

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

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:

E. P. Rahe
for E. P. Rahe, Manager
Nuclear Safety Department

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

4450Q

B40710051B B40629
PDR ADOCK 05000482
A PDR

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 Electronic Control Module must be installed in a location outside containment that is limited to normal environment conditions and earthquake loads. Mounting should be to a vertical surface using the holes provided on the back panel.

1.3 Auxiliary Devices: The electronic control module is the auxiliary device utilized by the modulation valve tested in HE-10C.

WESTINGHOUSE CLASS 3

1.4 Preventative Maintenance Schedule: Per the Westinghouse Equipment Qualification test program, no preventive maintenance is required to support the equipment qualified life of 10 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): Electronic Control Module

Parameter	Normal Conditions	Abnormal Conditions	Containment Test Conditions	DBE Conditions(a)			Post DBE Conditions(a)		
				FLB/SLB	LOCA	Seismic	FLB/SLB	LOCA	Seismic
1.7.1 Time requirement	Continuous	Included under normal	N/A	Same as normal	Same as Normal	Event duration	Same as Normal	Same as Normal	Continuous
1.7.2 Performance requirement	Note c		N/A	Same as Normal	Same as Normal	Note c	Same as Normal	Same as Normal	Note c
1.P Environmental Conditions for Same Function (b)									
1.P.1 Temperature(*F)	50-120	Included under normal	N/A	Same as Normal	Same as Normal	Ambient	Same as Normal	Same as Normal	Ambient
1.8.2 Pressure (psig)	-6.7/+3		N/A	Same as Normal	Same as Normal	Ambient	Same as Normal	Same as Normal	Ambient
1.8.3 Humidity (Percent RH)	0-100		N/A	Same as Normal	Same as Normal	Ambient	Same as Normal	Same as Normal	Ambient
1.8.4 Radiation (R)	2.5×10^3 y	1×10^4 y	N/A	Same as Normal	Same as Normal	Same as Normal	None	None	Same as Normal
1.8.5 Chemicals	None		N/A	Same as Normal	Same as Normal	None	Same as Normal	Same as Normal	None
1.8.6 Vibration	Figure 1		N/A	Same as Normal	Same as Normal	None	Same as Normal	Same as Normal	None
1.P.7 Acceleration(g)	None		N/A	Same as Normal	Same as Normal	Figure 2	Same as Normal	Same as Normal	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.

WESTINGHOUSE CLASS 3

1.9 Qualified Life: The demonstrated qualified life is 10 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) Electronic Control Module was conducted at several different test facilities. All functional tests were conducted at Target Rock Corporation, East Farmingdale, N.Y. The environmental and vibration/seismic testing was performed at American Environment Co., Inc., in West Babylon, N.Y. All radiation testing was performed by Isomedix, Inc., in Parisippany, N.J.

- 2.1 Equipment Description: Target Rock Corporation, "Electronic Control Module, Model 80T, part number 300592-1, serial number 001.
- 2.2 Number Tested: 1
- 2.3 Mounting: As defined in Section 1.2
- 2.4 Connections: As specified by manufacturer on the 79AB-003 modulating valve assembly drawings
- 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⁾

	<u>Normal</u>	<u>Abnormal</u>	<u>Containment Test</u>	<u>Seismic</u>	<u>HELB/LOCA</u>	<u>Post-HELB/LOCA</u>
2.6.1 Temp. (°F)	50-110	Included under normal	N/A	Ambient	N/A	N/A
2.6.2 Pressure (psig)	-6.7/+3			Ambient		
2.6.3 Humidity (Percent RH)	0-100 percent			Ambient		
2.6.4 Radiation (R)	2.5×10^3 y	1×10^4 y		None		
2.6.5 Chemicals	None			None		
2.6.6 Vibration	See Fig. 1			None		
2.6.7 Acceleration (g)	None			Figure 2		

44500

7

WESTINGHOUSE CLASS 3

2.7 Measured Variables

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

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

WESTINGHOUSE CLASS 3

		<u>Required</u>	<u>Not Required</u>
2.7.5	Category V - Electrical Characteristics		
2.7.5.1	Insulation Resistance	A,B,C	D
2.7.5.2	Output Voltage		A,B,C,D
2.7.5.3	Output Current	A,B,C	D
2.7.5.4	Output Power		A,B,C,D
2.7.5.5	Response Time		A,B,C,D
2.7.5.6	Frequency Characteristics		A,B,C,D
2.7.5.7	Simulated Load	A,B,C	D

2.7.6 Category VI - Mechanical Characteristics

N/A

2.7.7 Category VII - Auxiliary Equipment

N/A

- A. Performance Tests
- B. Environmental Aging Tests
- C. Vibration/Seismic Tests
- D. Radiation 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 Disassembly and Inspection

Note: Since the Electronic Control Modules are limited to installation outside of containment, the HELB and post-HELB conditions are not applicable.

2.9 Test Sequence Actual

The Electronic Control Module was tested in accordance with the preferred test sequence identified in Section 2.8.

WESTINGHOUSE CLASS 3

2.10 Test Data

2.10.1 Objective

The objective of this test program is to demonstrate that the Target Rock Electronic Control Module meets or exceeds the safety related performance requirements while subjected to simulated normal, abnormal and accident environments in accordance with 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).

2.10.2 Equipment Tested

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

2.10.3 Test Summary

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

- 2.10.3.2 The Electronic Control Module was initially performance tested in accordance with the manufacturer's applicable Test Procedure and inspected to insure no damage had occurred since manufacture. Performance testing and subsequent inspection was successfully completed.
- 2.10.3.3 The Electronic Control Module was thermally aged for 1441 Hours at 240°F and 100 percent humidity. These aging conditions are equivalent to a qualified life of 10 years. The module was cycled 4850 times during thermal aging. Prior to thermal aging, the module was cycled 15,150 cycles for a total of 20,000 cycles.
- 2.10.3.4 The test unit was radiation tested by exposure to a gamma source for a dosage of 2.5×10^4 Rads to simulate the normal environment total dose.
- 2.10.3.5 The test unit was vibration/seismic tested in accordance with the requirements of Figures 1 and 2 and IEEE 344-1975. The control module was exposed to multi-frequency, multi-axis test motion which, when analyzed for each axis, produces a test response spectrum (TRS) which envelopes the required response spectrum (RRS) shown in Figure 2.
- 2.10.3.6 The test unit was additionally radiation tested by exposure to a gamma dosage of 1.0×10^4 rads after the DBE vibration/seismic testing.

WESTINGHOUSE CLASS 3

2.10.3.7 During and after the testing identified in Sections 2.10.3.3 through 2.10.3.5 the Electronic Control Module 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 the Target Rock Corporation Electronic Control Module 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 Model 80T Electronic Control Module for a period of 10 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. Kamenic, M. E., "Equipment Qualification Test Report Target Rock Corporation Electronic Control Module", WCAP 8687, Supplement 2-E10B (Proprietary).

WESTINGHOUSE CLASS 3

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 the Target Rock Electronic Control Module.

TABLE 1

ACTUAL QUALIFICATION TEST CONDITIONS

EQUIPMENT (1) SYSTEM/CATEGORY	LOCATION STRUCTURE/AREA	MANUFACTURER TYPE/MODEL	ABNORMAL/ACCIDENT ENVIRONMENTAL EXTREMES			OPERABILITY		ACCURACY()		QUAL LIFE	QUAL METHOD	QUAL REF	QUAL PROGRAM STATUS
			PARAMETER	SPECIFIED (2)	QUALIFIED	REQ	DEM	REQ	DEM				
Valve appurtances/ CVCS,SIS RHR, RCS Category a	Outside Containment	Target Rock Model aOT Electronic Control Module	Temperature Pressure Rel. humidity Radiation Chemistry	120°F .3 psig 100 percent 1.0x10 ⁴ R(y) None	1 yr. Post DBE	1 yr. Post DBE	N/A N/A	N/A N/A	10 yrs.	Seq. Test	HE-10B	Completed	

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.

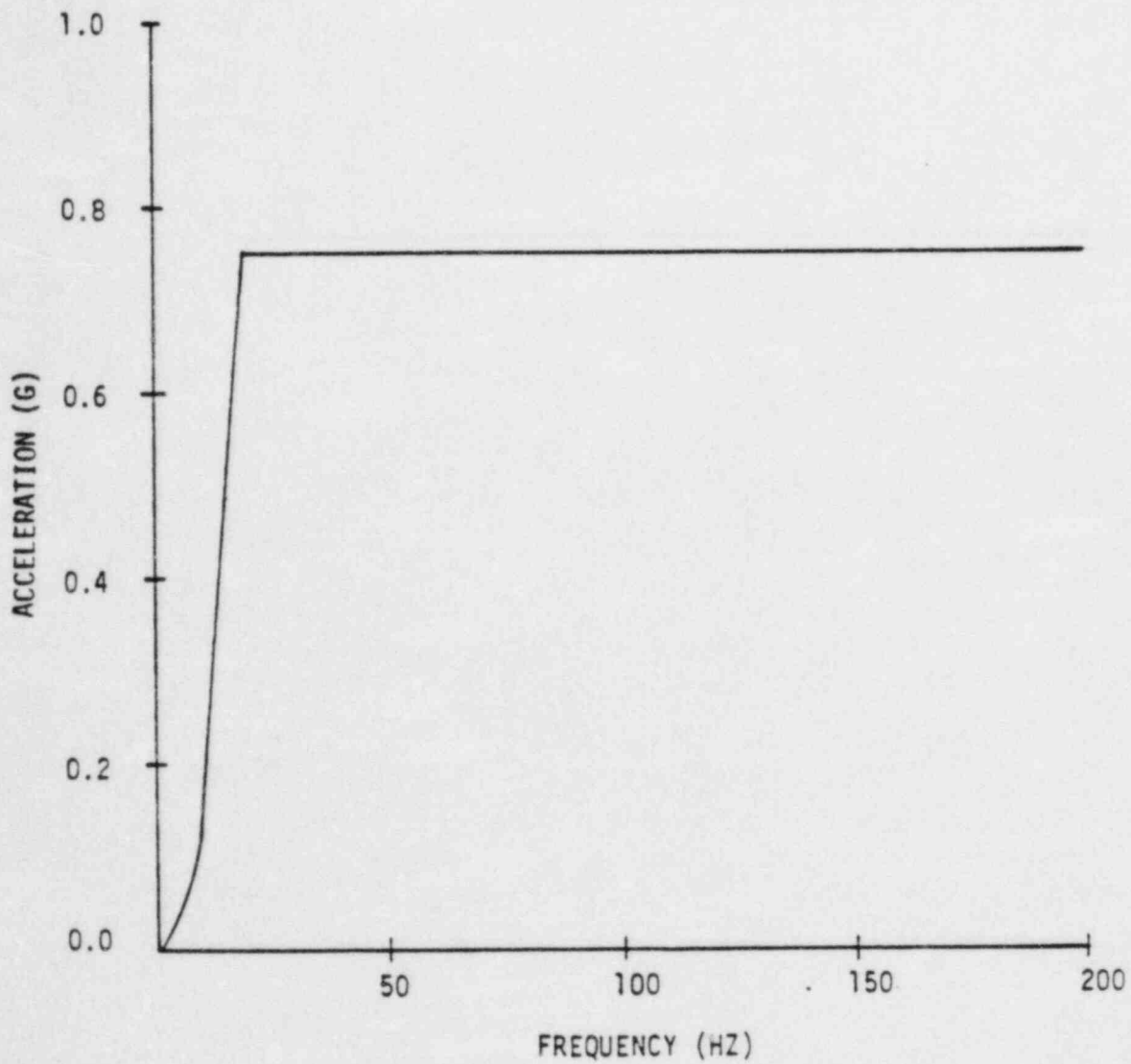


Figure 1: PLANT INDUCED VIBRATION
LINEAR SPECTRA

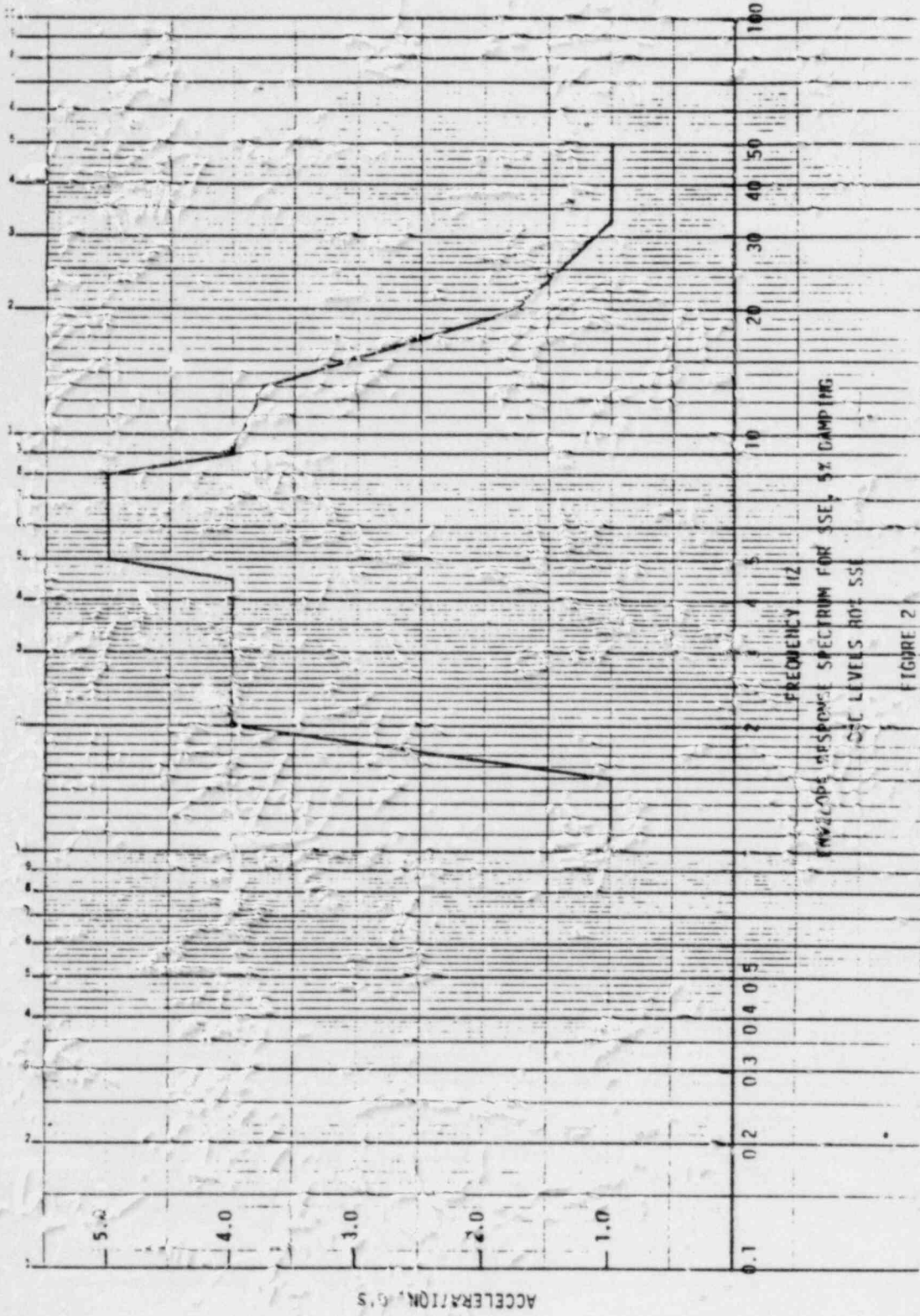


FIGURE 2 REQUIRED RESPONSE SPECTRA

WESTINGHOUSE CLASS 3

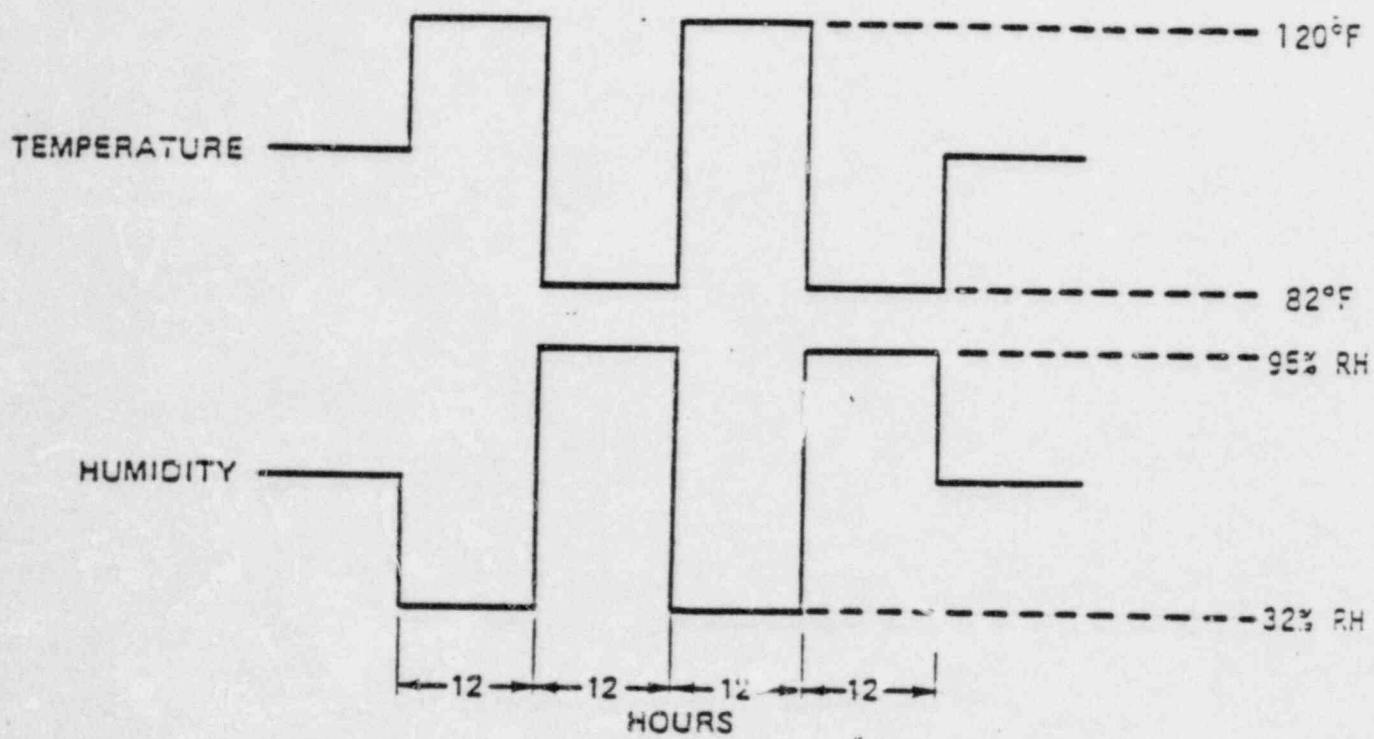


Figure 1
Environmental Test Profile

WESTINGHOUSE CLASS 3

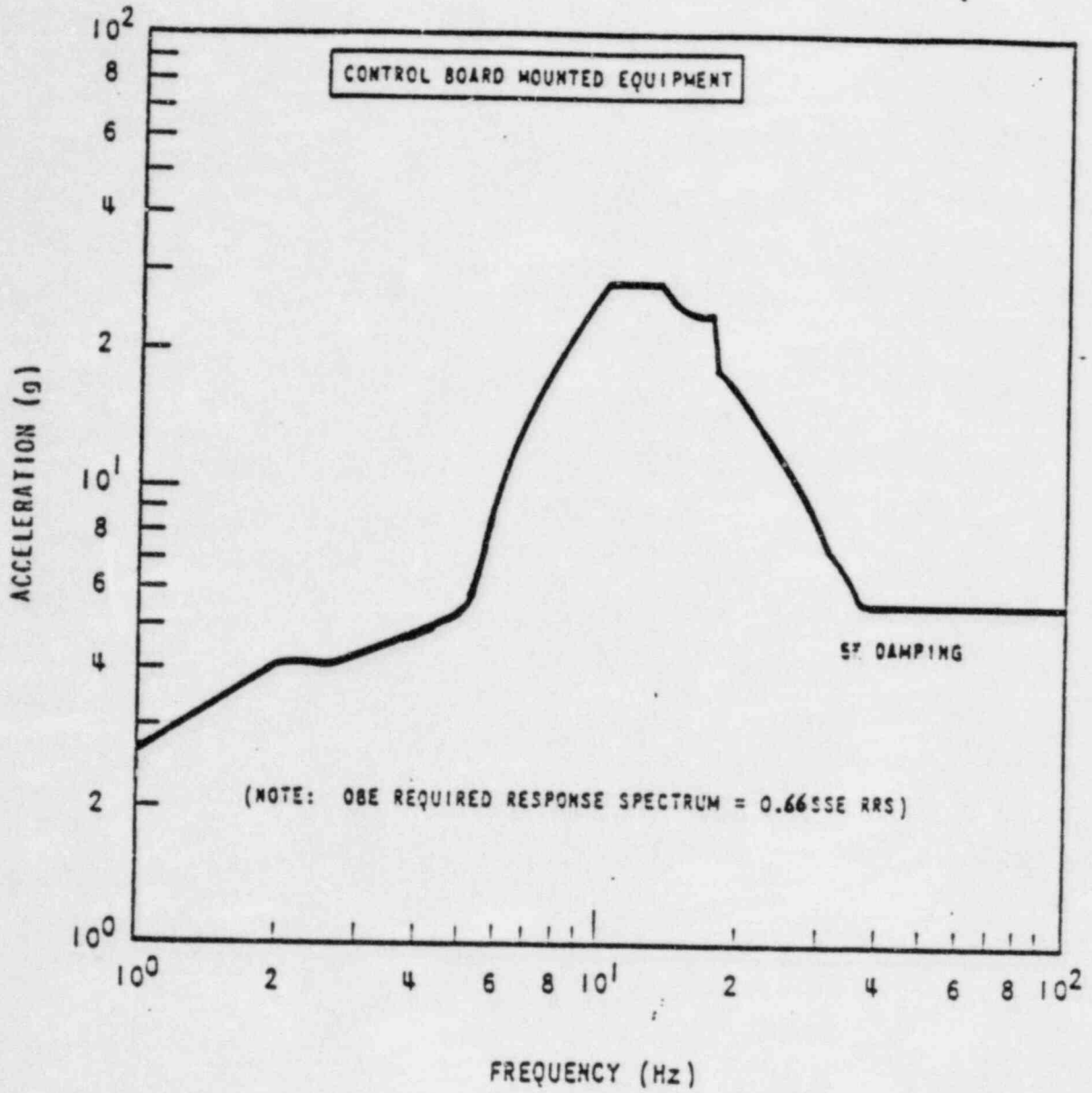


Figure 2
Required Response Spectrum (RRS) for Safe Shutdown Earthquake (SSE)