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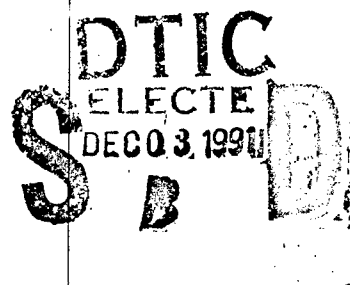
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AFPEA PROJECT NO. 90-P-131

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QUALIFICATION TESTING OF THE
TRANSPORTABLE COLLECTIVE PROTECTION SYSTEM CONTAINER

HQ AFLC/LGTP
AIR FORCE PACKAGING EVALUATION ACTIVITY
Wright-Patterson AFB OH 45433-5999

August 1991

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ABSTRACT

Human Systems Division (HSD/YAGD), Wright-Patterson AFB OH 45433-5503 requested assistance from the Air Force Packaging Evaluation Activity (AFPEA) in conducting shock and vibration testing on the modified Transportable Collective Protection System (TCPS) Rowley Stand-Alone container.

The TCPS, manufactured by ILC/Dover Inc., is a chemical warfare tent. Personnel can enter the tent, remove protective clothing and perform duties in an uncontaminated environment.

Previous vibration tests resulted in pole and container damage (Report No. 90-R-03). HSD/YAGD requested AFPEA to design and prototype the support racks and retest the new design to ensure that the TCPS and its container would not be damaged by shipment and handling. Upon completion of testing, the modified support racks passed all tests and met all HSD/YAGD requirements.

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INTRODUCTION

BACKGROUND: Human Systems Division (HSD/YAGD), Wright-Patterson AFB OH 45433-5503 requested assistance from the Air Force Packaging Evaluation Activity (AFPEA) in conducting shock and vibration testing on the modified Transportable Collective Protection System (TCPS) Rowley Stand-Alone container. The TCPS, manufactured by ILC/Dover Inc., is a chemical warfare tent. Personnel can enter the tent, remove protective clothing and perform duties in an uncontaminated environment. WR-ALC/DSTDL designed and prototyped pole support racks after previous vibration tests resulted in pole and container damage (Report No. 90-R-03). AFPEA shock tested the redesigned container. One of the TCPS pole supports failed testing again. HSD/YAGD requested AFPEA to modify the supports and retest. AFPEA designed, prototyped, and tested a new support rack system. AFPEA modified the support rack and retested. The modified support rack system passed all tests and met all HSD/YAGD requirements. This test report reflects testing of only the final design.

PURPOSE: The purpose of this project was to determine if the pole support rack system inside the TCPS container would protect the TCPS and the container from damage during shipment and handling.

TEST SPECIMEN: The Stand-Alone Rowley container was shipped from ILC/Dover with the TCPS packed inside (See Figures 1 & 2). The Stand-Alone container contained three TCPS units that could be assembled together. The dimensions of the Stand-Alone container were 105" x 84" x 45". The weight was approximately 1700 pounds. Because previous testing resulted in damage to the units and the container, HSD/YAGD requested AFPEA to modify the container to include a pole support system (See Figures 3 & 4). The container and the pole support system were subjected to Cornerwise and Edgewise Drop testing, Pendulum Impact testing, and Vibration testing. The tests were done at ambient temperature because HSD/YAGD and AFPEA agreed that the pole support system would not be adversely affected by temperature. AFPEA tested the TCPS containers for performance only; therefore, no instrumentation was required.

TEST OUTLINE AND TEST EQUIPMENT: The Test Plan (Table 1) was developed by HSD/YAGD and the AFPEA. Test methods and procedures were as outlined in Federal Test Method Standard No. 101 (FTMS 101) and Military Standard 810 (MIL-STD-810). Any modifications to the standard test methods or procedures are noted in the test plan.

All testing was conducted at AFPEA, HQ AFLC/LGTP, Building 70, Area C, Wright-Patterson AFB, OH 45433-5999. The equipment required for each test is noted in the Test Plan (Table 1).

TEST PROCEDURES AND RESULTS:

Test No. 1: FTMS 101, Method 5005.1, Cornerwise-Drop (Rotational) Test. The drop height was 17 inches. The test was applied to each corner of the base for a total of four drops.

Test No. 2: MIL-STD-810, Method 516.3, Procedure IV, Table 516.3-II, Shock (Edgewise Drop) Test. The drop height was 18 inches. The test was applied one to each edge of the base for a total of four drops.

RESULTS: The container was visually inspected after all cornerwise and edgewise drops were completed. Minor damage included four lost clips and the middle block on edge 7-8 was twisted (Figures 5 & 6). The nuts on the skids were also loose (See Figure 7). The pole support rack system and the contents did not sustain any damage.

Test No. 3: FTMS 101, Method 5012, Pendulum-Impact Test. The test was applied once to each side of the container for a total of four impacts at a velocity of seven feet per second.

RESULTS: The container was visually inspected after the pendulum impacts were completed. The container and its contents did not sustain any damage.

Test No. 4: FTMS 101, Method 5019.1, Vibration (Repetitive Shock) Test. Duration of the test was two hours at 4.6 hz frequency and 1-inch double amplitude.

RESULTS: The container was visually inspected after completion of the test. Only minor damage was sustained to the poles wrapped in cushioning. (These poles are not in the support racks but are wrapped together in cushioning). The poles slipped out of the cushioning and the ends rubbed and caused some paint to be scraped off of the poles. The rest of the contents and the container, including the support rack system, did not sustain any damage.

CONCLUSIONS AND RECOMMENDATIONS: Upon completion of AFPEA's evaluation, the Stand-Alone Rowley container passed all tests and met all the requirements of HSD/YAGD. The minor damage which occurred to the container and the TCPS can be easily corrected. The blocks on the underside and in the middle of the container loosened during shipment and during testing (See Figure 6). Suggest inputting a lag bolt through the connecting skid parallel to the base to correct the problem. Also suggest using lock nuts or T-nut type inserts on the screws for the skids. They also loosened and fell off during testing (See Figure 7). The straight poles in the container rubbed together during testing causing paint to be scraped off. Suggest securing the poles more firmly with more tape and cushioning.

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TABLE 1

AIR FORCE PACKAGING EVALUATION ACTIVITY (Container Test Plan)				AFPEA PROJECT NUMBER 90-P-131	
CONTAINER SIZE (L x W x D) (INCHES)		WEIGHT (LBS)	CUBE (CU. FT.)	QUANTITY	DATE
INTERIOR:	EXTERIOR:	GROSS:	ITEM:		
	105 x 84 x 45	1700		1	6 Feb 91
ITEM NAME Transportable Collective Protective System Further Testing			MANUFACTURER ILC Dover		
CONTAINER NAME Container Mftd. by Rowley			CONTAINER COST		
PACK DESCRIPTION Wood Container					
CONDITIONING As noted below.					
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMETERS	CONTAINER ORIENTATION	INSTRUMENTATION	
1.	<u>ROUGH HANDLING TESTS</u>				
a.	FED-STD-101 Method 5005.1	Cornerwise-drop (rotational) test. Ambient Temp. Drop height 17 inches.	One drop on each base corner, total of four drops.	Visual Inspection	
b.	MIL-STD-810E Method 516.4 Procedure IV Table 516.4-II	Shock (Edgewise-drop) test. Ambient Temp. Drop height 18 inches.	One drop on each base edge, total of four drops.	Visual Inspection	
c.	FED-STD-101 Method 5012	Pendulum-impact test. Ambient Temp. Impact velocity 7 ft/sec, drop height 9 inches.	One impact on each side and each end, total of four impacts.	Visual Inspection	
2.	<u>VIBRATION (Repetitive Shock)</u>				
	FED-STD-101 Method 5019.1	Input excitation of 1-inch double amplitude at 4.6 hz frequency. Two hour Ambient Temp test.		Visual Inspection	
COMMENTS:					
PREPARED BY: <i>Caroline J. Buckey</i> Caroline J. Buckey, Mechanical Engineer			APPROVED BY: <i>Larry Wood</i> Larry Wood, Chief, Materials Branch		

Figure 1

TCPS General View

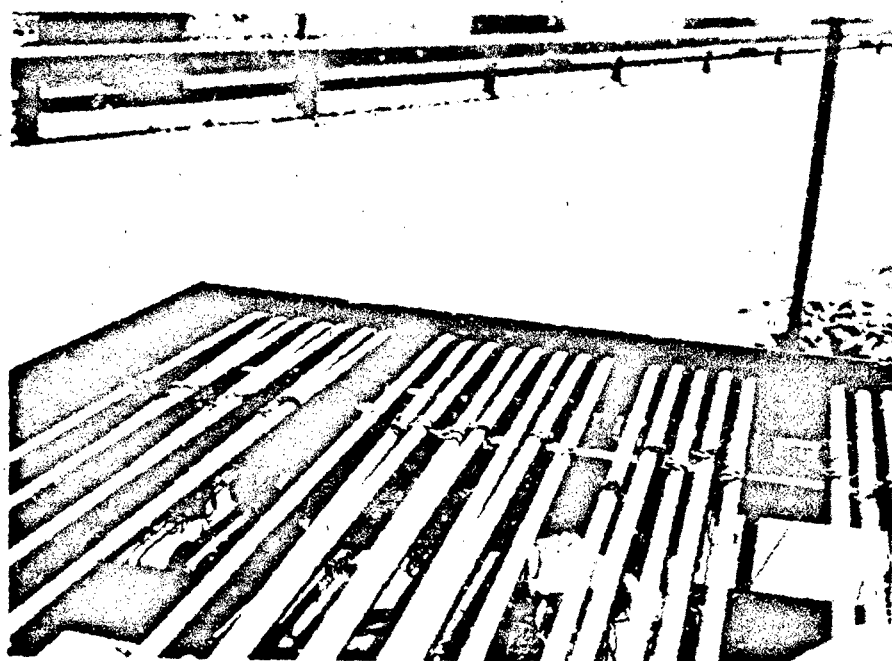


Figure 2

TCPS General View



Figure 2

Support Rack System End #1

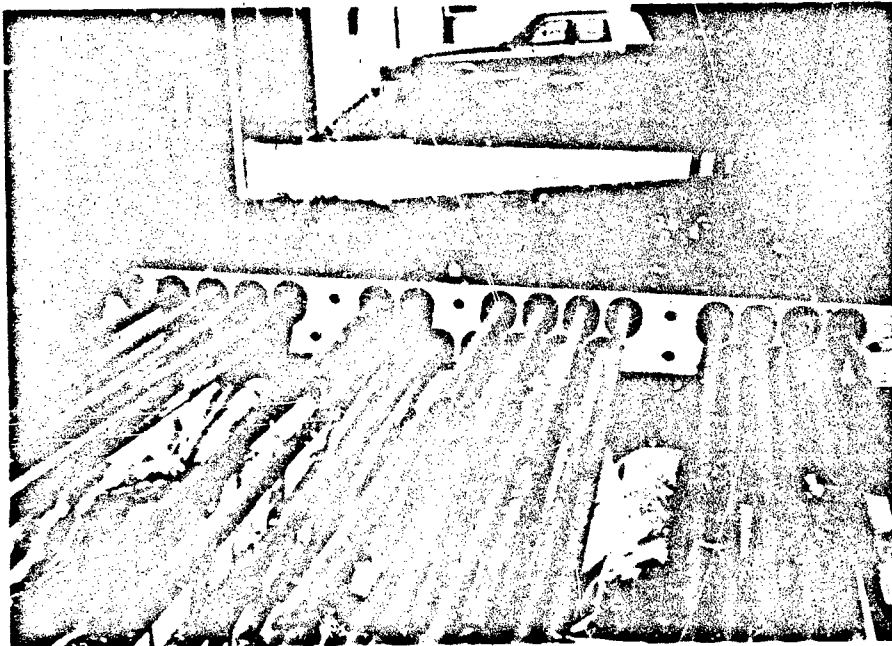


Figure 4
Support Rack System End #2

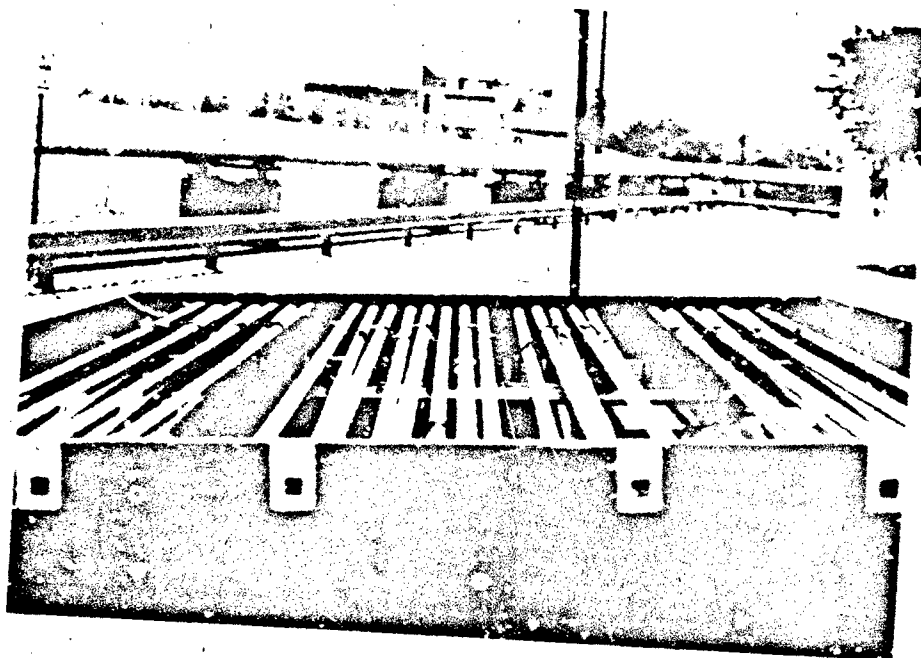


Figure 5

Lost Clip

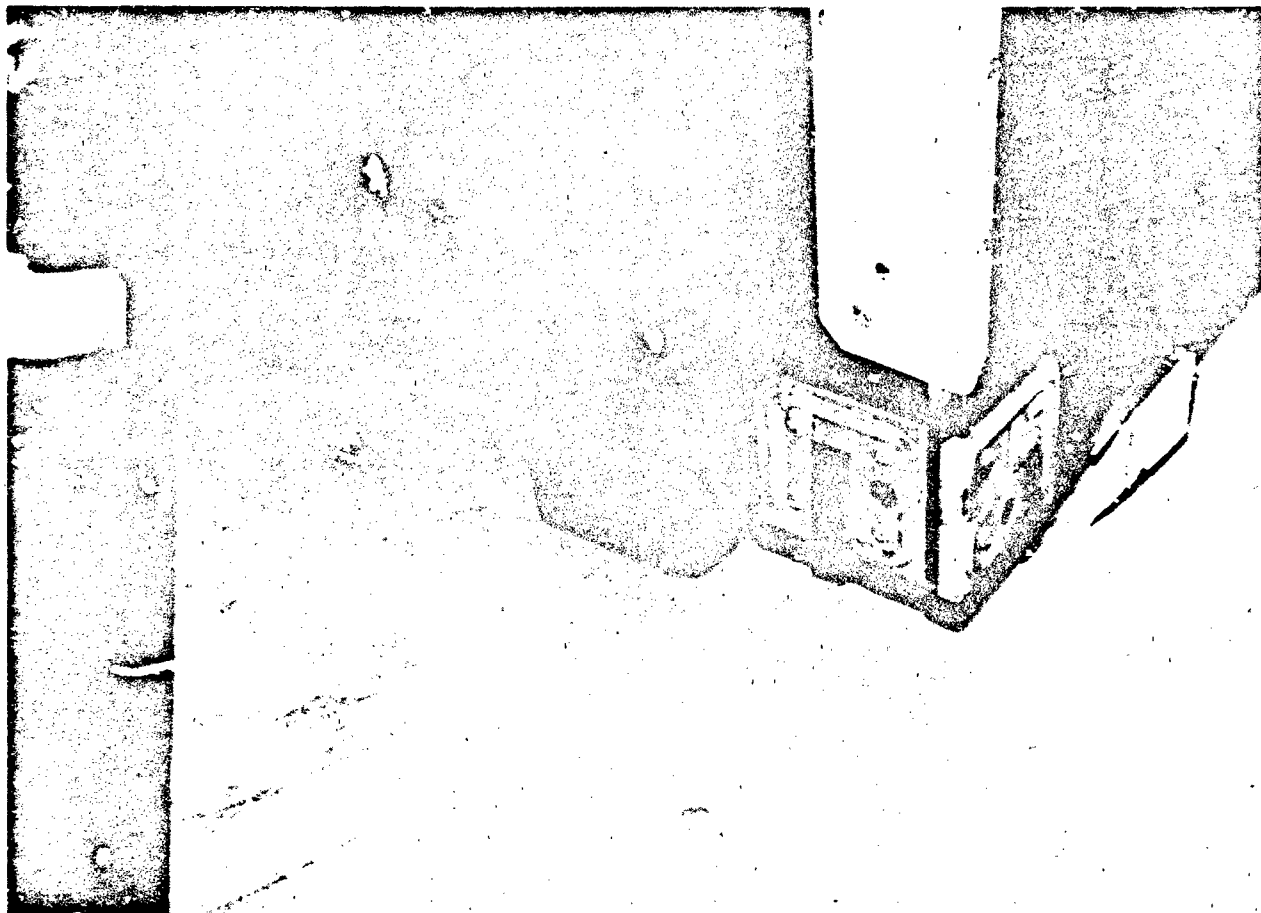


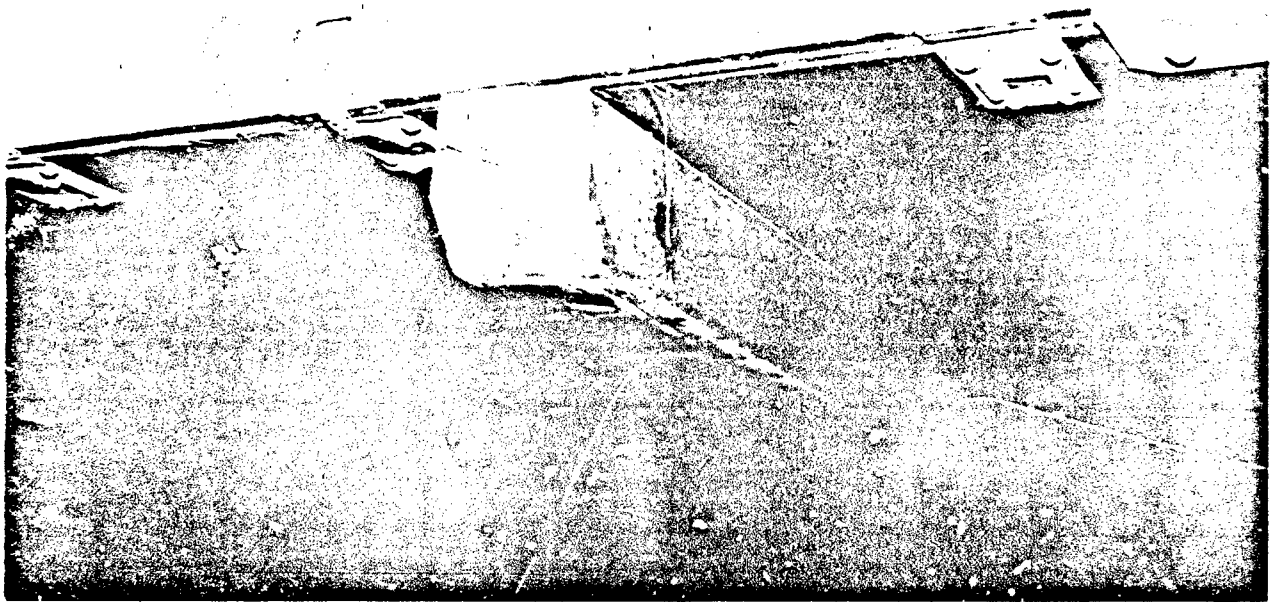
Figure 6

Twisted Block



Figure 7

Loosened Skids



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Human Systems Division (HSD/YAGD), Wright-Patterson AFB OH 45433-5503 requested assistance from the Air Force Packaging Evaluation Activity (AFPEA) in conducting shock and vibration testing on the modified Transportable Collective Protection System (TCPS) Rowley Stand-Alone container. The TCPS, manufactured by ILC/Dover Inc., is a chemical warfare tent. Personnel can enter the tent, remove protective clothing and perform duties in an uncontaminated environment. WR-ALC/DSIDL designed and prototyped pole support racks after previous vibration tests resulted in pole and container damage (Report No. 90-R-03). AFPEA shock tested the redesigned container. One of the TCPS pole supports failed testing again. HSD/YAGD requested AFPEA to modify the supports and retest. AFPEA designed, prototyped, and tested a new support rack system. AFPEA modified the support rack and retested. The modified support rack system passed all tests and met all HSD/YAGD requirements.					
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