TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

500C Chestnut Street Tower II

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Mr. Norman C. Moseley, Director
Division of Reactor Operations Inspection
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Moseley:

OFFICE OF INSPECTION AND ENFORCEMENT BULLETIN 79-01 - RII:JPO
50-259, -260, -296 - BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3

In response to J. P. O'Reilly's February 8, 1979, letter which transmitted IE Bulletin 79-01, we are enclosing a final report outlining the results of our investigations at Browns Ferry.

Very truly yours,

J. E. Gilleland
Assistant Manager of Power

Enclosure
cc: Mr. James P. O'Reilly, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
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ENCLOSURE

RESPONSE TO IE BULLETIN 79-01
FOR BROWNS FERRY NUCLEAR PLANT

TVA has surveyed the electrical equipment installed at Browns Ferry Nuclear Plant inside primary containment that is required to function under accident conditions, and examined the documentation for its environmental qualification. Specific equipment items are listed followed by a reference to the appropriate qualification documents. Also attached are data sheets giving the component description, description of the accident environment, the environment to which the component is qualified, test method, and reference document. The following contains the results of our survey.

Item 1 - Connectors

Gulton and Amphenol electrical connectors associated with units 1 and 2 have been qualified for a 10-year life in accordance with Wyle Laboratories test report No. 43854-1 dated March 23, 1978.

Bendix connectors associated with unit 3 have been qualified for a 10-year life in accordance with Wyle Laboratories test report No. 44107-1 dated September 19, 1978.

Item 2 - Penetrations

Physical Science Corporation: Test reports from the Physical Science Corporation dated May 4, 1970, (test report No. 18312) show dielectric and leak tests were successfully performed at a temperature of 310 degrees Fahrenheit and a pressure of 60 psig. The manufacturer has stated that the penetration will successfully operate at temperatures of up to 400 degrees Fahrenheit. It should also be noted that tests were conducted by Wyle Laboratories (test report No. 43854-1 dated March 23, 1978) on electrical connectors with several connectors attached to a Physical Science penetration. The two test reports supply sufficient qualification data for the Physical Science penetrations. These penetrations are used in units 1 and 2.

General Electric Company (GE) Series 100: GE Series 100 penetrations have been qualified in accordance with GE Low Voltage Qualification Test Report No. 74-502-3 dated September 1973 and Low Voltage Qualification Test Report Addendum No. 1 dated March 1974. These penetrations have been used as replacement penetrations on units 1 and 2.

GE Cannister-Type: GE cannister-type penetrations have been qualified in accordance with GE Prototype Testing Qualification Reports EPAQ-007, -008, -009, -046, -055, -056, -057, and -061 dated March 16, 1970. These penetrations are used on unit 3.

Item 3 - Terminal Blocks

There are no unprotected terminal blocks used on the Browns Ferry units which must function in a post-accident environment (see response to IE Bulletin 78-02 for Browns Ferry dated February 13, 1978, J. E. Gilleland to J. P. O'Reilly).

Item 4 - Limit Switches

The subject limit switches referenced in IE Circular 78-08 were not installed in any containment at Browns Ferry (see response to IE Bulletin 78-04 for Browns Ferry dated March 23, 1978, J. E. Gilleland to J. P. O'Reilly). IE Bulletin 79-01 expanded the list of unqualified limit switches. Notification to the Nuclear Regulatory Commission (NRC) was made on February 23, 1979, informing the NRC of the use of a Namco model SL3-B2W (present model EA-700) limit switch on the inboard main steam isolation valves at Browns Ferry. NRC was also notified on April 10, 1979, of the use of a Namco model SL2-C11 limit switch on a testable check valve in the core spray system at Browns Ferry. In both cases it was concluded that environmental qualification of the subject switches is unnecessary. No other limit switches which are required to function under accident conditions have been found in the containment area at Browns Ferry.

Item 5 - Cable Splices

Electrical cable splices associated with electrical penetration assemblies were confirmed to be qualified in correspondence from GE dated June 26, 1978. These splices were qualified during the tests conducted by GE on the cannister-type and Series 100 penetrations.

Electrical cable splice assemblies were also qualified in accordance with Wyle Laboratories test report No. 43854-3 dated April 26, 1978.

Item 6 - Cables

There are four types of cables used on equipment in the containment areas at Browns Ferry. They are TVA-types CPJ and CPJJ, GE-type Vulkene, and ITT-type Surprenant. The Wyle Laboratories test on the electrical cable splices assemblies (test report No. 43854-3 dated April 26, 1978) contained splices using cables of the Vulkene, CPJ, and CPJJ types. No cable failures were reported during this test. We consider this sufficient qualification.

The ITT cable has been qualified in accordance with Isomedix Test Report No. 375-02 dated March 1975.

In addition to the above tests, cable samples were installed in each units' containment to study the long-range effects of radiation and temperature on these cables. The installation dates were as follows.

Unit 1 - December 12, 1978
Unit 2 - June 1, 1978
Unit 3 - October 1978

These cables will be sampled periodically to determine the rate of cable deterioration from the effects of radiation and temperature.

Item 7 - Primary Containment Hydrogen Sensor

The primary containment hydrogen sensor has been qualified in accordance with GE test report (GE IRT-QTR-063) dated March 12, 1976.

Item 8 - Limitorque Valve Operators

The following test reports provide qualification of the Limitorque valve operators.

1. Franklin Institute Research Laboratories Test Report No. F-C2232-01 dated November 1968.

2. Limitorque Company Test Laboratory Limitorque Valve actuators for PWR Service/Project No. 600456, dated June 7, 1974, through November 22, 1974.

3. Limitorque Valve Control Test Report January 2, 1969, Engineering Order No. 600198.

4. Lockheed Electronics Company Test Report No. 2120-4594 dated July 31, 1968.

Item 9 - Valve Motors

Notification was made to NRC on March 13, 1979, informing NRC of the use of Class B motor winding insulation on two motor-operated valves located in the containment area. These valves are FCV-1-55 (Main Steam Line Drain) and FCV-74-78 (RHR Head Spray). These valve motors are to be rewound using wire with a Class H insulation rating during the next refueling outage of each unit. As of this date, this work has been completed on unit 2, with plans to complete this work on units 1 and 3 this fall.

Item 10 - Target Rock Relief Valves (Three-stage, model 67F)

The ASCO solenoid valves (ASCO Cat. No. WTHTX 8300 B68F) used on ADS relief valves has been qualified in accordance with Plant Equipment Design Engineering Memorandum No. 126-62, dated January 15, 1975.

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Item 11 - Target Rock Relief Valves (Two-Stage model 756F ADS valves for units 1 and 2)

The solenoid (Trombetta model No. 1/2 SMS-A-01) on the replacement Target Rock relief valves used for ADS on units 1 and 2 has been qualified in accordance with Target Rock Test Procedure No. 2063C dated February 21, 1977, and Qualification Report No. 2199A dated January 9, 1979.

REFERENCE DOCUMENTS

1. Wyle Laboratories Report 43854-1 dated March 23, 1978
2. Wyle Laboratories Report 44107-1 dated September 19, 1978
3. General Electric Report 74-502-3
4. General Electric Report EPAQ-007
5. General Electric Report EPAQ-008
6. General Electric Report EPAQ-009
7. General Electric Report EPAQ-046
8. General Electric Report EPAQ-055
9. General Electric Report EPAQ-056
10. General Electric Report EPAQ-057
11. General Electric Report EPAQ-061
12. Wyle Laboratories Report 43854-3 dated April 26, 1978
13. General Electric Report IRT-QTR-063 dated March 12, 1976
14. Franklin Institute Research Laboratories Test Report F-C2232-01
15. Plant Equipment Design Engineering Memorandum No. 126-62
16. Target Rock Report 2199A dated January 9, 1979
17. Limitorque Corporation Test Laboratories Project 600456
18. Isomedix Report 375-02 dated March 1975

ITEM	EQUIPMENT DESCRIPTION	TIME REQ'D-	ENVIRONMENT (LOCATION) PARAMETER	SPEC.	QUAL.	QUAL. METHOD*	DOC. REF**	REMARKS
1	Connectors					Sequential	1	Aged 864 hours @ 250° F
	Gulton 6448 - 1 or 2 plug		Temp. (°F)	325	325 ± 2			
	6445 - 1 or 2 receptacle		Press. (psia)	69.7	92.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6 X 10^7 Rad	6.9 X 10^7 Rad			
			Chem.					
2	Connectors					Sequential	2	Connectors potted with Scotch
	Bendix		Temp. (°F)	325	325 ± 2			Cast Resin No. 9
	10-214628-51S plug		Press. (psia)	69.7	92.7			Aged 174 hours @ 217° F in air
	10-214028-51P receptacle		Rel. Hum.	100%	100%			then 1140 hours @ 217° F in
	10-214636-78S plug		Radiation	2.6 X 10^7 Rad	6.9 X 10^7 Rad			nitrogen
	10-214036-78P receptacle		Chem.					
3	Penetrations					Sequential	1	Aged 846 hours @ 250° F
	Physical Science		Temp. (°F)	325	325 ± 2			
	canister-type		Press. (psia)	69.7	92.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6 X 10^7 Rad	6.9 X 10^7 Rad			
			Chem.					
4	Penetrations					Sequential	3	Aged by thermal cycling 120
	GE Series 100		Temp. (°F)	325	340			times from 50° F to 150° F
			Press. (psia)	69.7	117.7			in ≤ 24 hours
			Rel. Hum.	100%	100%			
			Radiation	2.6 X 10^7 Rad	5 X 10^7 Rad			
			Chem.		pH ≥ 8.4			

This list is a compilation of items by component. Do not list the same type of component more than once. Use limiting environment where more than one applies.

*ie, separate effects, sequential, etc.
**please attach typed lists of reference documents

PLANT NAME: Browns Ferry Nuclear Plant Units 1 - 2

ITEM	EQUIPMENT DESCRIPTION	TIME REQ'D.	ENVIRONMENT (LOCATION) PARAMETER	SPEC.	QUAL.	QUAL. METHOD*	DOC. REF**	REMARKS
5	Penetration					Sequential	4, 5, 6, 7, 8, 9, 10, 11	Only the epoxy was subjected to radiation
	GE canniater-type		Temp. (^{0}F)	325	352			
			Press. (psia)	69.7	138.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	10^8 Rad			
			Chem.					
6	Cables					Sequential	12	Aged 168 hours @ 250°F in air
	CPJ (XLP with PVC jacket)		Temp. (^{0}F)	325	324.8			
			Press. (psia)	69.7	93			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	6.9×10^7 Rad			
			Chem.					
7	Cable					Sequential	12	Aged 168 hours @ 250°F in air
	Vulkene (GE XLP)		Temp. (^{0}F)	325	324.8			
			Press. (psia)	69.7	93			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	6.9×10^7 Rad			
			Chem.					
8	Cable					Sequential	12	Aged 168 hours @ 250°F in air
	CPJJ (XLP multiconductor with PVC jacket)		Temp. (^{0}F)	325	324.8			
			Press. (psia)	69.7	93			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	6.9×10^7 Rad			
			Chem.					

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Use limiting environment where [illegible] than one applies. **please attach typed lists of reference documents

ITEM	EQUIPMENT DESCRIPTION	TIME REQ'D.	ENVIRONMENT (LOCATION) PARAMETER	SPEC.	QUAL.	QUAL. METHOD*	DOC. REF**	REMARKS
9	Cable					Sequential	18	Aged 7 days @ 300° F
	ITT Surprenant Exane		Temp. (°F)	325	340			
			Press. (psia)	69.7	127.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	2.0×10^8 Rad			
			Chem.		3000 ppm boron,	.064 molare sodium thiosulfate, sodium hydroxide pH 9.10		
10	Cable Splices					Sequential	12	Aged 168 hours @ 250° F
	Type CPJ, Vulkene, and		Temp. (°F)	325	324.8			in air
	CPJJ cables covered with		Press. (psia)	69.7	93			
	Raychem nuclear Grade heat		Rel. Hum.	100%	100%			
	shrinkable sleeving		Radiation	2.6×10^7 Rad	6.9×10^7 Rad			
			Chem.					
11	H_2 Sensors					Sequential	13	
	GE part No. 47E226428-G2		Temp. (°F)	325	331			
			Press. (psia)	69.7	64.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	3.2×10^7 Rad			
			Chem.					
12	Valve operators					Sequential	14	Conditioned 325° F for 12 ½
	Limitorque SMB-0-15		Temp. (°F)	325	328			hours, preaging 180° C for
			Press. (psia)	69.7	104.7			100 hours
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad				
			Chem.		1.5% boric acid	buffered with sodium hydroxide to pH of 7.67		

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(Sheet No. Arkansas Nuclear Plant Units 1 - 2)

ITEM	EQUIPMENT DESCRIPTION	TIME REQ'D.	ENVIRONMENT (LOCATION) PARAMETER	SPEC.	QUAL.	QUAL. METHOD*	DOC. REF**	REMARKS
13	Valve operator Limitorque					Sequential	17	Aged for 100 hours @ 180° C,
	model SMB-0-40		Temp. (°F)	325	310			cycled 1208 times
			Press. (psia)	69.7	84.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	2.04×10^8 Rad			
			Chem.		pH 10.5 ≤ pH ≤ 11.1			
14	Solenoids ADS					Sequential	15	Aged by cycling 20C times
	ASCO model WPHTX8300B681		Temp. (°F)	325	340			
			Press. (psia)	69.7	79.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	3×10^7 Rad			
			Chem.					
15	Relief Valves					Sequential	16	Aged for 480 hours @ 285° F
	2 stage Target Rock model		Temp. (°F)	325	340			cycled 8000 times
	7567F with solenoid		Press. (psia)	69.7	79.7			
			Rel. Hum.	100%	100%			
			Radiation	2.6×10^7 Rad	3.26×10^7 Rad			
			Chem.					
			Temp. (°F)					
			Press. (psia)					
			Rel. Hum.					
			Radiation					
			Chem.					

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