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PERSON CHANGING MARKING & DATE	RECORD ID: 98SN1430
RB Craner 2/5/98	
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SCDR 223-61

RECOMMENDED ENVIRONMENTAL TESTS FOR XW-59/MINUTEMAN

[redacted]

RS 7185/130

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW

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Walter H. Suiter, 7185

June 1961

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Approved by: S. A. Moore
S. A. Moore - 7180

ABSTRACT

This study selects a minimum number of standard tests from SC-4451(M) or suggests modifications of standard tests which may be used by the project division responsible for the XW-59 development. The environmental criteria listed are those which are presented in the XW-59/MINUTEMAN Stockpile-to-Target Sequence. The suggested tests are based upon confirmation of, or extensions to, the SYS environment by cross checking with "Data Bank" environmental information. No tests are suggested for in Silo radiation or Electron Densities.

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INTRODUCTION

This study was undertaken to assist the Project Division in formulating a detailed test plan for the XW-59/MINUTEMAN warhead, and to compare the environmental data presented in the STS to "Data Bank" environmental data.

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PROPOSED ENVIRONMENTAL TEST PROGRAM, XW-59

CRITERIA	CONFIGURATION	SC-4451 TEST
Temperature	WH in AEC Shipping Container	
(1) High +160°F		A1
(2) Low -65°F		A3
(3) Fluctuation		
+90 to +160°F		A2
-40 to -65°F		A4 Modified → Stabilize WH at -40°F. Reduce chamber temperature to -65 for 4 hrs. Raise chamber temperature to -40°F. Hold for 24 hrs. or stabilization.
(4) Temperature Shock	WH in AEC Shipping Container	
125 to -65 F, 30 min. Rate 6-1/3°F/min.		
-35 to -65°F, 20 min. Rate 1-1/2°F/min.		A5
-65 to +125°F, 20 min. Rate 9-1/2°F/min.		
-35 to 80 > 1 min.* Rate 115°F/min.		A5 Modified to obtain rate of change 46°F/min. and limits of -35 to 80°F.

* > 1 min. is unrealistic from a Facility standpoint, transition time not to exceed 2½ minutes.

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CRITERIA	CONFIGURATION	8C-4451 TEST
(1) Handling	WR in Re-Entry Vehicle	No test required. (See Para. 4.1).
(2) Low Temperature Exposure	WR in Re-Entry Vehicle	No test required. (See Para. 4.2).
(3) Temperature Shock	WR in Re-Entry Vehicle	Ag Modified to obtain rate of change of 400°/min. and Limits of RT to -360°F. Radiant Heat Facility in accordance with Fig. 6 of STD.
(4) Humidity	WR out of Shipping Container	No test required.
(5) Vibration	WR in Re-Entry Vehicle	No test required (accomplished in 4).
(6) Shock	WR in Re-Entry Vehicle	No test required (accomplished in 4).
(7) Acceleration	WR in Re-Entry Vehicle	No test required.
(8) Salt Fog	WR out of Shipping Container	No test required.
(9) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(10) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(11) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(12) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(13) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(14) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(15) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(16) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(17) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(18) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(19) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(20) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(21) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(22) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(23) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(24) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(25) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(26) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(27) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(28) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(29) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(30) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(31) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(32) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(33) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(34) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(35) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(36) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(37) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(38) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(39) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(40) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(41) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(42) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(43) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(44) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(45) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(46) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(47) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(48) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(49) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(50) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(51) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(52) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(53) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(54) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(55) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(56) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(57) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(58) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(59) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(60) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(61) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(62) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(63) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(64) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(65) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(66) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(67) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(68) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(69) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(70) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(71) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(72) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(73) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(74) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(75) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(76) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(77) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(78) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(79) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(80) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(81) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(82) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(83) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(84) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(85) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(86) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(87) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(88) Sand and Dust	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(89) Explosive Atmosphere	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(90) Fungus	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(91) Immersion	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(92) Leakage	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(93) Pressure	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(94) Temperature	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(95) Humidity	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(96) Vibration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(97) Shock	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(98) Acceleration	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *
(99) Salt Fog	WR out of Shipping Container	360°F to 80°F ≥ 1 min. *
(100) Rain	WR in Re-Entry Vehicle	360°F to 80°F ≥ 1 min. *

CRITERIA	CONFIGURATION	SC-4451 TEST
Humidity		
High 100% RH w/cond. at 75 to 80°F. 93% to 97% RH at 80 to 85°F.	WH in RV or AEC Shipping Container	B-1
Low 15% RH at 90°F, 5 hr. Linear change to 5% RH at 125°F. 5% RH at 125°F w/5 hr. Linear change to 15% at 90°F.	WH in RV or AEC Shipping Container	No test required. Accomplished in A2 above.
Winter Freezing Cycle	WH in AEC Shipping Container	H
Pressure		
High		
15.4 psia 27.7 psia	WH in AEC Shipping Container (Remove Container Cover)	C1
Low 0 psia	WH in AEC Shipping Container (Remove Container Cover)	Special test: Subject WH to minimum pressure possible.
Vibration	WH in AEC Shipping Container	M
Environment not expected to exceed that in Sec. 4 of MIL-STD-810 and Sec. 4.2.5.2 of CM-99-0000-06723.		
Shock and Bump	WH in AEC Shipping Container	M
Environment not expected to exceed that in Sec. 4 of MIL-STD-810 and Sec. 4.2.5.2 of CM-99-0000-06723.		

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CRITERIA	CONFIGURATION	30-4151 TEST
Insects	WH in AEC Shipping Container	No test available.
Environment not expected to exceed that in Sec. 4 of MIL-E52720 and Sec. 4.2.5.2 of GM-99-0000-06723.		
Salt Spray		
Environment not expected to exceed that in Sec. 4 of MIL-E52720 and Sec. 4.2.5.2 of GM-99-0000-06723.		Conduct materials tests in accordance with L1 and L2. No system tests applicable.
Fungus		
Environment not expected to exceed that in Sec. 4 of MIL-E52720 and Sec. 4.2.5.2 of GM-99-0000-06723.		
Static Acceleration		
To failure, which must be at least 90 g equivalent static acceleration.	WH mounted in RV or on Jig simulating RV mounting	Special test: To failure.
Vibration		
Lateral 30 g	WH in RV or mounted on Jig.	F1 modified to get 30 g.
Axial - 60 g	Simulating RV mounting	F1
Lateral 29 g combined with 60 g axial	Simulating RV mounting	F1 modified to obtain magnitude and direction of combined loads.

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CRITERIA	CONFIGURATION	SC-4451 TEST
Vibration		
1. 5-50 cps sinusoidal 0.5g peak 3 minutes, lateral axis	WH in Re-Entry Vehicle	→ Elb modified to limit maximum peak to 1g.
2. 5-2000 cps sinusoidal 3 minutes, longitudinal axis 0.7g RMS	WH in Re-Entry Vehicle	
3. 5-1000 cps random, Gaussian longitudinal axis $0.014g^2$/cps	WH in Re-Entry Vehicle	K2b
1. 3-20 cps ± 2.0g 2. 20-35 cps 0.04 in. 3. 35-500 cps ± 5.0g	WH in AEC Shipping Container	Elb modified to limit frequency to 600 cps.
NOTE: The peak-to-peak displacement shall be limited to 0.4 in.		
Shock		
12" Drop	WH in AEC Shipping Container	Conduct drop at -40°F.
RR Humping	WH in AEC Shipping Container	Sa modified for increments of velocity at impact.
Re-Entry Vehicle Semi-Trailer	WH in Re-Entry Vehicle	D2
Third Stage Separation	WH in Re-Entry Vehicle	Environment not known at the present time.

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CRITERIA		CONFIGURATION	SC-4451 TEST
Acoustic Noise			
18-37.5 cps	151db-re $2x10^{-4}$ micro bars	W4 in Re-Entry Vehicle or Unpackaged Warhead	E3a E3b
37.5-75 cps	154 $2x10^{-4}$ micro bars		
75-150 cps	151 $2x10^{-4}$ micro bars		
150-300 cps	151 $2x10^{-4}$ micro bars		
300-600 cps	144 $2x10^{-4}$ micro bars		
600-1200 cps	135 $2x10^{-4}$ micro bars		
1200-2400 cps	127 $2x10^{-4}$ micro bars		

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