EQDP-HE-10C
Rev. 0, 5/84

EQUIPMENT QUALIFICATION DATA PACKAGE

This document contains information, relative to the qualification of the equipment identified below, in accordance with the methodology of WCAP 8587. The Specification section (Section 1) defines the assumed limits for the equipment qualification and constitute interface requirements to the user.

HEAD VENT SYSTEM

Modulating Valve (HE-10C)

This system also includes the following pieces of equipment:

Solenoid Operated Isolation Valve (HE-10A)
Electronic Control Module (HE-10B)

Separate Equipment Qualification Data Packages (EQDPs) and Equipment Qualification Test Reports (EQTRs) have been developed for each of the above pieces of equipment utilized in the Head Vent System.

APPROVED: _____
for E. P. Rahe, Manager
Nuclear Safety Department

Westinghouse Electric Corporation
Nuclear Energy Systems
P.O. Box 355
Pittsburgh, Pennsylvania 15230

MODULATING VALVE

SECTION 1 - SPECIFICATIONS

1.0 PERFORMANCE SPECIFICATIONS

1.1 Electrical Requirements

1.1.1 Voltage: 90-140 VDC

1.1.2 Frequency: N/A

1.1.3 Load: N/A

1.1.4 Electromagnetic Interference: N/A

1.1.5 Other: N/A

1.2 Installation Requirements: The valves must be installed such that the opening to the solenoid enclosure from the conduit hub is effectively sealed from exterior moisture. These valves are line mounted in any orientation.

1.3 Auxiliary Devices: Modulating Valve Controller

1.4 Preventative Maintenance Schedule: Per the Westinghouse Equipment Qualification test program, no preventive maintenance is required to support the equipment qualified life of 6.16 years as specified in Section 1.9. This does not preclude development of a preventive maintenance program designed to enhance equipment performance and identify unanticipated equipment degradation as long as this program does not compromise the qualification status of the equipment. Surveillance activities may also be considered to support the basis for/and a possible extension of the qualified life.

1.5 Design Life: 40 years

1.6 Operating Cycles (Expected number of cycles during design life, including test): 20,000 for a 40 year life.

1.7 Performance Requirements for [b]: Solenoid Operated Modulation Valve

	Parameter	Normal Conditions	Abnormal Conditions	Containment Test Conditions	DBE Conditions(a) FLB/SLB	DBE Conditions(a) LOCA	DBE Conditions(a) Seismic	Post DBE Conditions(a) FLB/SLB	Post DBE Conditions(a) LOCA	Post DBE Conditions(a) Seismic
1.7.1	Time requirement	continuous	Included under normal	Test duration	<24 hrs.	<24 hrs.	Event duration	1 year	1 year	Continuous
1.7.2	Performance requirement	Note C		No damage	Note C	Note C	Note C	Note C	Note C	Note C
1.8	Environmental Conditions for Same Function [b]									
1.8.1	Temperature(°F)	50-120	Included under normal	Ambient	Fig. 2	Fig. 3	Ambient	Fig. 2	Fig. 3	Ambient
1.8.2	Pressure (psig)	-6.7/+2.3		70	Fig. 2	Fig. 3	Ambient	Fig. 2	Fig. 3	Ambient
1.8.3	Humidity (Percent RH)	10-100		Ambient	100	100	Ambient	100	100	Ambient
1.8.4	Radiation (R)	1.75×10^7 $_\gamma$ 1.0×10^5 Neutron per square centimeter second		None	3.5×10^4 $_\gamma$ 1.8×10^5 $_\beta$ Fig. 4 and 6	2.3×10^7 $_\gamma$ 1.7×10^8 $_\beta$ Fig. 5 and 7	None	1.2×10^5 $_\gamma$ 7.8×10^5 $_\beta$ Fig. 4 and 6	1.3×10^8 $_\gamma$ 1.3×10^9 $_\beta$ Fig. 5 and 7	None
1.8.5	Chemicals	None		None	Note d	Note d	None	Note d	Note d	None
1.8.6	Vibration	Figure 1		None	None	None	None	None	None	None
1.8.7	Acceleration(g)	None		None	None	None	3.2/3.2/3.2 (OBE) 4/4/4 (SSE)	None	None	None

Notes:
a: DBE is the Design Basis Event.
b: Margin is not included in the parameters of this section.
c: The valve stroke time, fully closed to fully open or fully open to fully closed, shall not exceed ten (10) seconds.
d: The spray solution contains 2500 ppm Boron buffered with 0.88 percent dissolved Sodium Hydroxide to maintain a ph of 10.5.

1.9 Qualified Life: The demonstrated qualified life is 6.16 years based on the actual test conditions identified in Table 1

1.10 Remarks:

None

SECTION 2 - QUALIFICATION BY TEST

2.0 TEST PLAN

The complete sequence of type testing for the Target Rock Corporation (TRC) 1" Solenoid Operated Modulation Valve was conducted at several different test facilities. The inservice thermal aging simulation, mechanical cycling test, containment pressure test simulation, vibration aging, siesmic simulation, and the Design Basis Environment test and qualification functional testing were conducted at American Environment Co., Inc., a division of East West Technology in West Babylon, N.Y. The inservice and accident gamma radiation testing was performed by Isomedix, Inc., in Parisippany, N.J. The inservice neutron radiation testing was performed at the State University of N.Y. at Buffalo.

2.1 Equipment Description: Target Rock Corporation, "one inch solenoid operated modulating valve", model 79AB-003, Design Number 1033110-1.

2.2 Number Tested: 1

2.3 Mounting: As defined in Section 1.2

2.4 Connections: As specified by manufacturer on the applicable valve assembly drawings and as defined in Section 1.2

2.5 Aging Simulation Procedure

By a sequential type test program as described by Subprogram A of Appendix B to WCAP-8587 and reported in Reference 1.

2.6 Service Conditions to be Simulated by Test[1]

		Normal	Abnormal	Containment Test	Seismic	HELB/LOCA	Post-HELB/LOCA
2.6.1	Temp. (°F)	50-120	Included under normal	Ambient	Ambient	Fig. 8	Fig. 8
2.6.2	Pressure (psig)	-6.7/+2.3		80	Ambient	Fig. 8	Fig. 8
2.6.3	Humidity (Percent RH)	10-100 percent		Ambient	Ambient	100 percent	100 percent
2.6.4	Radiation (R)	2.0×10^7 γ 1.0×10^5 Neutron/cm^2 sec		None	None	1.8×10^8 γ	Included under HELB/LOCA
2.6.5	Chemicals	None		None	None	Note(a)	Note(a)
2.6.6	Vibration	See Fig. 1		None	None	None	None
2.6.7	Acceleration (g)	None		None	3.2/3.2/3.2 (OBE) 4/4/4 (SSE)	None	None

NOTE: (a) The spray solution contains 2500 PPm Boron buffered with 0.88 percent dissolved Sodium Hydroxide to maintain a PH of 10.5.

2.7 Measured Variables

This section identifies the parameters required to be measured during the test sequence(s).

			Required	Not Required
2.7.1	Category I - Environment			
	2.7.1.1	Temperature	B, E	A,C,D
	2.7.1.2	Pressure	B, E	A,C,D
	2.7.1.3	Moisture		A,B,C,D,E
	2.7.1.4	Composition	E	A,B,C,D
	2.7.1.5	Seismic Acceleration	C	A,B,D,E
	2.7.1.6	Time	B,C,D,E	A
2.7.2	Category II - Input Electrical Characteristics			
	2.7.2.1	Voltage	A,B,C,E	D
	2.7.2.2	Current	A,B,C,E	D
	2.7.2.3	Frequency		A,B,C,D,E
	2.7.2.4	Power		A,B,C,D,E
	2.7.2.5	Other		A,B,C,D,E
2.7.3	Category III - Fluid Characteristics			
	2.7.3.1	Chemical Composition	E	A,B,C,D
	2.7.3.2	Flow Rate	E	A,B,C,D
	2.7.3.3	Spray	E	A,B,C,D
	2.7.3.4	Temperature	E	A,B,C,D
2.7.4	Category IV - Radiological Features			
	2.7.4.1	Energy Type	D	A,B,C,E
	2.7.4.2	Energy Level	D	A,B,C,E
	2.7.4.3	Dose Rate	D	A,B,C,E
	2.7.4.4	Integrated Dose	D	A,B,C,E

		Required	Not Required
2.7.5	Category V - Electrical Characteristics		
2.7.5.1	Insulation Resistance	A,C,E	B,D
2.7.5.2	Output Voltage		A,B,C,D,E
2.7.5.3	Output Current		A,B,C,D,E
2.7.5.4	Output Power		A,B,C,D,E
2.7.5.5	Response Time		A,B,C,D,E
2.7.5.6	Frequency Characteristics		A,B,C,D,E
2.7.5.7	Simulated Load		A,B,C,D,E
2.7.6	Category VI - Mechanical Characteristics		
2.7.6.1	Thrust	NA	
2.7.6.2	Torque	NA	
2.7.6.3	Time	NA	
2.7.6.4	Load Profile	NA	
2.7.7	Category VII - Auxiliary Equipment	NA	

A. Performance Tests
B. Environmental Aging Tests
C. Vibration - Seismic Tests
D. Radiation Test
E. DBE Environment Test

2.8 Test Sequence Preferred

This section identifies the preferred test sequences as specified in IEEE-323-74

2.8.1 Inspection of Test Item
2.8.2 Operation (Normal Condition)
2.8.3 Operation (Performance Specifications Extremes, Section 1)
2.8.4 Simulated Aging
2.8.5 Vibration/Seismic
2.8.6 Operation (Simulated High Energy Line Break Conditions)
2.8.7 Operation (Simulated Post HELB Conditions)
2.8.8 Disassembly and Inspection

2.9 Test Sequence Actual

The sample solenoid valves were type tested in accordance with the preferred test sequence identified in Section 2.8.

2.10 Type Test Data

2.10.1 Objective

The objective of this test program is to demonstrate, employing the recommended practices of Reg. Guide 1.89 (IEEE-323-1974), Reg. Guide 1.100 (IEEE 344-1975) and Reg. Guide 1.73 (IEE-382-1972), the capability of the TRC 1" Globe Solenoid Operated Modulation Valves to complete their safety-related function(s) described in EQDP Section 1.7 while exposed to the applicable environments defined in EQDP Section 1.8.

2.10.2 Equipment Tested

A sample component from the Generic Design was identified randomly and type tested. Manufacturing processes, production tests and materials of construction for the generic design are monitored and controlled and a quality release provided. The sample component selected from the Generic Component Group completed the entire test sequence of Section 2.8.

2.10.3 Test Summary

2.10.3.1 The test valve was randomly selected from a production run, for Westinghouse, as specified by Westinghouse equipment Specification G-955186.

2.10.3.2 The valve was initially performance tested in accordance with the manufacturer's applicable Valve Test Procedure and inspected to insure no damage had occurred since manufacture. The valve successfully completed these performance tests and inspection.

2.10.3.3 The solenoid valve was thermally aged in a controlled oven for a time period and at a test temperature equivalent to a qualified life of 6.16 years. The valve was cycled during thermal aging 4850 times. Before thermal aging the valve was cycled an additional 15,150 cycles for a total of 20,000 cycles. The test valve was then placed in a pressure chamber and subjected to an ambient pressure of 79 psig, for 24 hours to simulate the containment pressure tests occuring during the design life of the equipment.

2.10.3.4 The valve was radiation tested by exposure to a gamma source for a dosage of 2.054×10^8 Rads.

2.10.3.5 The valve was vibration/seismic tested in accordance with IEEE 344-1975. Vibration testing was performed to .75g as per Figure 1. The valve was exposed to seismic sine dwell testing which, when analyzed for each axis, provides qualification levels of 3.2/3.2/3.2g for OBE and 4.0/4.0/4.0g SSE."

2.10.3.6 The valve was then tested to the HELB environment as detailed in Figure 8.

2.10.3.7 During and after the testing identified in Sections 2.10.3.3 through 2.10.3.6 the valves was performance tested to demonstrate valve operability to the requirements of Sections 1.1 and 1.7.

2.10.4 Conclusion

The demonstrated qualified life of TRC 1 inch Solenoid Operated Valves has been established in accordance with Subprogram A of the Westinghouse Aging Evaluation Program. The results of the aging program, together with the seismic and environmental testing described herein, demonstrate the qualification of the TRC 1 inch Solenoid Operated Valves for a period of 6.16 years employing the practices recommended by Reg. Guide 1.89, 1.100 and 1.73.

2.11 Section 2 Notes

(1) The generic tests completed by Westinghouse employ parameters designed to envelope a number of plant applications. Margin is a plant specific parameter and will be established by the applicant.

2.12 References

1. Snider, J. M., "Equipment Qualification Test Report Target Rock Corporation 1 Inch Modulating Solenoid Valve", WCAP 8687, Supplement 2-E10C (Proprietary).

SECTIONS 3 AND 4 QUALIFICATION BY EXPERIENCE AND/OR ANALYSIS

Westinghouse does not employ operating experience or analysis in support of the qualification program for TRC 1 Inch Solenoid Operated Valves.

TABLE 1

ACTUAL QUALIFICATION TEST CONDITIONS

EQUIPMENT (1) SYSTEM/CATEGORY	LOCATION STRUCTURE/AREA	MANUFACTURER TYPE/MODEL	ABNORMAL/ACCIDENT ENVIRONMENTAL EXTREMES PARAMETER	SPECIFIED (2)	QUALIFIED	OPERABILITY REQ	OPERABILITY DEM	ACCURACY( ) REQ	ACCURACY( ) DEM	QUAL LIFE	QUAL METHOD	QUAL REF	QUAL PROGRAM STATUS
Valve solenoid/ Operated/CVCS, SIS, RHR, RCS/ Category a	Containment Bldg.	Target Rock Comp. 1 Inch Modulation Valve Solenoid Operated Globe/ 79AB-003	Temperature		420°F	1 yr. Post DBE	1 yr. Post DBE	N/A	N/A	6.16 yrs.	Seq. Test	HE-10C	Completed
			Pressure		70 psig								
			Rel. humidity		100 percent								
			Radiation		2.05×10^8 R(γ)								
			Chemistry		2500 ppm H_3BO_3 NaOH to 10.5 pH								

1. For definition of the equipment category, refer to NUREG-0588 "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," Appendix E, Section 2.

2. Plant specific environmental parameters are to be inserted by the applicant.

WESTINGHOUSE CLASS 3

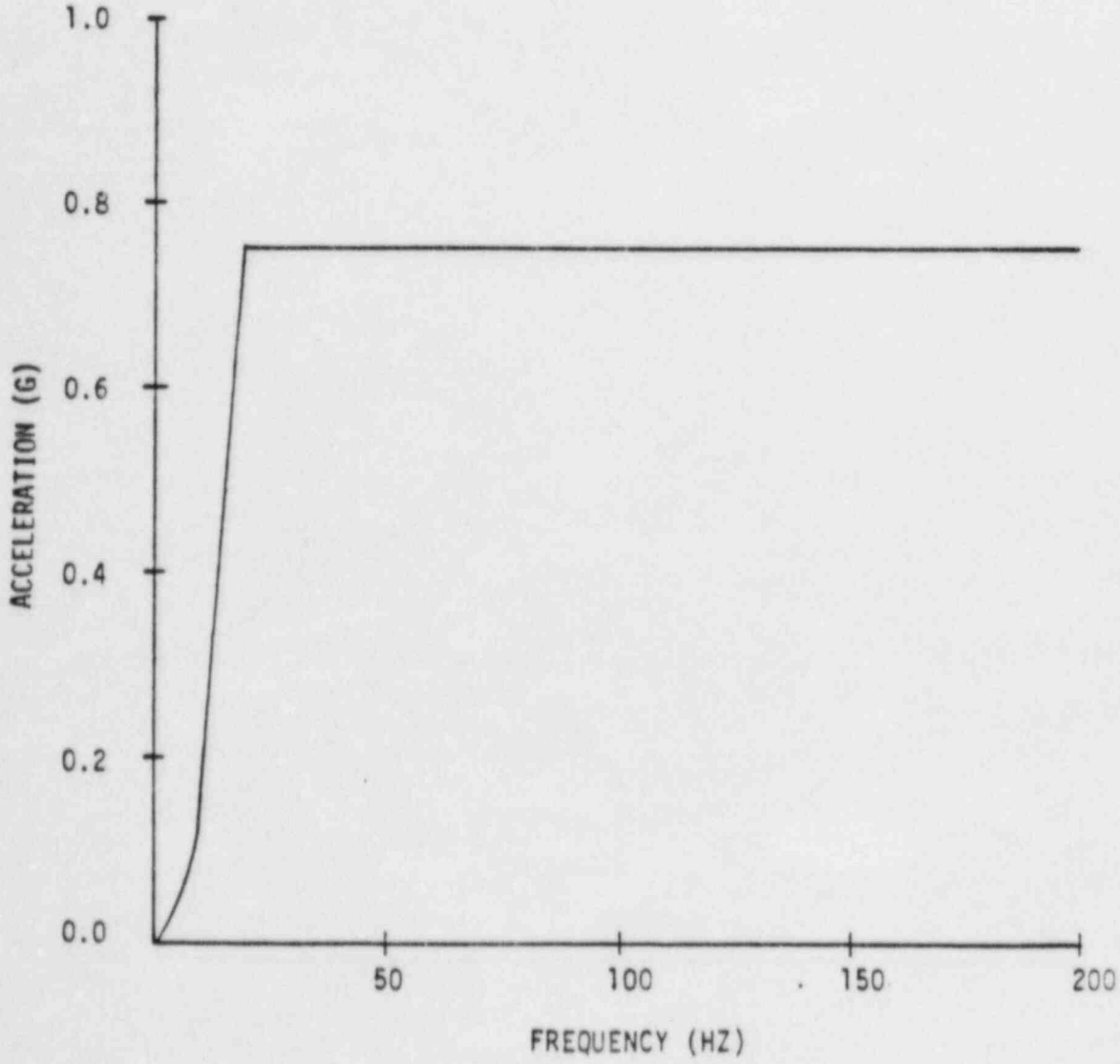

Figure 1: PLANT INDUCED VIBRATION
LINEAR SPECTRA

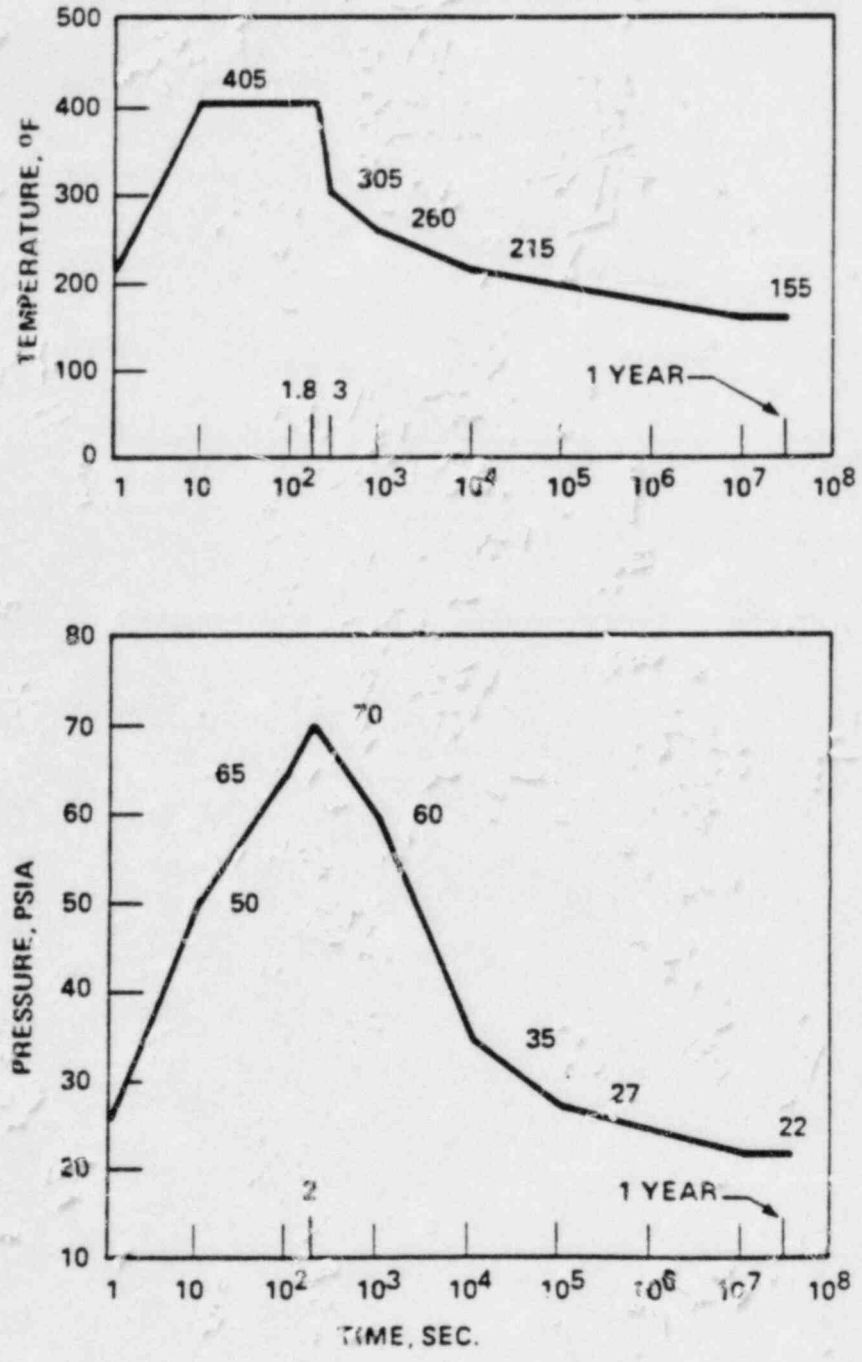

Figure 2 High Energy Line Break

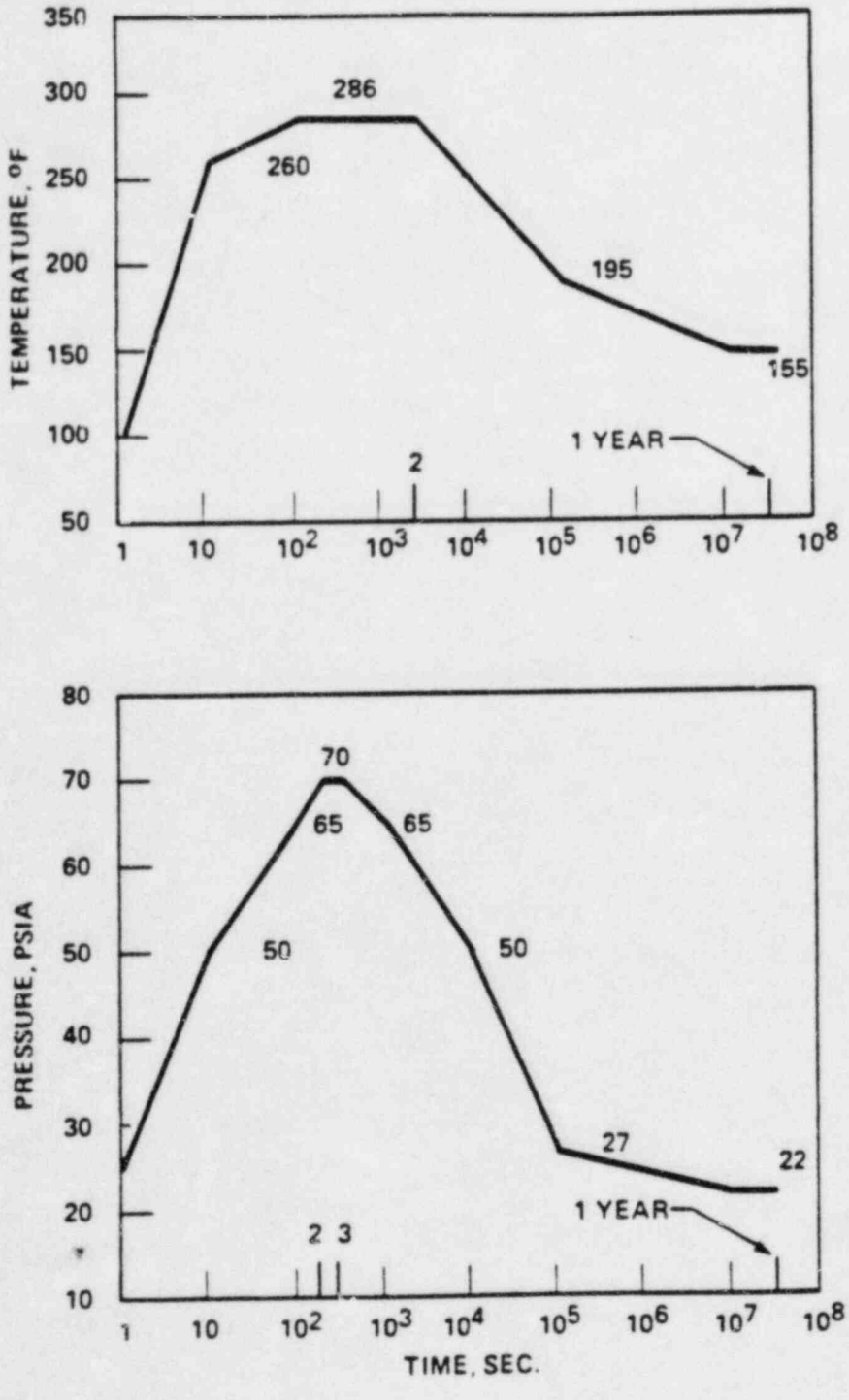

Figure 3 Loss of Coolant Accident Environment

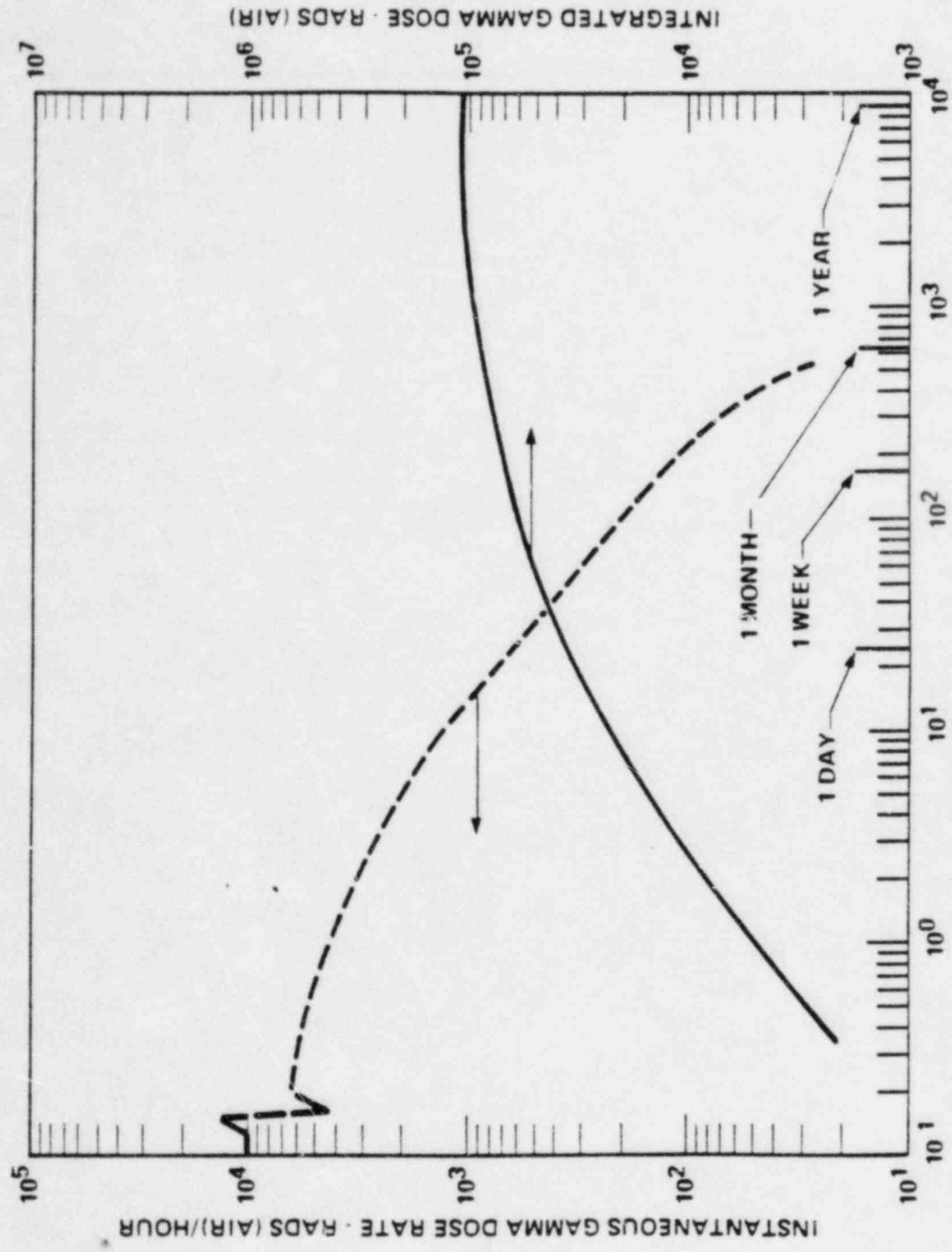

Figure 4 Gamma Dose and Dose Rate Inside the Containment as a Function of Time After a Steam Line Break Accident

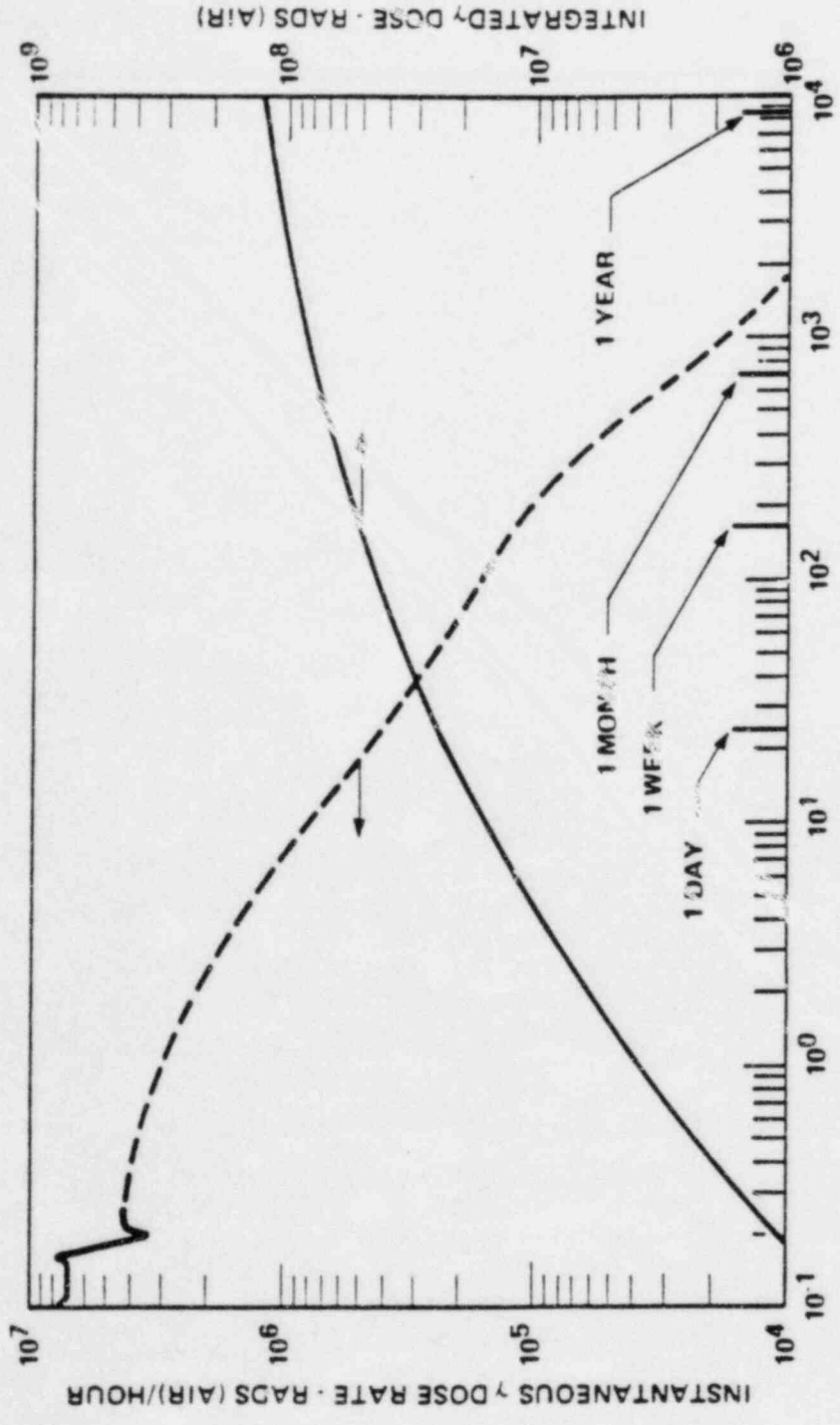

Figure 5 Gamma Dose and Dose Rate Inside the Containment as a Function of Time After LOCA

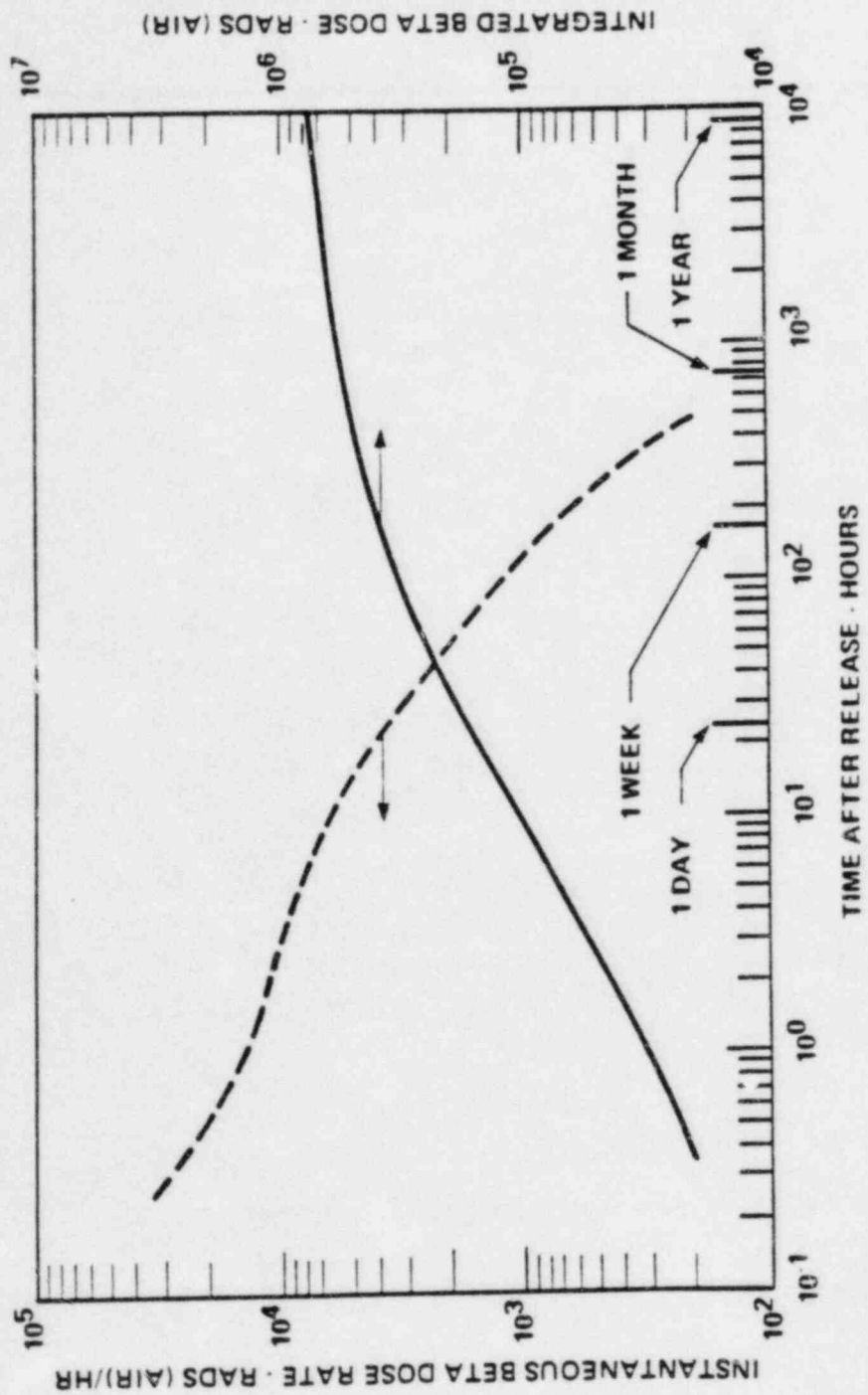

Figure 6 Beta Dose and Dose Rate Inside the Containment as a Function of Time After a Steam Line Break Accident

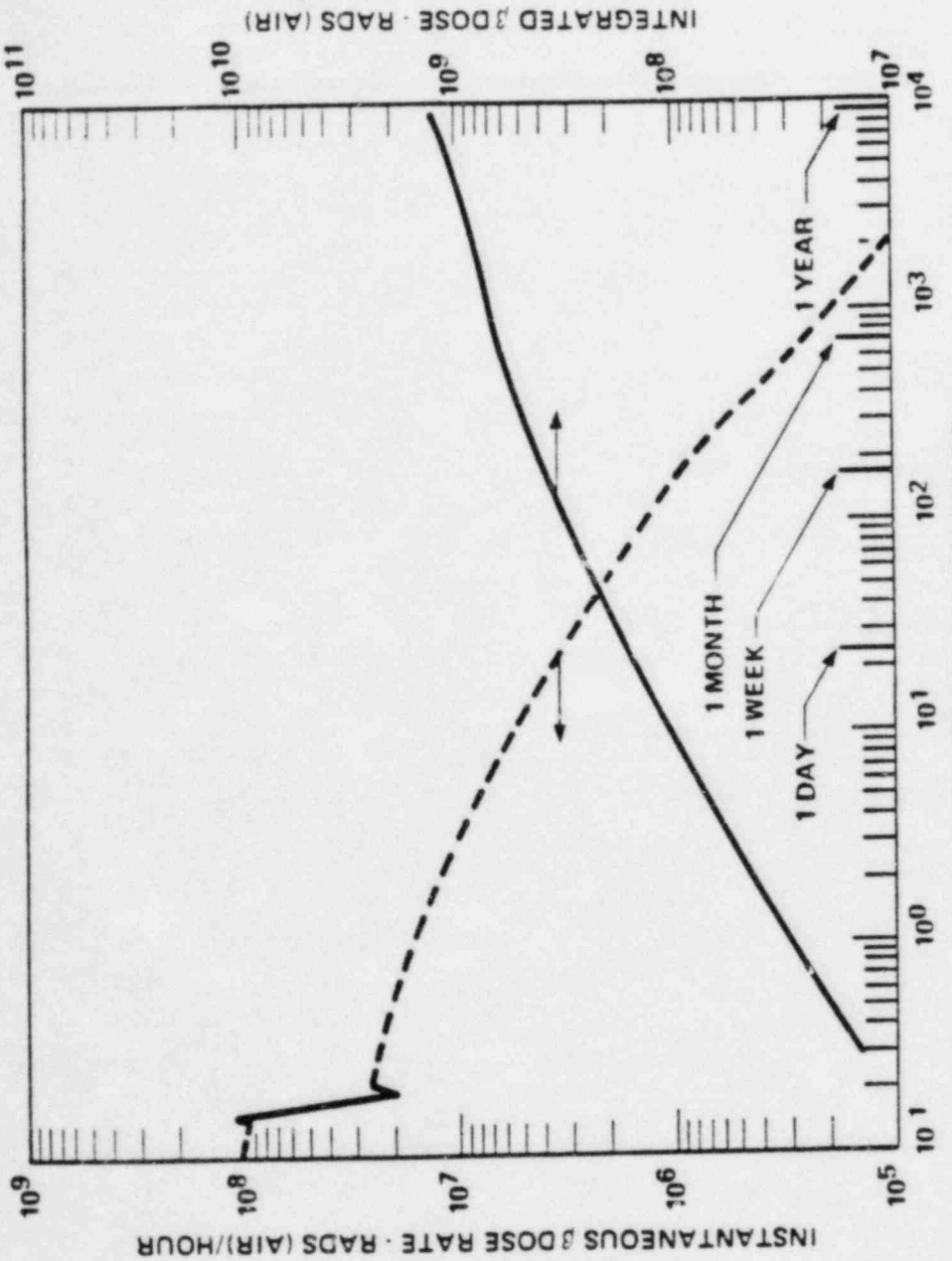

Figure 7 Beta Dose and Dose Rate Inside the Containment as a Function of Time After LOCA

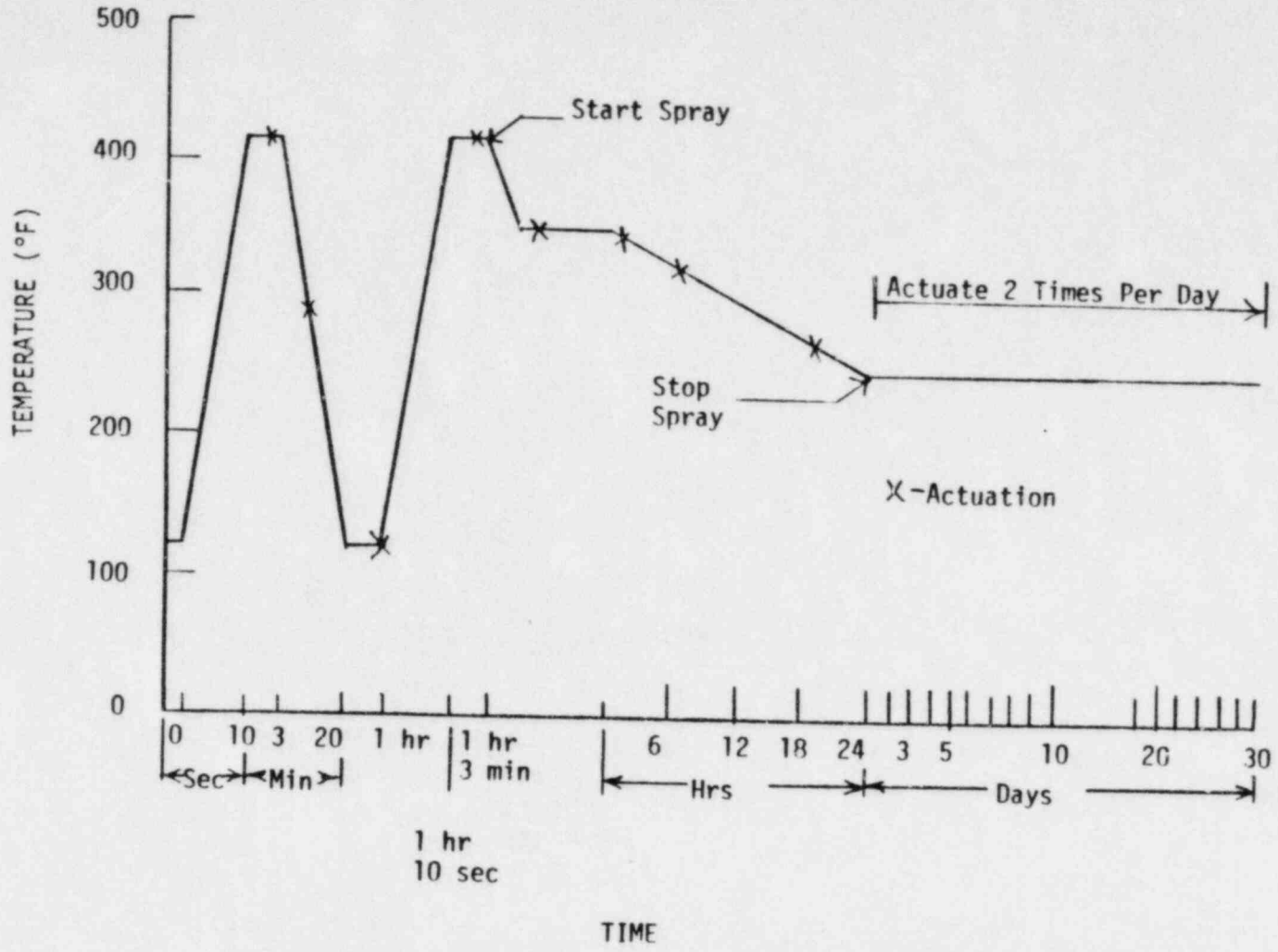

Fig. 8 Test Chamber Profile for Accident Environment Simulation

Enclosure 3

Justifications for Interim Operation Related to Environmental Qualification of the Seal Water Injection Filter Specification M-723

The JIO for the seal water injection filters (BG-FBG04 A and B) was submitted by SLNRC 84-0047, dated March 21, 1984. The concern, as described in the JIO, involved the qualification of the pressure boundary function of the filter for a postulated high radiation environment. Because one of the filters is on-line during normal plant operation and is not automatically isolated for a Loss of Coolant Accident, (LOCA), it was postulated, using very conservative preliminary assumptions, that all radioactive material in the containment sump following a LOCA could be concentrated in the on-line filter. The resulting calculated radiation dose exceeded radiation qualification threshhold values for the filter seal.

Based on further analysis performed by Westinghouse and Bechtel, a more realistic - but still conservative - scenario has been defined. The analysis considered particulate loads on the filter element, and the timing of post-LOCA containment sump recirculation. Based on this analysis, sufficient time (10 days) is available for operator action to be taken to isolate the on-line filter by means of Class 1E powered valves which can be operated from the control room (EJ-HV-8804A and EM-HV-8924). With the filter isolated, the leakage has been determined to be insignificant even if seal failure does occur. Procedures have been modified at the Callaway Plant to accomplish isolation of the on-line filter. The Wolf Creek procedures will be modified prior to exceeding 5% power operation.

Based on the above discussion, the qualification concern described in the original M-723 JIO has been eliminated, the filter is now qualified and the JIO has been terminated.

MHF/nld/10b24

SNUPPS
Interim Justification Position for the Seismic Qualification of Cutler Hammer Series E-30 Pushbutton Assemblies
(E-028, J-200, J-201)

Equipment

The equipment at issue is the Cutler-Hammer series E-30 pushbutton assemblies which are utilized in SNUPPS equipment specifications E-028, J-200 and J-201

Qualification Concern

The test report which documents seismic qualification of the pushbutton assemblies has recently submitted and the review is not complete.

Summary of Testing

Seismic testing of Cutler-Hammer series E-30 pushbutton assemblies has been completed at Wyle Laboratories. Testing was performed to the requirements of IEEE-323-1974 and IEEE-344-1975. The test sequence employed was:

1) baseline functional testing
2) thermal aging (40 years)
3) post aging functional testing
4) operational cyclic testing
5) post cyclic functional testing
6) extreme service condition testing
7) functional testing
8) seismic testing
9) post seismic functional testing
10) post test inspection

Random multifrequency biaxial input was employed for the seismic testing. The tested equipment was subjected to five OBEs and one SSE. The test response spectrum enveloped the SNUPPS required response spectrum. The tested assemblies were energized and performance was monitored during the testing.

The equipment tested consisted of eighteen pushbutton assemblies, some of which are identical to those used in the SNUPPS plants. All eighteen assemblies successfully completed the testing program. The seismic portion of the test program was witnessed by personnel representing the SNUPPS Architect Engineer, Bechtel Power Corporation.

Conclusion

The qualification report which documents the test results is under review. Upon completion of the review of the test report, this JIO will be terminated. However, based on the above summary of the testing which has been successfully completed, the seismic qualification of the Cutler-Hammer series E-30 pushbutton assemblies for SNUPPS applications has been acceptably demonstrated.

MHF/nldl0b28&29

SNUPPS

Interim Justification Position for the

Seismic Qualification of the

Target Rock Head Vent System Control Module

(HE-10B)

HE-10B, Target Rock Head Vent System Control Module

The JIO for the HE-10B Control Module was developed because the modules were not considered fully qualified until test documentation was completed. The JIO consisted of a draft Westinghouse Equipment Qualification Data Package (EQDP).

Westinghouse has recently approved and issued the EQDP for HE-10B as Revision 0 dated 5/84. A copy of the EQDP is attached. The EQDP documents the successful completion of qualification, including seismic testing per IEEE-344-1975, in accordance with the methodology of Westinghouse Topical Report WCAP-8587. The supporting test report (Equipment Qualification Test Report, EQTR H10B Rev. 0, May 1984) is also available for use by the SNUPPS Utilities and audit by the NRC as necessary.

Based on the above, the qualification concern for which a JIO was issued has been eliminated and the JIO is terminated.

MHF/n1d10b30