be identified and demonstrated to be qualified by test for the duration required.	In general, safety-related equipment is located above the maximum post-LOCA water level. The exceptions to this design philosophy are certain motor operated valves and associated cables. The submerged valves are discussed in FSAR Section 15.4.1.3.

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2.2.6 The temperature to which equipment is qualified, when exposed to the simulated accident environment, should be defined by thermocouple readings on or as close as practical to the surface of the component being qualified. If there were no thermocouples located near the equipment during the tests, heat transfer analysis should be used to determine the temperature at the component. (Acceptable heat transfer analysis methods are provided in Appendix B.)	In performing qualification tests for equipment exposed to a LOCA, MSLB, or HELB environment, the external environment temperature is measured as close to the equipment surface as practicable.
2.2.7 Performance characteristics of equipment should be verified before, after, and periodically during testing throughout its range of required operability.	Where the safety-related function of the equipment requires operation in the LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment, the equipment performance before, during (where practical) and after exposure to the simulated event is verified. 1
2.2.8 Caustic spray should be incorporated during simulated event testing at the maximum pressure and at the temperature conditions that would occur when the onsite spray systems actuate.	The response to Item 1.3.1 is applicable for equipment located inside containment and qualified by test to operate in the LOCA or MSLB environment.
2.2.9 The operability status of equipment should be monitored continuously during testing. For long-term testing, however, monitoring at discrete intervals should be justified if used.	The response to Item 2.2.7 is applicable.
2.2.10 Expected extremes in power supply voltage range and frequency should be applied during simulated event environmental testing.	Class 1E equipment is supplied by guaranteed stabilized power supplies. As a consequence, the range of the electrical parameters is considered to be within equipment capability.

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2.2.11 Dust environments should be addressed when establishing qualification service conditions.	Duke has implemented housekeeping procedures to preclude adverse dust conditions at McGuire. Therefore, dust environments are not required as a qualification parameter.
2.2.12 Cobalt-60 is an acceptable gamma radiation source for environmental qualification.	In general, Cobalt-60 sources are used to simulate the effects of gamma radiation for equipment qualified by test to operate in a LOCA/MSLB or post-LOCA recirculation radiation environment. 1
2.3 <u>Test Sequence</u>	
2.3.1 Justification of the adequacy of the test sequence selected should be provided.	In general, when testing is used to qualify equipment required to perform a safety function in a LOCA, MSLB, or HELB environment, the following test sequence is employed: 1. The equipment is subjected to a calibration and/or verification test at ambient conditions. This test included verification of safety related functions. 2. No specific abnormal tests are required since the accident environment envelopes the abnormal condition with margin. 3. The equipment is irradiated, using a Cobalt-60 source, to the estimated worst case gamma dose obtained from in-service operation and required accident and post accident performance. 4. The same equipment is tested to verify equipment capability during a simulated seismic event.

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2.3.1 (Continued)	(Continued) 5. The same equipment is tested under applicable simulated accident and post-accident conditions. Completion of the above test sequence gives assurance that the equipment can perform safety-related functions under normal, abnormal and design basis event conditions. The design basis event testing applies extremes of radiation, vibration (seismic), temperature, humidity and chemical spray in a conservative sequence and verifies that the equipment being qualified is not marginal with respect to these parameters. The subject of margin and aging are discussed under Items 3 and 4, respectively.
2.3.2 The test should simulate as closely as practicable the postulated environment.	For equipment that is qualified by testing, the test environment simulates as closely as practicable the postulated environment.
2.3.3 The test procedures should conform to the guidelines described in Section 5 of IEEE Std. 323-1971.	In general, the qualification testing of safety-related equipment at McGuire conforms to the guidelines of IEEE 323-1971. The Duke position with respect to the documentation requirements of IEEE 323-1971 is provided in the response to Item 5.2.
2.3.4 The staff consideres that, for vital electrical equipment such as penetrations, connectors, cables, valves and motors, and transmitters located inside containment or exposed to hostile steam environments outside containment, separate effects testing for the most part is not an acceptable qualification method. The testing of such equipment should be conducted in a manner that subjects the same piece of equipment to radiation and the hostile steam environment sequentially.	For equipment which is qualified by testing and which is required to perform a safety function in a LOCA, MSLB, or HELB environment, the test sequence identified in the response to Item 2.3.1 is generally employed and as a consequence does not, in general, employ separate effects testing. Separate effects testing, if used, is justified.

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2.4	Other Qualification Methods	
	Qualification by analysis or operating experience implemented, as described in IEEE Std. 323-1971 and other ancillary standards, may be found acceptable. The adequacy of these methods will be evaluated on the basis of the quality and detail of the information submitted in support of the assumptions made and the specific function and location of the equipment. These methods are most suitable for equipment where testing is precluded by physical size of the equipment being qualified. It is required that, when these methods are employed, some partial type tests on vital components of the equipment be provided in support of these methods.	Duke does not necessarily rely on operating experience to establish the qualification of safety-related equipment, rather, operating experience may be included in support of qualification by test and/or analysis. The equipment tables identify the qualification methodology employed for each item of safety-related equipment.
3.0	MARGINS	
3.1	Quantified margins should be applied to the design parameters discussed in Section 1 to assure that the postulated accident conditions have been enveloped during testing. These margins should be applied in addition to any margins (conservatism) applied during the derivation of the specified plant parameters.	For most plant specific applications margins are available between the qualification parameters and the plant specific requirements. Margins are as shown in the equipment tables.
3.2	The margins provided in the design will be evaluated on a case-by-case basis. Factors that should be considered in quantifying margins are (a) the environmental stress levels induced during testing, (b) the duration of the stress, (c) the number of items tested and the number of tests performed in the hostile environment, (d) the performance characteristics of the equipment while subjected to the environmental stresses, and (e) the specified function of the equipment.	Same as 3.1 | 1

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3.3	When the qualification envelope in Appendix C is used, the only required margins are those accounting for the inaccuracies in the test equipment. Sufficient conservatism has already been included to account for uncertainties such as production errors and errors associated with defining satisfactory performance (e.g., when only a small number of units are tested).	This generic envelope is not specifically employed by Westinghouse or Duke for qualification testing. It should be noted that a given manufacturer's test curve may approximate this generic curve.	
3.4a	Some equipment may be required by the design to <u>only</u> perform its safety function within a short time period into the event (i.e., within seconds or minutes), and, once its function is complete, subsequent failures are shown not to be detrimental to plant safety. Other equipment may not be required to perform a safety function but must not fail within a short time period into the event, and subsequent failures are also shown not to be detrimental to plant safety. Equipment in these categories is required to remain functional in the accident environment for a period of at least 1 hour in excess of the time assumed in the accident analysis.	In general, equipment required to operate in a harsh accident environment is qualified to perform its safety function over a considerable period in excess of the calculated worst case time to perform the safety functions as derived from the accident analysis. The arbitrary additional one hour time requirement has not been applied to all equipment. The time margins indicated in the equipment tables are considered acceptable.	1
3.4b	For all other equipment (e.g., post-accident monitoring, recombiners, etc.), the 10 percent time margin identified in Section 6.3.1.5 of IEEE Std. 323-1974 may be used.	In qualifying equipment required to operate in a LOCA, MSLB, HELB, or post-LOCA recirculation radiation environment, margin is included in qualification testing by selecting conservative qualification parameters and/or test sequences. Some of the areas where margin is usually implicit in a test sequence is as follows: 1. The full radiation dose, simulating effects of in-service and accident radiation doses, is applied in a single step prior to seismic and HELB test simulations.	1 1 1

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3.4b	(Continued)	(Continued) 2. The seismic event simulation applies significant mechanical stress to the equipment prior to the HELB simulation. 3. The single envelope normally employed for HELB simulation, not only encompasses the effects of LOCA and MSLB accidents, but a whole spectrum of break sizes and locations within these accident definitions. As a consequence, the envelope employed invariably contains significant margin with respect to the transient for any single break size and location. 4. The single HELB simulation normally employed combines the high irradiation dose associated with the LOCA with the high temperature associated with the MSLB.
4.0	<u>AGING</u>	
4.1	Qualification programs that are committed to conform to the requirements of IEEE Std. 382-1972 (for valve operators) and IEEE Std. 334-1971 (for motors) should consider the effects of aging. For this equipment, the Category I positions of Section 4 are applicable.	Safety-related valve operators (motor and solenoid) located inside containment and continuous duty motors located inside containment have been mechanically, thermally, and radiation aged to an equivalent of 40 years of service in accordance with IEEE 382-1972 and IEEE 334-1971, respectively.
4.2	For other equipment, the qualification programs should address aging only to the extent that equipment that is composed, in part, of materials susceptible to aging effects should be identified, and a schedule for periodically replacing the equipment and/or materials should be established. During individual case reviews, the staff will require that the effects	Addressment of aging was not a requirement in qualification programs for Category II equipment. However, with the wealth of in-service experience covering a variety of equipment types, no significant in-service aging mechanisms have been identified which could prejudice the qualification tests performed on new equipment within a few years from start-up.

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4.2	(Continued) of aging be accounted for on selected equipment if operating experience or testing indicates that the equipment may exhibit deleterious aging mechanisms.	(Continued) Duke Power Company is evaluating the in-containment Class 1E equipment and will report at the time of discovery any equipment for which significant aging mechanisms are identified including the justification for continued use and/or reasonable alternative action. This on-going investigation will necessarily be very time consuming and will rely heavily on EPRI research, NRC studies, NPRDS information, IE Bulletins and Circulars, and industry research and testing.
5.0	<u>QUALIFICATION DOCUMENTATION</u>	
5.1	The Staff endorses the requirements stated in IEEE Std. 323-1974 that, "The qualification documentation shall verify that each type of electrical equipment is qualified for its application and meets its specified performance requirements. The basis of qualification shall be explained to show the relationship of all facets of proof needed to support adequacy of the complete equipment." "Data used to demonstrate the qualification of the equipment shall be pertinent to the application and organized in an auditable form."	Duke Power Company will arrange and maintain in an auditable form sufficient qualification documentation that will support the qualification that is required for each type of safety-related electrical equipment.
5.2	The guidelines for documentation in IEEE Std. 323-1971 are acceptable. The documentation should include sufficient information to address the required information identified in Appendix E. A certificate of conformance by itself is not acceptable unless it is accompanied by test data and information on the qualification program.	The qualification test reports referenced in the equipment tables for equipment qualified to operate in an accident environment, in general, meet the requirements of Section 5 to IEEE 323-1971 by providing certain essential information . For example: - safety-related functional requirements to be demonstrated

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5.2 (Continued)	(Continued) - range of applicable environmental parameters to be considered - identification of the test unit - description of the test facility and monitoring instrumentation - description of test unit mounting and interfaces - summary of the test procedures - summary of the test results

ATTACHMENT 5

COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT
TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

McGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED INSIDE CONTAINMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	Transmitters (Barton Lot 2)	Cont. Press Sensors (Barton 351)	Transmitters a,c (Veritrak [ ])	RTDs (Rosemount)	Neutron Detectors (WIGT®)	H_2 Recombiner (5) (W Sturtevant A)	Cont. Air Return and H_2 Skim Fan Motors	Valve Motor Operators (Limitorque and Rotork)
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Item 2.1.1 a	C	C	N/A	C	N/A	C	C	C
2.1.1 b	N/A	N/A	C	N/A	C	N/A	N/A	N/A
2.1.2	C	C	N/A	(3)	N/A	C	C	C
2.1.3	C	C	N/A	C	N/A	C	C	C
2.1.3 a	C	C	N/A	C	N/A	C	C	C
2.1.3 b	C	C	N/A	C	(4)	C	C	C
2.1.3 c	N/A	N/A	C	N/A	N/A	N/A	N/A	C
2.1.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.1	C	C	N/A	C	N/A	C	C	C
2.2.2	C	C	N/A	C	N/A	C	C	C
2.2.3	C	C	N/A	C	N/A	C	C	C
2.2.4	C	C	N/A	C	N/A	C	C	C
2.2.5	C	C	N/A	C	C	C	C	C
2.2.6	C	C	N/A	C	N/A	C	C	C
2.2.7	C	C	N/A	C	N/A	C	C	C
2.2.8	C	C	N/A	C	N/A	C	C	C
2.2.9	C	C	N/A	C	N/A	C	C	C
2.2.10	C	C	N/A	C	N/A	C	C	C
2.2.11	C	C	C	C	C	C	C	C
2.2.12	C	C	N/A	C	N/A	C	C	C
2.3.1	C	C	N/A	C	N/A	C	(6)	C
2.3.2	C	C	N/A	C	N/A	C	C	C
2.3.3	C	C	N/A	C	N/A	C	C	C
2.3.4	C	C	N/A	C	N/A	C	(6)	C
2.4	C	C	N/A	C	N/A	C	C	C
3.1	C	C	N/A	C	N/A	C	C	C
3.2	(1)	C	N/A	C	N/A	C	C	C
3.3	C	C	N/A	C	N/A	C	C	C
3.4 a	(2)	C	N/A	C	N/A	N/A	N/A	C
3.4 b	C	C	N/A	C	N/A	C	C	C
4.1	N/A	N/A	N/A	N/A	N/A	N/A	C	C
4.2	C	C	N/A	C	N/A	C	N/A	N/A
5.1	C	C	C	C	C	C	C	C
5.2	C	C	N/A	C	N/A	C	C	C

McGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

UIPMENT IDENTIFICATION NUREG 0588	Valve Solenoid Operators (Valcor, Asco, Target Rock)	Damper Motors (Rotork)	Diff Press Switches (Solon)	Electrical Penetrations (D.G. O'Brien)	Cables (All Suppliers)	Cable Term/ Splice Material (Raychem)	Stem-Mounted Limit Switches (Namco)	Seal Material (3M)
Item 2.1.1 a	C	C	C	C	C	C	C	C
2.1.1 b	N/A	N/A	N/A	N/A	C	N/A	N/A	N/A
2.1.2	C	C	C	C	C	C	C	C
2.1.3	C	C	C	C	C	C	C	C
2.1.3 a	C	C	C	C	C	C	C	C
2.1.3 b	C	C	C	C	C	C	C	C
2.1.3 c	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.1	C	C	C	C	C	C	C	C
2.2.2	C	C	C	C	C	C	C	C
2.2.3	C	C	C	C	C	C	C	C
2.2.4	C	C	C	C	C	C	C	C
2.2.5	C	C	C	C		C	C	C
2.2.6	C	C	C	C	C	C	C	C
2.2.7	C	C	C	C	C	C	C	C
2.2.8	C	C	C	C	C	C	C	C
2.2.9	C	C	C	C	C	C	C	C
2.2.10	C	C	C	N/A	N/A	N/A	N/A	N/A
2.2.11	C	C	C	C	C	C	C	C
2.2.12	C	C	C	C	C	C	C	C
2.3.1	C	C	C	(7)	C	C	C	C
2.3.2	C	C	C	C	C	C	C	C
2.3.3	C	C	C	C	C	C	C	C
2.3.4	C	C	C	(7)	C	C	C	C
2.4	C	C	C	C	C	C	C	C
3.1	C	C	C	C	C	C	C	C
3.2	C	C	C	C	C	C	C	C
3.3	C	C	C	C	C	C	C	C
3.4 a	C	C	C	C	C	C	C	C
3.4 b	C	C	N/A	C	C	C	C	C
4.1	C	C	N/A	N/A	N/A	N/A	N/A	N/A
4.2	N/A	N/A	C	C	C	C	C	C
5.1	C	C	C	C	C	C	C	C
5.2	C	C	C	C	C	C	C	C

McGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED INSIDE CONTAINMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	CONT'MT RAD MON (HIGH RANGE)	CONT'MT RAD MON CABLE	SAFETY VLV POS ACOUSTIC MON
NUREG 0588			
Item 2.1.1 a	(8)	(8)	(9)
2.1.1 b	(8)	(8)	(9)
2.1.2	(8)	(8)	(9)
2.1.3	(8)	(8)	(9)
2.1.3 a	(8)	(8)	(9)
2.1.3 b	(8)	(8)	(9)
2.1.3 b	(8)	(8)	(9)
2.1.4	(8)	(8)	(9)
2.2.1	(8)	(8)	(9)
2.2.2	(8)	(8)	(9)
2.2.3	(8)	(8)	(9)
2.2.4	(8)	(8)	(9)
2.2.5	(8)	(8)	(9)
2.2.6	(8)	(8)	(9)
2.2.7	(8)	(8)	(9)
2.2.8	(8)	(8)	(9)
2.2.9	(8)	(8)	(9)
2.2.10	(8)	(8)	(9)
2.2.11	(8)	(8)	(9)
2.2.12	(8)	(8)	(9)
2.3.1	(8)	(8)	(9)
2.3.2	(8)	(8)	(9)
2.3.3	(8)	(8)	(9)
2.3.4	(8)	(8)	(9)
2.4	(8)	(8)	(9)
3.1	(8)	(8)	(9)
3.2	(8)	(8)	(9)
3.3	(8)	(8)	(9)
3.4 a	(8)	(8)	(9)
3.4 b	(8)	(8)	(9)
4.1	(8)	(8)	(9)
4.2	(8)	(8)	(9)
5.1	(8)	(8)	(9)
5.2	(8)	(8)	(9)

MCGUIRE NUCLEAR STATION - UNIT 1

COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT LOCATED INSIDE CONTAINMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

Note 1

The reported tests on the prototype, Lot 1, and Lot 2 units involve multiple tests on multiple units. The differences between the individual units are known and are minor, and thus the experience in total represents an in-depth knowledge of the characteristics of these transmitters under severe environment conditions. This experience, together with the conservative parameters employed for testing, provide an unparalleled assurance that these units will perform to specification under all anticipated service conditions.

Note 2

Certain Barton transmitters are claimed for short-term functions, that is until the containment pressure reaches the point at which safety injection is initiated by high containment pressure. A conservative estimate indicates that these transmitters are required to perform their short term functions until a containment pressure change of 8 psig has occurred. This pressure corresponds to a maximum containment temperature of 280°F and would occur no later than 3 minutes following the initiation of the break inside containment. Thus, Westinghouse specifies a trip accuracy of ± 10% for up to 5 minutes as a conservative qualification requirement. The Westinghouse qualification program [ ] a,b,c an additional 1 hour while maintaining the specified trip accuracy.

The 1 hour margin requirement has been introduced by the Staff due to concerns over the consequences of transmitter failures after a few minutes into the accident scenario. In particular, that such failures could lead to negation of the safety function or generate information that could mislead the operator. These concerns are not valid in this case due to the manner in which these transmitters are employed and qualified:

Trip Function

The qualification tests demonstrate that the trip accuracy requirement is maintained for up to 5 minutes and that the requisite trip signal will be generated. Once the signal is generated the signal is 'locked-in' by the protection system and will not reset should the transmitter fail to continue to generate the trip signal at some time after 5 minutes. Thus, all automatic protective actions will proceed irrespective of the performance of the transmitter after 5 minutes.

Information to Operator

The transmitter qualification verifies that equipment failures do not occur in a period up to 1 hour and 5 minutes after initiation of the accident. In fact, the qualification verifies that the transmitters will continue to operate for at least 4 months post-accident while maintaining the accuracy requirement specified for post accident monitoring instrumentation.

Note 3

The only difference between the RTD models supplied by Rosemount is in the [ ]^{a,b,c}; therefore, the environmental results reported in WCAP-9157 for Rosemount [ ]^{a,c} are equally applicable to the Rosemount [ ]^{a,c}.

Note 4

The power range neutron detectors are not required to perform any safety functions in an adverse accident environment. However, Westinghouse investigations into potential system interaction scenarios resulting from adverse accident environments identified a possible scenario in which an adverse accident environment resulting from an intermediate steamline break inside the containment could cause a malfunction of the power range neutron detectors. This interaction scenario is one of four which were the subject of IE Information Notice 79-22.

Duke Power Company has analyzed the effects of an adverse accident environment on the power range detectors and has concluded that there are no credible failures of these detectors that could result in unsafe plant conditions.

Note 5

The referenced topical reports, WCAP-7709L (Proprietary) through Supplement 4, and WCAP-7820 (Non-Proprietary) through Supplement 4 which summarize the Westinghouse qualification tests on the Model A Hydrogen Recombiner to IEEE 323-1971, have been reviewed and approved by the NRC as indicated in a letter from D B Vassallo to C E Eicheldinger dated May 1, 1975. This evaluation indicates that the Staff will not require any further review of these documents except to verify the plant specific applicability of the qualification parameters

Note 6

NRC letter dated March 7, 1980 requested Duke to provide justification for the acceptability of separate effects testing for the containment air return and hydrogen skimmer fan motors. Specifically, the NRC Staff's concern was that although the motor insulation system and other motor components are qualified for a radiation environment in excess of the calculated normal plus accident radiation environment, the Motorette testing did not include exposure to a steam environment following exposure to radiation.

Duke Power Company has reviewed the design and testing of these fan motors. We have determined that the combined effects of a radiation environment and a steam environment were previously included in the qualification testing on a complete motor assembly. The motor assembly tested was a valve motor operator composed of the materials identified in Reliance Electric Company Report NUC-9 which are similar to the materials composing the McGuire containment air return and hydrogen skimmer fan motors. This valve motor operator (ID No. 2Y267074A1EZ) was irradiated and examined as reported by Reliance in NUC-9 and then shipped to the Limitorque Corporation where it was successfully tested in a steam environment in accordance with IEEE 382-1972 as reported in Limitorque Test Report 600456. The radiation and steam environmental parameters used in the Reliance and Limitorque tests envelope the accident conditions for the McGuire fan motors. Duke Power Company therefore concludes that in addition to the environmental testing described in Joy Manufacturing Company Test Report X-604, the environmental testing described above further assures the capability of the McGuire containment air return and hydrogen skimmer fan motors to function in the postulated McGuire accident environment.

Note 7

Separate effects radiation testing was performed on the McGuire electrical penetrations. The only effects of the irradiation were a slight increase in the hardness of the elastomeric grommets that provide the environmental seal in the plug and cable assemblies and a color change in the epoxy fiberglass insulators. These effects produced no measureable change in the electrical or mechanical performance of the penetration assemblies; therefore, separate effects testing for radiation is considered acceptable.

Note 8

This equipment is being installed per NRC requirements stated in NUREG 0660. Qualification data will be provided by October 1, 1981 in accordance with the September 5, 1980 clarifications to the NUREG.

Note 9

This equipment is being installed per NRC requirements stated in NUREG 0660. Qualification testing for this equipment is scheduled for completion in December, 1980. The results of this testing will be provided upon receipt and review of the formal report by Duke Power Company.

ATTACHMENT 6

COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT
TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	CONT. SPRAY PUMP MOTORS	RHR PUMP MOTORS	SI PUMP MOTORS	CENT. CHG PUMP MOTORS	NSW PUMP MOTORS	GVD SUMP PUMP MOTORS	COMP. COOL PUMP MOTORS	BAT PUMP MOTORS	BIR PUMP MOTORS
NUREG 0588									
Item 2.1.1a	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.1.1b	C	C	N/A	N/A	N/A	C	N/A	C	C
2.1.2	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.1.3	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.1.3a	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.1.3b	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.3c	C	C	N/A	N/A	N/A	C	N/A	C	C
2.1.4	C	C	N/A	N/A	N/A	C	N/A	C	C
2.2.1	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.2.2	C	C	C	C	C	C	C	C	C
2.2.3	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.6	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.2.7	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.9	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.2.10	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.2.11	C	C	C	C	C	C	C	C	C
2.2.12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2.3.1	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.3.2	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.3.3	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.3.4	N/A	N/A	C	C	C	N/A	C	N/A	N/A
2.4.	N/A	N/A	C	C	C	N/A	C	N/A	N/A
3.1	N/A	N/A	C	C	C	N/A	C	N/A	N/A
3.2	N/A	N/A	C	C	C	N/A	C	N/A	N/A
3.3	N/A	N/A	C	C	C	N/A	C	N/A	N/A
3.4a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.4b	N/A	N/A	C	C	C	N/A	C	N/A	N/A
4.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2	N/A	N/A	C	C	C	N/A	C	N/A	N/A
5.1	C	C	C	C	C	C	C	C	C
5.2	N/A	N/A	C	C	C	N/A	C	N/A	N/A

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	SF COOLING PUMP MOTORS	RHR AND CS AHU, MOTORS	FP AHU MOTORS	TB/ATC COMPONENT SURGE SUPPRESSORS	TP/ATC COMPONENT SL TERM BLOCKS	TB/ATC COMPONENT BUSSMAN FUSEBLOCKS (2808, 3792, 3839, 4439, 4575)	TB/ATC COMPONENT C-H RELAYS (D23, D26)
NUREG 0588							
Item 2.1.1a	C	N/A	C	C	C	C	C
2.1.1b	N/A	C	N/A	N/A	N/A	N/A	N/A
2.1.2	C	N/A	C	C	C	C	C
2.1.3	C	N/A	C	C	C	C	C
2.1.3a	C	N/A	C	C	C	C	C
2.1.3b	N/A	N/A	N/A	C	C	C	C
2.1.3c	N/A	C	N/A	C	C	C	C
2.1.4	N/A	C	N/A	N/A	N/A	N/A	N/A
2.2.1	C	N/A	C	C	C	C	C
2.2.2	C	C	C	C	C	C	C
2.2.3	C	N/A	C	C	C	C	C
2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.6	C	N/A	N/A	N/A	N/A	N/A	C
2.2.7	C	N/A	N/A	N/A	N/A	N/A	C
2.2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.9	C	N/A	N/A	N/A	N/A	N/A	C
2.2.10	C	N/A	C	N/A	N/A	N/A	C
2.2.11	C	C	C	C	C	C	C
2.2.12	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2.3.1	C	N/A	N/A	N/A	N/A	N/A	C
2.3.2	C	N/A	N/A	N/A	N/A	N/A	C
2.3.3	C	N/A	N/A	C	C	C	C
2.3.4	C	N/A	N/A	N/A	N/A	N/A	C
2.4	C	N/A	C	C	C	C	C
3.1	C	N/A	N/A	C	C	C	C
3.2	C	N/A	N/A	C	C	C	C
3.3	C	N/A	N/A	N/A	N/A	N/A	C
3.4a	N/A	N/A	N/A	C	C	C	C
3.4b	C	N/A	N/A	C	C	C	C
4.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2	C	N/A	C	C	C	C	C
5.1	C	C	C	C	C	C	C
5.2	C	N/A	N/A	N/A	N/A	N/A	C

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	TB/ATC COMPONENT C-H SW & IND LIGHTS (E29, E30, 102501)	TB/ATC COMPONENT ANALOG OP ISOL	TB/ATC COMPONENT SD RELAYS	AHU DIFF PRESS SW	FIRESTAT TEMP SW	PNL/CAB COMPONENT VOLT/CURRENT ALARM	ABFXF-CP 1A & 1B	ABFXF-FIRE PROT PANEL
NUREG 0588								
Item 2.1.1a	C	C	C	N/A	N/A	C	N/A	N/A
2.1.1b	N/A	N/A	N/A	C	C	N/A	C	C
2.1.2	C	C	C	N/A	N/A	C	N/A	N/A
2.1.3	C	C	C	N/A	N/A	C	N/A	N/A
2.1.3a	C	C	C	N/A	N/A	C	N/A	N/A
2.1.3b	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.3c	C	N/A	N/A	C	C	N/A	C	C
2.1.4	N/A	N/A	N/A	C	C	N/A	C	C
2.2.1	[illegible]	C	C	N/A	N/A	C	N/A	N/A
2.2.2	C	C	C	C	C	C	C	C
2.2.3	C	C	C	N/A	N/A	C	N/A	N/A
2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.6	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.2.7	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.9	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.2.10	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.2.11	C	C	C	C	C	C	C	C
2.2.12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2.3.1	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.3.2	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.3.3	C	C	C	N/A	N/A	C	N/A	N/A
2.3.4	C	N/A	C	N/A	N/A	N/A	N/A	N/A
2.4	C	C	C	N/A	N/A	C	N/A	N/A
3.1	C	[illegible]	C	N/A	N/A	C	N/A	N/A
3.2	C	C	C	N/A	N/A	C	N/A	N/A
3.3	C	N/A	C	N/A	N/A	N/A	N/A	N/A
3.4a	C	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.4b	C	C	C	N/A	N/A	[illegible]	N/A	N/A
4.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2	C	C	C	N/A	N/A	C	N/A	N/A
5.1	C	C	C	C	C	C	C	C
5.2	C	N/A	C	N/A	N/A	N/A	N/A	N/A

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO HELB ENVIRONMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	ABFXF-1A MOTORS	AV FILTER UNIT 1A, 1B	ANNULUS VENT FAN MOTOR 1A	ANNULUS VENT DAMPER MOTORS	STARTER/CONTACTOR U A201 J3CA	VALVE SOLENOID OPERATORS (VALCOR, ASCO)	VALVE MOTOR OPERATORS (LIMITORQUE, ROTORK)	LIMIT SWITCHES (NAMCO)	CABLES (ALL SUPPLIERS)
NUREG 0588									
Item 2.1.1a	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.1.1b	C	C	C	C	C	N/A	N/A	N/A	N/A
2.1.2	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.1.3	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.1.3a	N/A	N/A	N/A	N/A	N/A	C	(2)	C	C
2.1.3b	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.1.3c	C	C	C	C	C	C	C	C	C
2.1.4	C	C	C	C	C	N/A	N/A	N/A	C
2.2.1	N/A	N/A	N/A	N/A	N/A	C	C	C	N/A
2.2.2	C	C	C	C	C	C	(2)	C	C
2.2.3	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.6	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.2.7	N/A	N/A	N/A	N/A	N/A	C	(2)	C	C
2.2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.9	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.2.10	N/A	N/A	N/A	N/A	N/A	C	C	C	N/A
2.2.11	C	C	C	C	C	C	C	C	C
2.2.12	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
2.3.1	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.3.2	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.3.3	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.3.4	N/A	N/A	N/A	N/A	N/A	C	C	C	C
2.4	N/A	N/A	N/A	N/A	N/A	C	C	C	N/A
3.1	N/A	N/A	N/A	N/A	N/A	C	C	C	C
3.2	N/A	N/A	N/A	N/A	N/A	C	C	C	C
3.3	N/A	N/A	N/A	N/A	N/A	C	C	C	C
3.4a	N/A	N/A	N/A	N/A	N/A	C	(2)	C	C
3.4b	N/A	N/A	N/A	N/A	N/A	C	(2)	C	C
4.1	N/A	N/A	N/A	N/A	N/A	C	C	N/A	C
4.2	N/A	N/A	N/A	N/A	N/A	C	C	C	C
5.1	C	C	C	C	C	C	C	C	C
5.2	N/A	N/A	N/A	N/A	N/A	C	C	C	C

MCGUIRE NUCLEAR STATION - UNIT 1

COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO THE HELB ENVIRONMENT TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

Note 1

The radiation qualification information required in response to NUREG 0588 and Item 2.1.6.b of NUREG 0578 is provided in Attachment 3 and Attachment 7.

Note 2

Rotork Test Report TR-3025 shows that when the qualified temperature for these valves is exceeded, the torque switches may fail on the next operation of the valve. Since at least one additional operation is available after the valve's temperature qualification has been exceeded, the valve can be relied upon to move to its safety position.

ATTACHMENT 7

COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT
AND EXPOSED TO THE POST-LOCA RECIRCULATION RADIATION ENVIRONMENT
TO THE DUKE POSITION ON THE CATEGORY II GUIDELINES OF NUREG 0588

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO POST-LOCA RECIRCULATION RADIATION ENVIRONMENT TO THE DUKE POSITION ON
THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	BORIC ACID TRANSFER PUMP MOTORS	BORON INJ. RECIRC. PUMP MOTORS	CENT. CHG. PUMP MOTORS	CONT. SPRAY PUMP MOTORS	FUEL POOL COOLING PUMP MOTORS	RHR PUMP MOTORS	RHR&CS ROOMS SUMP PUMP MOTORS
NUREG 0588							
Item 2.1.1a	N/A	N/A	C	C	C	C	C
2.1.1b	C	C	N/A	N/A	N/A	N/A	N/A
2.1.2	N/A	N/A	C	C	C	C	C
2.1.3	N/A	N/A	C	C	C	C	C
2.1.3a	N/A	N/A	C	C	C	C	C
2.1.3b	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.3c	C	C	N/A	N/A	N/A	N/A	N/A
2.1.4	C	C	N/A	N/A	N/A	N/A	N/A
2.2.1	N/A	N/A	C	C	C	C	C
2.2.2	C	C	C	C	C	C	C
2.2.3	N/A	N/A	C	C	C	C	C
2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.7	N/A	N/A	C	C	C	C	C
2.2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.9	N/A	N/A	C	C	C	C	C
2.2.10	N/A	N/A	C	C	C	C	C
2.2.11	C	C	C	C	C	C	C
2.2.12	N/A	N/A	C	C	C	C	C
2.3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.3.2	N/A	N/A	C	C	C	C	C
2.3.3	N/A	N/A	C	C	C	C	C
2.3.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.4	N/A	N/A	C	C	C	C	C
3.1	N/A	N/A	C	C	C	C	C
3.2	N/A	N/A	C	C	C	C	C
3.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.4a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.4b	N/A	N/A	C	C	C	C	C
4.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2	N/A	N/A	C	C	C	C	C
5.1	C	C	C	C	C	C	C
5.2	N/A	N/A	C	C	C	C	C

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO POST-LOCA RECIRCULATION RADIATION ENVIRONMENT TO THE DUKE POSITION ON
THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	SI PUMP MOTORS	ANNULUS VENT FAN MOTORS	AUX BLDG FILTERED EXH FAN MOTORS	DG VENT FAN MOTORS	FP COOLING PUMP AHU MOTORS	RHR PUMP AHU MOTORS	600 VOLT LOAD CENTERS
NUREG 0588							
Item 2.1.1a	C	C	C	C	C	C	C
2.1.1b	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.2	C	C	C	C	C	C	C
2.1.3	C	C	C	C	C	C	C
2.1.3a	C	C	C	C	C	C	C
2.1.3b	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.3c	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.1.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.1	C	C	C	C	C	C	C
2.2.2	C	C	C	C	C	C	C
2.2.3	C	C	C	C	C	C	C
2.2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.7	C	C	C	C	C	C	C
2.2.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.2.9	C	C	C	C	C	C	C
2.2.10	C	C	C	C	C	C	C
2.2.11	C	C	C	C	C	C	C
2.2.12	C	C	C	C	C	C	C
2.3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.3.2	C	C	C	C	C	C	C
2.3.3	C	C	C	C	C	C	C
2.3.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.4	C	C	C	C	C	C	C
3.1	C	C	C	C	C	C	C
3.2	C	C	C	C	C	C	C
3.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.4a	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.4b	C	C	C	C	C	C	C
4.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.2	C	C	C	C	C	C	C
5.1	C	C	C	C	C	C	C
5.2	C	C	C	C	C	C	C

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO POST-LOCA RECIRCULATION RADIATION ENVIRONMENT TO THE DUKE POSITION ON
THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	600 VOLT MOTOR CONTROL CTRS	DIESEL BATTERY	DIESEL BATTERY CHGR	RCP SWGR POT. TRANSFORMER	VALVE MOTOR OPERATORS (LIMITORQUE, ROTORK)	VALVE SOLENOID OPERATORS (VALCOR, ASCO)	LIMIT SWITCHES (NAMCO)
NUREG 0588							
Item 2.1.1a	C	(1)	(1)	C	C	C	C
2.1.1b	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.1.2	C	(1)	(1)	C	C	C	C
2.1.3	C	(1)	(1)	C	C	C	C
2.1.3a	C	(1)	(1)	C	C	C	C
2.1.3b	N/A	(1)	(1)	N/A	C	C	C
2.1.3c	N/A	(1)	(1)	N/A	C	C	C
2.1.4	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.2.1	C	(1)	(1)	C	C	C	C
2.2.2	C	(1)	(1)	C	C	C	C
2.2.3	C	(1)	(1)	C	C	C	C
2.2.4	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.2.5	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.2.6	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.2.7	C	(1)	(1)	C	C	C	C
2.2.8	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.2.9	C	(1)	(1)	C	C	C	C
2.2.10	C	(1)	(1)	C	C	C	C
2.2.11	C	(1)	(1)	C	C	C	C
2.2.12	C	(1)	(1)	C	C	C	C
2.3.1	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.3.2	C	(1)	(1)	C	C	C	C
2.3.3	C	(1)	(1)	C	C	C	C
2.3.4	N/A	(1)	(1)	N/A	N/A	N/A	N/A
2.4	C	(1)	(1)	C	C	C	C
3.1	C	(1)	(1)	C	C	C	C
3.2	C	(1)	(1)	C	C	C	C
3.3	N/A	(1)	(1)	N/A	N/A	N/A	N/A
3.4a	N/A	(1)	(1)	N/A	N/A	N/A	N/A
3.4b	C	(1)	(1)	C	C	C	C
4.1	N/A	(1)	(1)	N/A	N/A	N/A	N/A
4.2	C	(1)	(1)	C	C	C	C
5.1	C	(1)	(1)	C	C	C	C
5.2	C	(1)	(1)	C	C	C	C

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS IE EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO POST-LOCA RECIRCULATION RADIATION ENVIRONMENT TO THE DUKE POSITION ON
THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	HVAC DAMPER MOTORS	HVAC 3-WAY SOLENOID VALVE	PROP TEMP CONTROLLER	HIGH TEMP THERMOSTAT	RTD (WEED)	DIFF. PRESS. SWITCH	LIMIT SWITCH (MICRO SWITCH)
NUREG 0588							
Item 2.1.1a	C	(2)	(2)	(2)	(2)	(2)	C
2.1.1b	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.1.2	C	(2)	(2)	(2)	(2)	(2)	C
2.1.3	C	(2)	(2)	(2)	(2)	(2)	C
2.1.3a	C	(2)	(2)	(2)	(2)	(2)	C
2.1.3b	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.1.3c	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.1.4	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.2.1	C	(2)	(2)	(2)	(2)	(2)	C
2.2.2	C	(2)	(2)	(2)	(2)	(2)	C
2.2.3	C	(2)	(2)	(2)	(2)	(2)	C
2.2.4	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.2.5	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.2.6	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.2.7	C	(2)	(2)	(2)	(2)	(2)	C
2.2.8	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.2.9	C	(2)	(2)	(2)	(2)	(2)	C
2.2.10	C	(2)	(2)	(2)	(2)	(2)	C
2.2.11	C	(2)	(2)	(2)	(2)	(2)	C
2.2.12	C	(2)	(2)	(2)	(2)	(2)	C
2.3.1	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.3.2	C	(2)	(2)	(2)	(2)	(2)	C
2.3.3	C	(2)	(2)	(2)	(2)	(2)	C
2.3.4	N/A	(2)	(2)	(2)	(2)	(2)	N/A
2.4	C	(2)	(2)	(2)	(2)	(2)	C
3.1	C	(2)	(2)	(2)	(2)	(2)	C
3.2	C	(2)	(2)	(2)	(2)	(2)	C
3.3	N/A	(2)	(2)	(2)	(2)	(2)	N/A
3.4a	N/A	(2)	(2)	(2)	(2)	(2)	N/A
3.4b	C	(2)	(2)	(2)	(2)	(2)	C
4.1	N/A	(2)	(2)	(2)	(2)	(2)	N/A
4.2	C	(2)	(2)	(2)	(2)	(2)	C
5.1	C	(2)	(2)	(2)	(2)	(2)	C
5.2	C	(2)	(2)	(2)	(2)	(2)	C

MCGUIRE NUCLEAR STATION - UNIT 1
COMPARISON OF THE ENVIRONMENTAL QUALIFICATION OF CLASS 1E EQUIPMENT
LOCATED OUTSIDE CONTAINMENT AND EXPOSED TO POST-LOCA RECIRCULATION RADIATION ENVIRONMENT TO THE DUKE POSITION ON
THE CATEGORY II GUIDELINES OF NUREG 0588

EQUIPMENT IDENTIFICATION	CABLES (ALL SUPPLIERS)	CONT SUMP LEVEL XMITTER	TB/ATC COMPONENTS
NUREG 0588			
Item 2.1.1a	C	C	(3)
2.1.1b	N/A	N/A	(3)
2.1.2	C	C	(3)
2.1.3	C	C	(3)
2.1.3a	C	C	(3)
2.1.3b	C	N/A	(3)
2.1.3c	C	N/A	(3)
2.1.4	N/A	N/A	(3)
2.2.1	C	C	(3)
2.2.2	C	C	(3)
2.2.3	C	C	(3)
2.2.4	N/A	N/A	(3)
2.2.5	N/A	N/A	(3)
2.2.6	N/A	N/A	(3)
2.2.7	C	C	(3)
2.2.8	N/A	N/A	(3)
2.2.9	C	C	(3)
2.2.10	C	C	(3)
2.2.11	C	C	(3)
2.2.12	C	C	(3)
2.3.1	N/A	N/A	(3)
2.3.2	C	C	(3)
2.3.3	C	C	(3)
2.3.4	N/A	N/A	(3)
2.4	C	C	(3)
3.1	C	C	(3)
3.2	C	C	(3)
3.3	N/A	N/A	(3)
3.4a	N/A	N/A	(3)
3.4b	C	C	(3)
4.1	N/A	N/A	(3)
4.2	C	C	(3)
5.1	C	C	(3)
5.2	C	C	(3)