WCAP 8587

"Equipment Qualification Data Packages"

Supplement 1

EQDP-ESE-6

Resistance Temperature Detectors: RCS Well Mounted

Revision 5

Instruction Sheet

The following instructional information and checklist is being furnished to help insert the following into WCAP-8587 Supplement 1 EQDP-ESE-6 Class 3 (Non-Proprietary). Discard the old sheet and insert the new sheets as listed below. Revised information is indicated by a bar and number 5 on the outside margin of the page.

Remove (Front/Back)	Insert (Front/Back)
Cover sheet/--	Cover sheet/--
page 2/3	page 2/3
12/13	12/13
17/--	17/--
18/--	18/--

41280

March, 1983

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.

Resistance Temperature Detectors: RCS Well Mounted

APPROVED: _____

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SECTION 1 - SPECIFICATIONS

1.0 PERFORMANCE SPECIFICATIONS

1.1 Electrical Requirements

1.1.1 Voltage: (Ref. 1.3 Auxiliary Devices with approximately 1 milliamp current))

1.1.2 Frequency: N/A

1.1.3 Load: N/A

1.1.4 Electromagnetic Interference: None

1.1.5 Other: Resistance 410 Ω at 525°F

1.2 Installation Requirements: Westinghouse Drawing 2650C31 Rev. 1 | 3

1.3 Auxiliary Devices: Thermowell, R/E or R/I Converter and the RTD requires an interface connection which will be subject to the same condition as the RTD. The qualification of this interface connection is not an objective of this program.

1.4 Preventative Maintenance Schedule: Per the Westinghouse Equipment Qualification test program, no preventive maintenance is required to support the equipment qualified life. 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. | 5

1.5 Design Life: 40 years

1.6 Operating Cycles (Expected number of cycles during design life, including test): Continuous duty

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1.7 Performance Requirements for[b]: Th and Tc Wide Range

	Parameter	Containment Normal Conditions	Containment Abnormal Conditions	Test Conditions	DBE Conditions(a) FLB/SLB	DBE Conditions(a) LOCA	Post DBE Conditions(a) Seismic	Post DBE Conditions(a) LOCA	Post DBE Conditions(a) FLB/SLB	Post DBE Conditions(a) Seismic
1.7.1	Time requirement	Continuous	Included under normal	Test duration	Event duration	Event duration	Event duration	4 months	4 months	Continuous
1.7.2	Performance requirement	(c)		No damage	As normal	As normal	As normal	As normal	As normal	As normal
1.8 Environmental Conditions for Same Function[b]										
1.8.1	Temperature(°F)	Fluid 700 Nominal Ambient 122 Maximum Ambient 140		Ambient	Fig. 2	Fig. 1	Ambient	Fig. 1	Fig. 2	Ambient
1.8.2	Pressure (psig)	-0.1 to .3 (RTD) 312[c] (well)		70	Fig. 2	Fig. 1	0	Fig. 1	Fig. 2	0
1.8.3	Humidity (percent RH)	0-95		Ambient	100	100	Ambient	100	100	Ambient
1.8.4	Radiation (R)	7×10^7 γ (tip) (d) 4.5×10^6 γ cable (d)		None	Included under post DBE	Included under post DBE	None	1.1×10^8 γ 9×10^6 β(e)	1.1×10^5 7×10^5 β	None
1.8.5	Chemicals	None		None	Fig. 2	Fig. 2	None	Fig. 1	Fig. 2	None
1.8.6	Vibration	See Section 2.10		None	None	None	None	None	None	None
1.8.7	Acceleration (g)	None		None	None	None	2.10.3.3	None	None	None

Notes: a: DBE is the Design Basis Event.

b: Margin is not included in the parameters of this section.

c: ± 0.2°F repeatability ± 1.0°F drift allowance, first order time response 4.0 seconds w/o well for step change of at least 20°F with a water flow of 3 ft/sec.

d: 10 year life assumed for dose calculation's. Radioactive fluid defines normal rating dose.

e: Dose shown for cable. Postulated RCS contained accident dose is 1.5×10^8 γ(tip).

WESTINGHOUSE CLASS 3

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2.10.3.4 High Energy Line Break/Post HELB Simulation

The well mounted RTD's were subjected to the HELB simulation temperature profile of Figure 4. Following the 420°F temperature peak, the temperature gradually declines to 250°F and is held at saturated steam conditions for 15 days, simulating a four-month period of post HELB operation. | 5

2.10.4 Conclusion

The qualification status of the well mounted RTD's is demonstrated by the completion of the simulated aging and design basis event condition testing described herein and reported in Reference 1.

2.11 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. Black, J.P., Skeers, D.M., Rens, T.E., "Equipment Qualification Report, Resistance Temperature Detectors - RCS Well Mounted (Seismic and Environmental Testing)" WCAP-8687, Supplement 2-E06A (Proprietary). | 4

3 | SECTION 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 RCS Well Mounted RTD's.

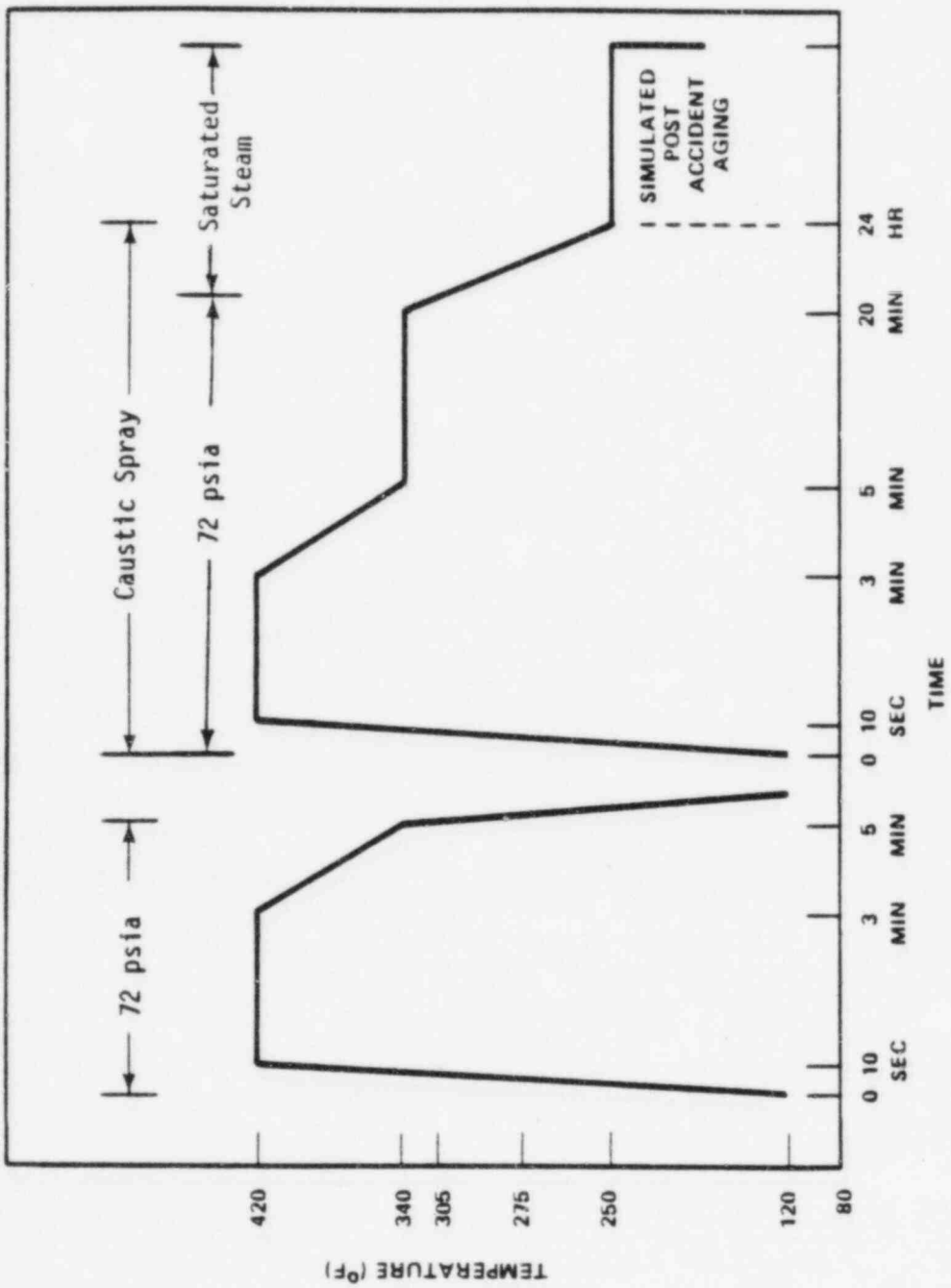

Figure 4. Typical Combined LOCA/SLB/FLB Test Envelope

TABLE 1

ACTUAL QUALIFICATION TEST CONDITIONS

EQUIPMENT (1) SYSTEM/CATEGORY	LOCATION STRUCTURE/AREA	MANUFACTURER TYPE/MODEL	ABNORMAL/ACCIDENT ENVIRONMENTAL EXTREMES PARAMETER	SPECIFIED (2)	QUALIFIED (3)	OPERABILITY REQ	OPERABILITY DEM	ACCURACY(%) REQ	ACCURACY(%) DEM	QUAL LIFE	QUAL METHOD	QUAL REF	QUAL PROGRAM STATUS
RCS temperature wide range RTDS/ PAMS/ Category a	Containment Bldg./inside missile shield	RdF 21205	Temperature		420°F	Post DBE	Post DBE	0°F	0°F	10 yrs.	Seq. Test	ESE-6	Completed
			Pressure		75 psig								
			Rel. humidity		100	4 Mo.	4 Mo. (4)	(4)	(5)				
			Radiation		(Tip) $2.47 \times 10^8 R(\gamma)$ (Cable) $1.15 \times 10^8 R(\gamma)$ $9.23 \times 10^8 R(\beta)$								
			Chemistry		2750 ppm H_3BO_3 NaOH to 10.7 pH								

NOTES

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.
3. The values listed represent the design conditions plus margin. For completed programs, the values listed were met in the test. Any variations from the values listed were in a conservative direction or were not considered significant.
4. There are no changes in the RTD due to severe environments. The calibration accuracy is ±0.2°F and the drift allowance is ±1.0°F. These errors do not include the channel inaccuracies or process errors. Response times and seismic accuracies are contained in the equipment EQDP.
5. Qualified life assumed a normal temperature of 50°C.