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CRDL Technical Memorandum 2-32

CHLOROPICRIN LEAKAGE TEST OF THE M17 PROTECTIVE MASK EQUIPPED WITH DRINKING AND RESUSCITATION DEVICES WORN BY VOLUNTEERS

by

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FOREWORD

The work described in this report was authorized under Project No. 1C622401A097, Medical Defense Aspects of Chemical Agents (U). This work was started and completed in March 1965. The experimental data are contained in notebook number MN 1875.

The human subjects in the tests conducted by this installation are enlisted US Army volunteers. There is no coercion or enticement to volunteer. The most stringent medical safeguards surround every human test.

Acknowledgments

The authors acknowledge the cooperation of Lt Colonel Nicholas G. Bottiglieri and Mr. Carl Stearn from Clinical Research Division in providing the volunteers, the volunteers for their services; Mr. John Buddemeyer, Mr. Eugene Sovinsky, Mr. John Scavnicky, and Mr. John Deppisch from Physical Protection Division for their assistance and for the proper fitting of protective masks and hoods.

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CHLOROPICRIN LEAKAGE TEST OF THE M17 PROTECTIVE MASK EQUIPPED WITH DRINKING AND RESUSCITATION DEVICES WORN BY VOLUNTEERS

I. INTRODUCTION.

The purpose of this test was to determine by wearing trials whether the E13R13 Field Protective Mask (a modified M17 Protective Mask with connections for the E49 Protective Mask Drinking Kit or the E50 Protective Mask Resuscitation Tube) can be worn and manipulated in a contaminated atmosphere (chloropicrin, PS) without leaking and exposing the operator to the contaminant.

II. PROCEDURE.

Twelve volunteer subjects were selected from the Clinical Research Division pool for these tests. Six E13R13 masks with the E49 and E50 devices were tested. Two were the small size and four the medium size. In each PS-run the mask with the drinking device was tested first, after which the resuscitation device was tested. With each mask there was a corresponding control M17 mask. Prior to any exposure test each mask, on donning, was carefully checked and adjusted by an expert for proper fitting on the face. The M6 hood was worn with each mask. No other protective or special clothing was worn by the subjects. Cotton gloves were worn by all subjects during the last half of this test to determine whether gloves would cause any difficulty in changing the accessories to the mask.

The total exposure time was from 12-1/2 to 15-1/2 min. The tests were conducted over a 4-day period in a dynamic 20-cu m vapor chamber having an airflow of 3000 liters per min. There were two runs in the morning and two in the afternoon. The average nominal PS concentration in the chamber was 1450 mg/cu m.*

The balanced block statistical system was used for the wearing trials wherein the test subjects of each size group exchanged masks within their respective group before each exposure. The group wearing the small size completed four cycles and the group wearing the medium size completed two cycles for a total of 16 wearing trials on each man. This system was used to eliminate bias.

The masked subjects entered the chamber and remained at rest for 5 min, after which they engaged in exercises for a period of 4 min. The exercises consisted of running in place, turning head repeatedly sidewise and up and down, bending body at the waist, and turning from side to side.

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* McGrath, F. P., Dutreau, C. U., Silver, S. D., and Oberst, F. W. MLRR 70. Chloropicrin Leakage Tests on the M-9 Gas Mask Worn by Men During Mild Activity. July 1951. UNCLASSIFIED Report.

On completion of the exercises the subjects wearing the E49 device connected the drinking tube to a canteen and drank water.

The test for the E50 resuscitation device was performed at the conclusion of the drinking device trial. This consisted of connecting the resuscitation tube to the outlet valve at least six times and inflating a rubber balloon. Any subject detecting PS during any part of the test signaled the test observers and withdrew from the chamber.

Figures 1 to 4 illustrate the E13R13 Field Protective Mask and accessories used in this test.

III. RESULTS.

Three leaks were detected throughout the tests on the modified masks. Two of these occurred during the first day of the tests when the subjects were endeavoring to connect the resuscitation tube and accidentally disturbed the outlet valve. One of these test subjects could not adequately complete the connection without receiving PS vapor on his face. The third leak developed during the bending down exercises. In this case the head harness was not properly adjusted. The subject left the chamber, and the mask was readjusted. He re-entered and resumed the test without recurrence of a leak. There were no incidents of leakage for the controls.

Cotton gloves were worn by the test subjects for the entire last half of the tests and did not produce any significant handicaps while the subjects changed the accessories to the mask.

IV. DISCUSSION.

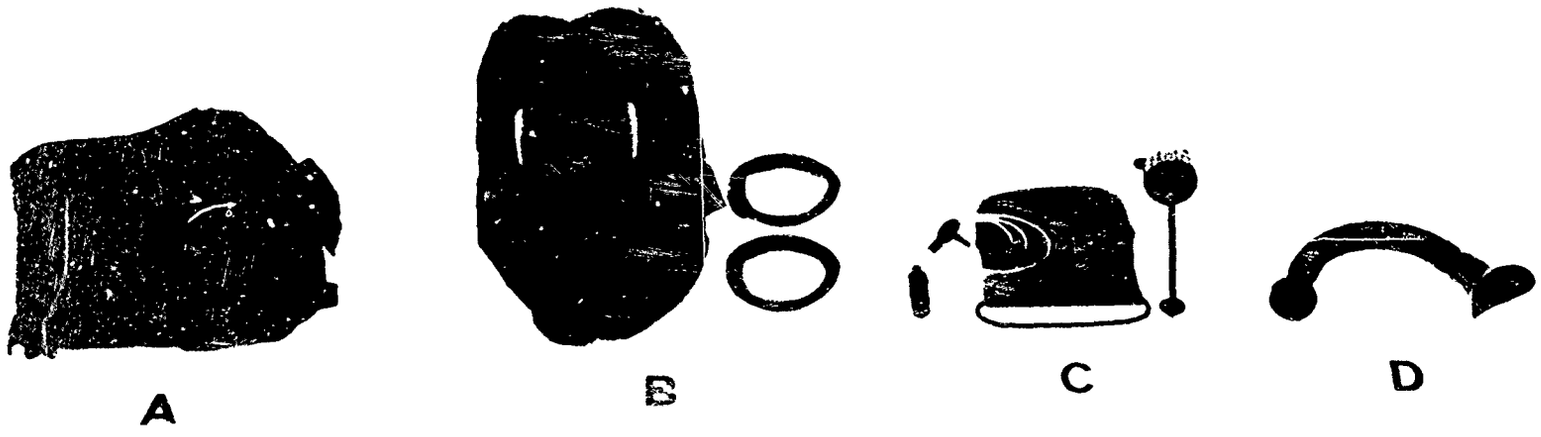
Action should be taken to eliminate the possibility of accidental displacement of the outlet valve when connecting the resuscitation tube.

There was evidence during the first day that men wearing these devices need training in order to successfully perform the necessary operation.

V. CONCLUSION.

It was concluded that personnel should receive adequate instructions in wearing the E13R13 Protective Mask and in changing the accessory devices used with the mask in a contaminated atmosphere.

E13R13 FIELD PROTECTIVE MASK AND ACCESSORIES



A. CARRIER, M15

B. MASK, FIELD PROTECTIVE E13R13 WITH M6 PROTECTIVE HOOD

C. KIT, DRINKING, PROTECTIVE MASK, E49

D. TUBE, RESUSCITATION, PROTECTIVE MASK E50

FIGURE 1

E13R13 FIELD PROTECTIVE MASK AND ACCESSORIES

FIGURE 2

E49 PROTECTIVE MASK DRINKING KIT BEING CONNECTED TO THE
E13R12 OR E13R13 FIELD PROTECTIVE MASK

FIGURE 3

DRINKING WATER WHILE WEARING THE E13R12 OR E13R13 PROTECTIVE MASK AND USING THE E49 PROTECTIVE DRINKING KIT

FIGURE 4

E50 PROTECTIVE MASK RESUSCITATION TUBE BEING CONNECTED
TO E13R13 FIELD PROTECTIVE MASK

SUPPLEMENTARY

INFORMATION

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ADDENDUM SHEET

Report No.: CRDL Technical Memorandum 2-32

Title: Chloropicrin Leakage Test of the M17 Protective Mask Equipped With Drinking and Resuscitation Devices Worn by Volunteers

Classification: UNCLASSIFIED Report

Authors: Norman B. Billups
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Date: October 1965

Add the following to V. CONCLUSIONS on page 6:

After adequate training, individuals can use it in a toxic atmosphere without causing leakage into the mask.

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