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SECTION 2. DETAILS OF TEST (U)

2.1 INTRODUCTION

(u) 2.1.2 Test Grid

The test grid consisted of a 91-meter tower erected on Ursula islet and a downwind array of sampling locations. The purpose of this tower was to obtain data to provide estimates of the source strength and efficiency of the weapon system, and to serve as the primary meteorological site for recording required environmental parameters. The purpose of the downwind array was to determine the area coverage of the weapon system. Figures 1 and 2 illustrate the major features of the test grid. Table 9, Volume II, describes the location of the aerosol samplers throughout the test grid.

(u) 2.1.3 Dissemination of Test Aerosols

An F4-E aircraft was used to disseminate the aerosols.
[REDACTED]

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NIGHT TRAIN (U)

TEST 64-5

CLASSIFIED BY: [redacted]
EXEMPT FROM GENERAL CLASSIFICATION
SCHEDULE OF EXECUTIVE ORDER 11652
EXEMPT FROM DECLASSIFICATION
EXEMPTION AUTHORITY: [redacted]
DECLASSIFY ON: [redacted]
FINAL REPORT
DECEMBER
1964

Review: [redacted] 1754

[redacted]

Approved by [redacted]
[redacted]
[redacted]

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[redacted]

By authority of CG DTC
Date: 15 December 1964

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ABSTRACT (U)

1.

Therefore, the primary purpose of this test series was to study the penetration of an arctic inversion by a biological aerosol cloud; a secondary purpose was to study the downwind travel and diffusion of this cloud when disseminated into different arctic meteorological regimes. Studies were made in the vicinity of Fort Greely, Alaska, during the months of December 1963 and January 1964; temperature ranged from -39.3 to -3.3°C (-39° to +26° F).

2.

(U)

A total of 18 biological trials were conducted in which the biological tracer Bacillus subtilis var. niger (BG) was released along a line source. The A/B45Y-1 liquid biological spray tank, carried on the F-105 or F-100 aircraft, was used in 14 of these trials. The remaining four trials were surface trials in which dry BG was disseminated from the rear of a moving, tracked vehicle. In addition, biological release was accompanied by the release (from contractor-flown aircraft) of two colors of fluorescent particles (FP) of zinc cadmium sulfide.

3.

(u)

4.

(u)

5.

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[REDACTED]

4. DISSEMINATION SYSTEMS

a. Aerial Disseminator--A/B45Y-1 Wet Biological Spray Tank

The aerial dissemination system (Weapon System), consisting of a Fairchild A/B45Y-1 wet biological spray tank mounted on either an F-105 (Fig. 6) or an F-100 aircraft, was employed in all aerial trials of NIGHT TRAIN.

[REDACTED]

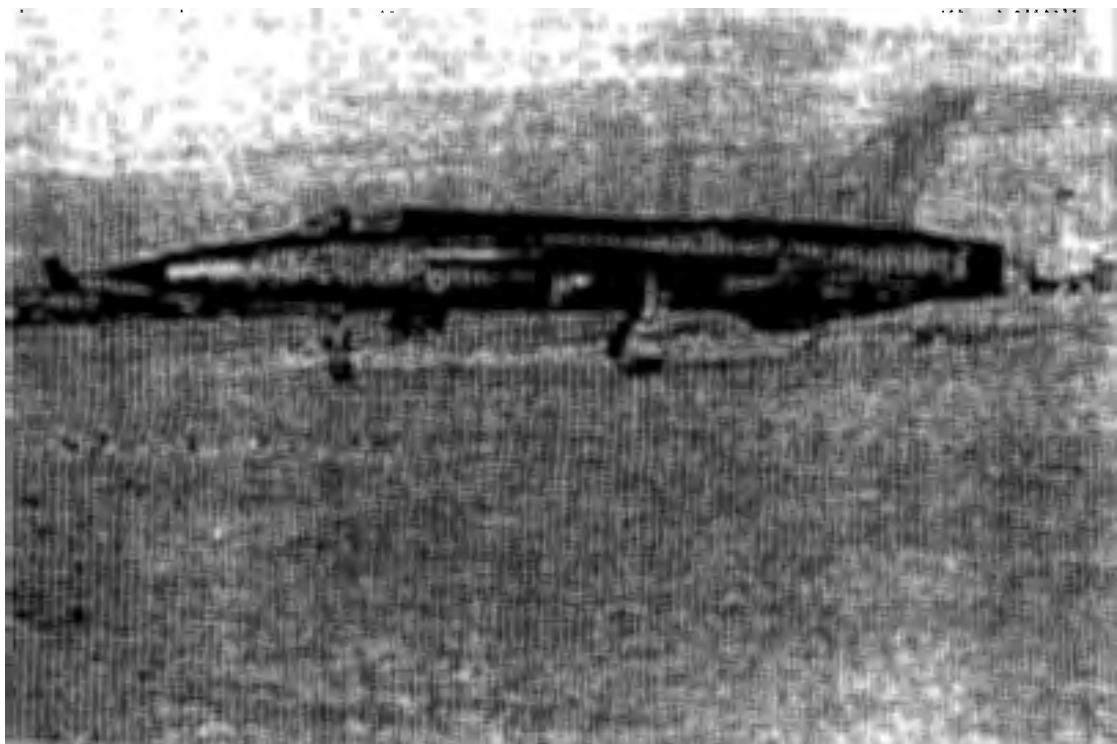


FIGURE 6 (U). F-105 Aircraft (U)

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[REDACTED]

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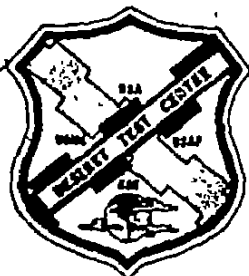
Report Number: DTC 6517125R

AD 388 8581

TEST 65-17--FEARLESS JOHNNY (U)

FINAL REPORT

[REDACTED]



NOVEMBER 1966

Prepared by
Capt Ray W. Bills

Headquarters • Desert Test Center • Fort Douglas, Utah • 84113

[REDACTED]

[REDACTED]

7. AD 388 8581
509 532

[REDACTED]

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ABSTRACT

In the test, FEARLESS JOHNNY, the target vessel (USS GEORGE EASTMAN, YAG 39) was challenged by agent VX or its simulant diethylphthalate to (1) evaluate the magnitude of exterior and interior contamination levels under three material readiness conditions, (2) demonstrate the effectiveness of the shipboard water washdown system as a protective and decontaminant measure against VX spray, and (3) evaluate the operational impact of gross VX contamination on a U.S. Navy ship.

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████████████████████
PREFACE

████████████████████
The test was designed to (1) evaluate for three material readiness conditions the magnitude of interior and exterior contamination from an aerial-delivered aerosol chemical weapon system using a simulant for agent VX, (2) demonstrate the effectiveness of the shipboard water wash-down system for decontamination and as a protective measure against an aerial spray of agent VX, and (3) evaluate the operational impact of gross VX contamination on a U.S. Navy ship.

████████████████████ FEARLESS JOHNNY was authorized by Letter CRD/V 044, Headquarters, Department of the Army, Office, Chief of Research and Development, Chemical-Biological Testing (U), 15 May 1964, SECRET. ██████████

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SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. TEST OBJECTIVESa. Primary Objectives

[REDACTED]

(1) First Objective

The first objective was to subject a naval vessel to a chemical aerosol spray (VX simulant) during each of three material readiness conditions in order to estimate the magnitude of external and internal contamination which may be caused by an aerial attack with agent VX. This objective was accomplished by conducting 14 trials using dyed diethylphthalate (DEP) as a simulant for VX.

(2) Second Objective

The second objective was to demonstrate the effectiveness of shipboard water washdown, both as a protective and as a decontaminating measure, against aerial spray of agent VX during each of two washdown conditions. This objective was accomplished by two successful trials with agent VX--one with the water washdown in operation during dissemination (wet deck), the other with the water washdown initiated after dissemination of the agent (dry deck).

(3) Third Objective

The third objective was to estimate the operational impact that gross VX contamination has on a ship.

SECTION III

TEST PROCEDURES (U)

1. TEST LOCATION AND DATE

(u) The FEARLESS JOHNNY trials were conducted at sea, southwest of Honolulu, Hawaii, during August and September 1965. The disseminating aircraft were stationed at the auxiliary landing field at Bonham, Island of Kauai.

2. TARGET VEHICLE

(u) a. The USS GEORGE EASTMAN (YAG 39) was the target vessel for all trials of the test program (Fig. 1).

3. LABORATORY AND ESCORT VESSELS

(4) a. The USS GRANVILLE S. HALL (YAG 40) (Fig. 4) was assigned to FEARLESS JOHNNY as an escort and laboratory support vessel. To provide a means of sample transfer between the target and support vessels, two light tugs were assigned to the test task force.

(a) b. Facilities to obtain the required meteorological data were also provided aboard the YAG 40. Data on windspeed and direction, temperature gradient, air temperature, precipitation, and sky conditions were all recorded by the meteorology personnel on the YAG 40, for each trial of the test.

4. TRIAL PROCEDURESa. Simulant Phase

(4) For the 14 trials of the simulant phase of FEARLESS JOHNNY, the chemical diethylphthlate (DEP), mixed with 0.1 of one percent of the fluorescent dye DF-504, was used as a simulant for agent VX. [REDACTED]

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Report Number DTC 6650130

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TEST 66-5 -- PURPLE SAGE (U)
FINAL REPORT

[REDACTED]



(2)

January 1967
Prepared by
Dr Frank D Bagley

HEADQUARTERS • DESERET TEST CENTER • FORT DOUGLAS, UTAH • 84113

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[REDACTED]

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[REDACTED]

ABSTRACT (U)

(u) -

DTC Test 66-5, PURPLE SAGE (U), was designed to evaluate the effectiveness of the experimental Shipboard Toxicological Operational Protection System (STOPS) against envelopmental attack of a gaseous chemical warfare (CW) agent under operational situations.

[REDACTED] The CW test agent was methyl acetoacetate (MAA), a GB simulant for which an agent-simulant relationship had been established in DTC Test 64-2, FLOWER DRUM (U), Phase I. The STOPS destroyer, USS HERBERT J. THOMAS (DD833), was enveloped by a test agent cloud generated by release of MAA through a turbine disseminator located on the bow of the ship.

(u)

[REDACTED]

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[REDACTED]

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SECTION II

TEST OBJECTIVES (U)

2. ADDITIONAL OBJECTIVE

- (u) — a. The additional objective was to evaluate the effect that the wearing of protective masks (Mk V or M17), for a 4-hour period, had on the operational efficiency of a ship's crew.

[REDACTED]

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SECTION III

TEST PROCEDURES (U)

1. TEST LOCATION AND DATE

Base of operations was the San Diego Naval Station. The trials were conducted in an operational area of the Pacific Ocean, off San Diego, Calif., during the period 5 Jan - 3 Feb 66.

2. TEST SHIP

a. USS HERBERT J. THOMAS (DD833), (Fig. 1), is a test ship with an experimental collective protective system, STOPS, installed.

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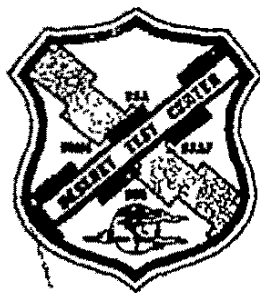
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Report Number: DTC 6661339

File No: 509530
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TEST 66-6 -- SCARLET SAGE (U)

FINAL REPORT



April 1967

Prepared by
John H. Morrison

HEADQUARTERS • DESERET TEST CENTER • FORT DOUGLAS, UTAH • 84113

[REDACTED]

[REDACTED]

Date: 17 April 1967

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[REDACTED]

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DTC 67-408

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ABSTRACT (U)

SCARLET SAGE (U) was designed to evaluate the protective effectiveness of the experimental Shipboard Toxicological Operational Protective System (STOPS) against an envelopment attack of a BW tracer aerosol under operational situations. STOPS is installed aboard the FRAM I destroyer, USS HERBERT J. THOMAS (DD 833).

In 16 trials, the ship was challenged with aerosols of the biological tracer, Bacillus subtilis var. niger (BG), released from a continuous point source which was located approximately 500m upwind of the target vessel during a 10-minute period.

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PREFACE (U)

The U.S. Navy provided an operational base and assigned the STOPS destroyer, USS HERBERT J. THOMAS (DD 833), an AVR boat (NORTH ISLAND), and personnel as requested by DTC. The USATECOM and USAMJCOM provided personnel, test equipment, and laboratory services. The USMC provided tactical air support.

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SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. PRIMARY OBJECTIVES

a. The first primary objective was to evaluate the effectiveness of STOPS as a protective system against biological tracer aerosols under five test situations.

[REDACTED]

b. The second primary objective was to determine the degree of tracer aerosol penetration into closed, but unpressurized areas of the ship.

[REDACTED]

c. The third primary objective was to compare, when applicable, the results of similar vessels (without STOPS modification), taking into consideration the ventilative characteristics.

[REDACTED]

2. SECONDARY OBJECTIVES

a. The first secondary objective was to determine the magnitude of exterior and interior contamination of surfaces from operational releases of the tracer aerosol and to evaluate the effectiveness of the exterior water-washdown system.

[REDACTED]

b. The second secondary objective was to evaluate the nasal pharyngeal-wash technique as a method for detecting the inhalation of biological aerosols by personnel exposed under operational conditions.

[REDACTED]

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SECTION III

CONDUCT OF TEST (U)

1. TEST LOCATION AND DATE

The test was conducted off the coast of California, between San Diego and San Clemente Island, in operational area Lima, within a radius of 30 nautical miles of the coordinates 32° 40' N, 117° 20' W. The base of operations was the U.S. Naval Station, San Diego, California. Trials were conducted during the period 9 February through 4 March 1966.

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4. TRIAL PROCEDURES (PRIMARY OBJECTIVES)

a. Biological Tracer

In all trials, an aerosolized slurry of Bacillus subtilis var. niger (BG) was disseminated. A standard BG slurry was used for the aerial challenge trials, while a diluted BG slurry was required to produce the desired dosage on the target ship in the surface release trials.

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[REDACTED]

Challenge dosages simulating the maximum operational level expected in the next 5-10 year period [REDACTED] were achieved by using an E-2 BW dissemination system mounted on an AVR boat [REDACTED]

[REDACTED]

14

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[REDACTED]

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[REDACTED]

DTC Test 68-50 Test Report. Volume I (U)

DESERET TEST CENTER FORT DOUGLAS UT

MAR 1969

[REDACTED]

[REDACTED]

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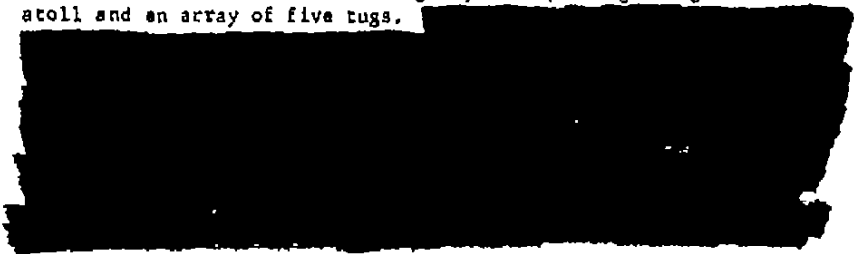
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~~ABSTRACT~~

(S) — DTC Test 68-50 was a full-scale field test of the area coverage potential of the F4/AB45Y-4/PG2 weapon system. PG2 is a chemical incapacitant with a low inhalatory dose requirement for humans. The test was conducted at Eniwetok Atoll, Marshall Islands, during September and October, 1968. The weapon system disseminated the aerosol over a 40-50 km downwind grid, encompassing a segment of the atoll and an array of five tugs.




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[REDACTED]
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● FOREWORD (U)

[REDACTED]
Many individuals and agencies made significant contributions to this test and to the report. Support included:

(h)

- Aerial surveillance Patrol Squadron 6-VPG
 - Air-sea rescue mission. . . 302, 303, and 304 Aerospace Rescue and Recovery Squadrons, Air Force Reserve
 - Tactical aircraft 4533 Tactical Test Squadron (33 TFW)
 - Onsite support. Air Force Western Test Range
 - Marine support. USS GRANVILLE S. HALL (YAG 40), five light army tugs
 - Technical support Desert Test Center
Fort Detrick
Armament Development Test Center
Air Force Armament Lab.
Ogden Air Material Area
✓ USAF Tactical Air Warfare Center
- [REDACTED]

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[REDACTED]

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SECTION 1. (S) INTRODUCTION (U)

1.1 (S) BACKGROUND

(h) — The agent employed in this program was Staphylococcal enterotoxin, Type B (symbol PE2), a toxin produced by certain strains of the common bacterium known as Staphylococcus aureus. [REDACTED]

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[REDACTED]
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[REDACTED]
[REDACTED]
1.2.3 Uranine Dye

(u) — Uranine dye (sodium fluorescein) was incorporated in the PG2 during the drying cycle at the production plant at a nominal concentration of 2 percent. The dye served as a tracer for the agent.

1.2.4 BG2

The dried form of BG, symbol BG2 (Bacillus subtilis var niger) was also used as a tracer of the agent aerosols.

[REDACTED]
1.3 TEST OBJECTIVES

The primary objective was to determine the potential casualty area and associated casualty levels for the F-4/AB45Y-5/PG2 weapon system.

[REDACTED]
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[REDACTED]
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SECTION 2. DETAILS OF TEST (U)

2.1 INTRODUCTION

(u) 2.1.2 Test Grid

The test grid consisted of a 91-meter tower erected on Ursula islet and a downwind array of sampling locations. The purpose of this tower was to obtain data to provide estimates of the source strength and efficiency of the weapon system, and to serve as the primary meteorological site for recording required environmental parameters. The purpose of the downwind array was to determine the area coverage of the weapon system. Figures 1 and 2 illustrate the major features of the test grid. Table 9, Volume II, describes the location of the aerosol samplers throughout the test grid.

(u) 2.1.3 Dissemination of Test Aerosols

An F4-E aircraft was used to disseminate the aerosols. [REDACTED]

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[REDACTED]

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[REDACTED]

DTC Test 69-32, Volume I (U)

[REDACTED]

DESERET TEST CENTER FORT DOUGLAS UT

28 MAY 1970

[REDACTED]

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[REDACTED]

[REDACTED]
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ABSTRACT (U)

(U) — DTC Test 69-32 was conducted to examine the effect of solar radiation on the viability of aerosolized Serratia marcescens (SM) and Escherichia coli (EC) after being aeriaily disseminated in a temperate marine environment during time periods about sunrise and sunset. A total of 27 field trials was conducted (14 SM and 13 EC) in an operational area southwest of the Hawaiian Islands. Releases were made from two Aero 14B spray tanks wing mounted on an A4C jet aircraft. Bacillus subtilis var niger (BG) with a fluorescent tracer suspension was released from one tank while either SM or EC was simultaneously released from the other. [REDACTED]

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[REDACTED]

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FOREWORD (U)

Agencies which gave direct support to the test (and the services provided by them) are listed below:

COMNAVSEA/PRON
WVCS 2 ORGANIZATIONS (U)

Preoperation coordination, communications support and area surveillance assistance.

COMSERVPAC

Provided surface support for the USS GRANVILLE S, HALL (YAG-40), five support craft, and ship repair assistance.

OO NAS, Barbers Point

Space and maintenance support for laboratory; logistics and administration.

FLCOMPRON ONE

Disseminating jet aircraft.

PATRON FOUR

P3V aircraft for airborne command post and area surveillance.

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[REDACTED]
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SECTION 1. INTRODUCTION (U)

1.1 REQUIREMENT (U)

DTC Test 69-32 originated from a USAF USA requirement which requested the determination of the effect of solar radiation on aerosolized microorganisms during periods associated with dawn and early evening (low solar radiation levels).
[REDACTED]
[REDACTED]

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[REDACTED]

1.4 ● OBJECTIVE OF THE TEST (U)

1.4.1 ● Effect of Sunlight on EC and SM (U)

(U) -

The objective of this test was to obtain field data on the effect of sunlight on aerosols of EC and SM when released in an open sea environment during periods of low solar radiation intensities associated with sunrise and sunset.

[REDACTED]

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[REDACTED] UNCLASSIFIED

SECTION 2. DETAILS OF TEST (U)

2.1 SCOPE (U)

(u) - A total of 27 field trials was conducted at sea (14 SM and 13 EC) in an operating area southwest of Hawaii during the period 30 April - 28 June 1969. A summary of trials conducted under specific conditions is given in Table 2.

2.2 (C) DISSEMINATION AND GRID ARRAY (U)

(u) - A Navy A4C jet aircraft equipped with two Aero 14B spray tanks, wing mounted, was used to aerosolize the test material. Five army light tug boats (support craft), each converted to serve as an ocean sampling platform and laboratory were employed as target vessels in this test [REDACTED]. Dissemination commenced 1.6 km downwind of the primary laboratory ship (YAG-40) and continued downwind for approximately 3.2 km beyond the last sampling support craft [REDACTED]

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[REDACTED]

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TEST 65-4--MAGIC SWORD. (U)

DESERET TEST CENTER FORT DOUGLAS UT

MAY 1966

Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; 1 Jun 83. Other requests for this document must be referred to Commander, US Army Dugway Proving Ground, Attn: MT-DA-L. Dugway, UT 84022.

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[REDACTED]

[REDACTED]

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[REDACTED]

ABSTRACT (U)

MAGIC SWORD (U) was designed to study the feasibility of an offshore release of Aedes aegypti mosquitoes and to obtain additional information on (1) mosquito-biting habits, (2) mosquito trap technology, and (3) operational and logistical problems associated with the delivery of mosquitoes to remote sites.

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

PREFACE (U)

[REDACTED]

[REDACTED]

Mission support at the remote island test site was provided by the captain (LCDR John H. Church) and crew of the USS GEORGE EASTMAN (YAG 39). Volunteers from the crew also participated in the mosquito-biting trials.

[REDACTED]

The tests were conducted on or in the vicinity of Baker Island during May 1965.

[REDACTED]

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[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

SECTION III

TEST PROCEDURES (U)

1. TEST LOCATION

The trials were conducted on (or in the vicinity of) Baker Island (0° 12'N, 176° 29'W), which is a low profile island of approximately 380 acres, located 37 naut mi south-southeast of Howland Island and about 340 naut mi west-northwest of Canton Island.

[REDACTED]

2. [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]
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[REDACTED]

[REDACTED]

All mosquito releases were made shortly after dawn and trap recoveries were checked at 3, 12, and 24 hrs, respectively, after the release.

[REDACTED]

b.

[REDACTED]

c. Onshore Trials...Biting Study

(1) A single grid--geometrically identical to those used in the trap technology trials, but with five equidistant positions on the inner circle and ten equidistant positions on the outer circle--was constructed for the mosquito-biting study. Volunteers were placed at each of these positions and a designated number of vectors was released centrally. During each of six 10-minute biting intervals, the number of bites

[REDACTED]

[REDACTED]

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[REDACTED]

received by each volunteer was recorded. The volunteers were seated with their head and neck covered, their sleeves rolled down, and their trousers rolled up to just below their knees. The men wore ankle-length, dark hose and low-cut shoes.

(2) All bites received, from the feet to just below the knees were recorded. The men remained generally motionless but were permitted to capture the mosquitoes with aspirators. The number of such captures was not recorded--nor were estimates made of the relative number of biting and captured mosquitoes.

(3) The grid for the first biting trial was located in an open, barren area; for the remaining biting trials, it was moved to a vegetated area similar to the areas selected for grids in the trap technology trials. The latter location is shown in Figure 2, Grid E.

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(C) 5. SUMMARY OF INVESTIGATION

a. Procedures and Results

The total number of convicts which escaped during the... and... filling operation was handled by... during the trials. When all the trials... the stored... were killed by... of the... (L...)... pilots survived... destroyed with... A search... using...

[REDACTED]

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[REDACTED]

of insecticide--was conducted throughout the ship.

[REDACTED]

[REDACTED]

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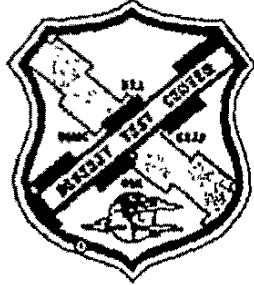
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TEST 65-6--BIG TOM (U)

FINAL REPORT



January 1967

Prepared by

Ernest H. Buhlman and Ronald D Stricklett

HEADQUARTERS • DESERET TEST CENTER • FORT DOUGLAS, UTAH • 84113

BY AUTHORITY OF CO, DTC
Date: 6 January 1967

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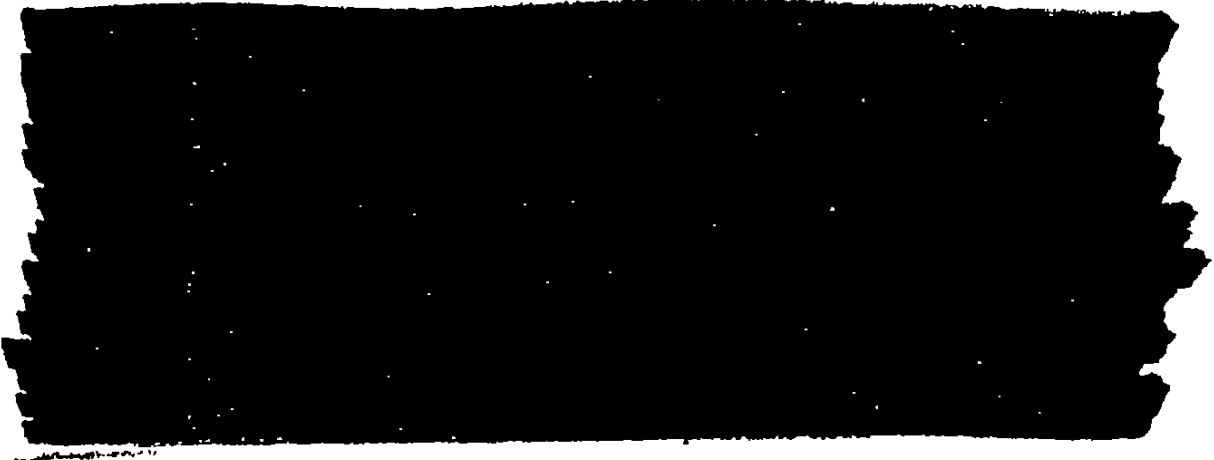
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ABSTRACT

(u)

The test BIG TOM (DTC 656), divided into two phases, was conducted during the months of May and June. BG (Bacillus subtilis var. niger) was released against the Island of Oahu. Phase A employed the A4/Aero 14B weapon systems, Phase B employed the F105/A/B 45Y-4 weapon system. To answer the basic objectives of the Marine Corps, casualty estimates were to be developed for various strike patterns employed during the exercise. It was assumed that when results from the use of BG were adjusted by certain factors BG was an adequate tracer for the pathogenic agent DK (Venezuelan equine encephalomyelitis).



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(S)

SECTION I

INTRODUCTION (U)

1. BACKGROUND

a.



One of these requirements was to evaluate the feasibility of a biological attack against an island complex, and to evaluate Marine Corps doctrine and tactics for delivery of such an attack.



2. SCOPE

a. BIG TOM consisted of a series of aerial line-source trials during which a harmless biological tracer material, BG, was released (disseminated) from a high-performance jet aircraft; both liquid-and dry-BG materials were used. All releases were made on the windward side of the island of Oahu.



were made on the windward side of the island of Oahu.



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[REDACTED]

[REDACTED]

d. [REDACTED]

(u)

For this study, Meteorology Research, Inc. (MRI), in all but one of the Phase A and B trials, released two colors of FP from an Aero Commander aircraft especially equipped with FP disseminators.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED] UNCLASSIFIED

(S)

SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. (S) [REDACTED]

2. FIRST OBJECTIVE

The first objective was to evaluate, in terms of estimated casualty production for a candidate agent, the effectiveness of current biological spray-type weapon systems when employed against targets in varying types of terrain and vegetation, such as that found on the Island of Oahu (Hawaii), by:

- 1) Investigating the diffusion and downwind travel of biological tracer aerosols
- 2) Estimating area coverage in both jungle and surrounding tropical terrain
- 3) Investigating the degree of aerosol penetration of a jungle canopy, the ventilation rate in the canopy, and time resolution of aerosols in the canopy
- 4) Investigating the degree of penetration and aerosol time resolution of typical fortifications; e.g., gun emplacements, coastal defenses, etc.

[REDACTED]

3. SECOND OBJECTIVE

The second objective was to evaluate the effectiveness of the Aero 14B/A4 weapon system, when employed in accordance with U.S. Marine Corps doctrine and tactics, against targets found on an island complex.

[REDACTED]

4. (S) SECONDARY OBJECTIVE:

A secondary objective was to characterize the meteorological conditions associated with this island complex which relate aerosol behavior to analog areas by:

[REDACTED] UNCLASSIFIED
aerosol behavior to analog areas by:
[REDACTED] UNCLASSIFIED

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- 1) Investigating the diffusion and downwind travel of biological and FP tracer aerosols over land and water
- 2) Investigating meteorological parameters such as wind-flow patterns, turbulence characteristics, etc.

This objective was fully accomplished. The data is reported in § V, ¶ 2. Conclusions are presented in § VI, ¶ 3.

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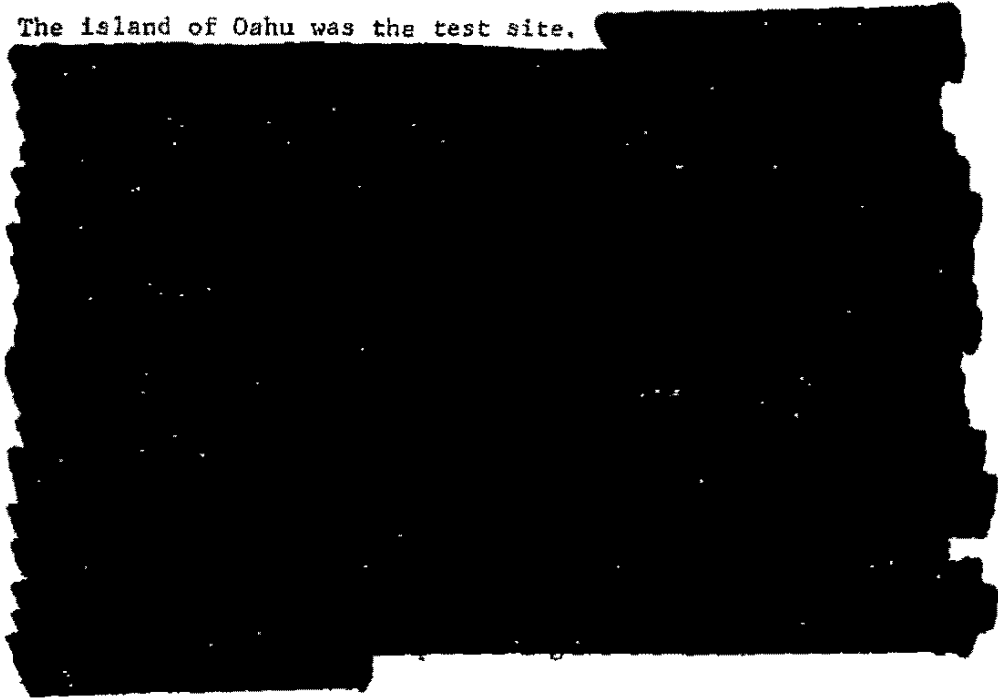
(S)

SECTION III

TEST PROCEDURES (U)

1. TEST SITE

The island of Oahu was the test site.



2. ^U(S) METEOROLOGICAL ENVIRONMENT

a. The Hawaiian Islands lie in a belt of prevailing easterly trade winds which characterize the subtropical oceanic regions of the world. Easterly winds are most predominant from May through September, when flow from east to northeast occurs 80 to 95 percent of the time, with speeds over the open ocean exceeding 7m/sec 50 percent of the time.

b. Interruptions to the easterly windflow occur with the approach and passage of troughs from the east or west. Westerly troughs may cause the winds to shift to a westerly quadrant during their passage, while the easterly troughs result in a shift from northeasterly to southeasterly or even southerly winds.

c. Local anomalies in the northeast trades associated with terrain features, such as sea and mountain breezes, are found in certain regions of the Island of Oahu where the BIG TOM trials were conducted. Mountain breezes are well developed in the central valley of Oahu in the Waianae area--in opposition to the prevailing easterly winds.



tion to the prevailing easterly winds.



[REDACTED]

d. The primary meteorological parameters affecting the diffusion of an aerosol in the atmosphere are windflow, turbulence, and stability. In the area of Oahu, the normal trade-wind inversion is near 2150m above mean sea level (MSL). The air mass starting from the sea surface exhibits a near-neutral lapse rate to about 400m with a more stable layer above, extending up to the top of the marine layer. Turbulence even at near-surface levels is very low as compared with observations made over continental areas. No marked differences were observed in the turbulence or stability profiles for the various trials. It can be concluded that the trial-to-trial variations in vertical mixing would be small.

e. The primary factor which governs dosages in the central valley of the island is the character of the airflow over the Koolau Range. Under strong trade-wind conditions, a wave-flow develops and air passing over the ridge is brought to the surface in the valley to the lee of the range. With lighter trade winds, the wave is poorly developed and air which passes over the ridge does not reach the surface but moves aloft over the valley. Under these conditions, local drainage flows and low-level temperature inversions develop, which tend to make dosages in this area highly variable as a result of the poor surface mixing conditions.

3.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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b. Zinc Cadmium Sulfide (FP)

The physical assay of FP material used on BIG TOM is shown in Table 3.



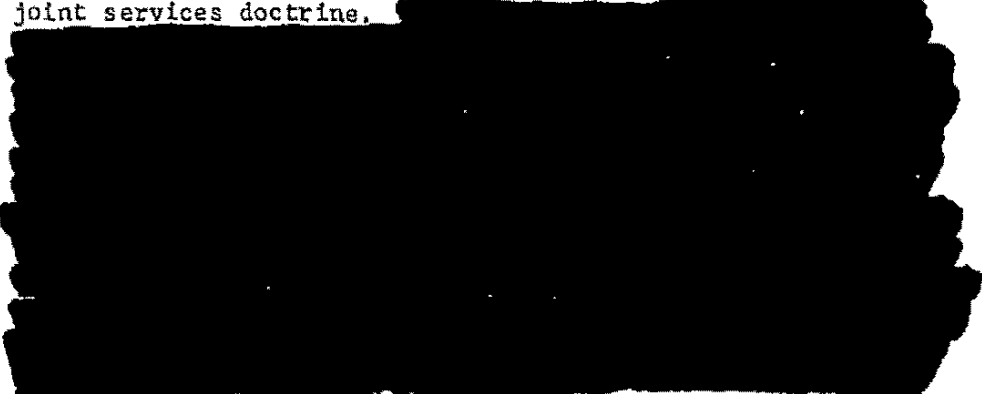
TABLE 3: FP ASSAY (U)

| | | | | |
|-----------|------------|------------|------------|------------|
| Tracer | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| FP-yellow | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| FP-green | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| FP-green | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |

5. DISSEMINATION PROCEDURES

a. Phase A

In each trial of this phase, liquid BG was released from an operational weapon system (A4/Aero 14B) upwind from the island at predetermined heights and distances, depending on joint services doctrine.



The preparation, assembly, filling, loading, unloading, and cleaning of the Aero 14B tanks were performed by a special munitions group at Kaneohe Marine Air Station. Subsequent to the BG releases, a private contractor, using a light aircraft, disseminated FP along a flight path corresponding to that of the BG releases.

that of the BG releases.



UNCLASSIFIED [REDACTED]

are shown in Fig. 1.) Surface wind was also recorded at the location near Makaha, about 5km south of station 30, beginning with trial B-3 on 2 June 1965. An MRI mechanical weather station recorded wind and temperature continuously at station 24 from 7 thru 16 June 1965. Climate wind sensors were also located aboard the YAG-40 at 10.1, 13.7, and 27.4m above the sea surface, with the data recorded on Esterline-Angus recorders as the land stations. Vertical temperature gradients were measured by means of thermocouples located at various levels on board the YAG-40. During trial periods, temperature differences, referenced to the 10.1-meter level, were recorded for 4.6, 13.7, and 27.4m above the sea surface.

(2) The YAG-40 was positioned near the center of the release line prior to each trial. At approximately 20 min before release time, she steamed upwind to avoid contamination, since she was to be used as a laboratory for BG analysis.

(3) In addition to measurements recorded on strip charts, various meteorological parameters were observed and recorded manually aboard the YAG-40 and at several island stations.

b. Upper Air Observations

Hourly pibal observations were made during test periods on board the YAG-40, at the CP, and at station 23, until 4 June. Beginning with trial A-6 on 7 June, pibals were taken at station 24 instead of station 23. The routine synoptic upper-air wind soundings were also obtained from the U.S. Weather Bureau station at Honolulu Airport.

c. Aircraft Instrumentation

(1) An Aero-Commander was provided, operated, and maintained by Meteorology Research, Inc. (MRI), for the purpose of disseminating both yellow and green FP and for taking meteorological measurements. The aircraft was instrumented to record the following parameters continuously on a six-channel Brush recorder:

- 1) True groundspeed
- 2) Turbulence
- 3) Pressure altitude
- 4) Air temperature
- 5) Wet-bulb depression
- 6) Aircraft heading.

UNCLASSIFIED [REDACTED]

- b) Aircraft heading.

[REDACTED]

UNCLASSIFIED

(2) The air-temperature sensor was a fast-response YSI thermistor; turbulence was measured by means of an MRI Universal Turbulence Indicator. Doppler radar provided a measurement of true groundspeed as well as drift angle; flight-level windspeed and direction were calculated from this information. Pressure altitude was measured by a pressure altimeter. The difference between the air temperature and the wet-bulb temperature was measured by means of a wet-bulb resistance thermistor. A Mast Development Company ozone analyzer and recorder was used to determine the ozone concentration at flight level.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

TABLE 6 (2): GENERAL METEOROLOGICAL CONDITIONS AT BEGINNING OF TRIALS (U)

| Trial | Date (1963) | Time ^a (LST) | Windspeed (m/s) | | | Turbulence (intensity in degrees) | Stability category | Ozone (pphm) | Top of marine layer (m) | Cloud cover (tenths) | RH ^b (%) |
|-------|-------------|-------------------------|-----------------|----------|---------|-----------------------------------|--------------------|--------------|-------------------------|----------------------|---------------------|
| | | | YAG 40 | Windward | Leeward | | | | | | |
| A-1 | 24 May | 2029 | 9.5 | 10.0 | 3.9 | 0.7 | Neutral | 1.3 | 1700 | 4 | 66-84 |
| A-1R1 | 26 May | 2053 | 8.5 | 8.0 | 6.6 | 0.9 | Neutral | 2.1 | 1600 | 5 | 68-78 |
| A-2 | 27 May | 2037 | 11.3 | 9.0 | 6.2 | 0.8 | Neutral | 2.5 | 1600 | 6 | 68-74 |
| A-3 | 28 May | 2003 | 11.1 | 9.4 | 6.5 | 0.9 | Neutral | 1.4 | 2000 | 6 | 68-82 |
| A-4 | 3 Jun | 2000 | 9.5 | 6.2 | 6.5 | 0.8 | Neutral | 1.7 | 2000 | 3 | 68-74 |
| A-5 | 4 Jun | 2000 | 8.3 | 7.0 | 9.5 | 1.1 | Neutral | 1.5 | 3500 | 7 | 74-78 |
| A-6 | 7 Jun | 2006 | 7.5 | 6.5 | 8.5 | 0.7 | Neutral | 1.3 | 1200 | 4 | 69-70 |
| A-7 | 15 Jun | 1955 | 11.5 | 5.5 | 5.3 | 0.6 | Neutral | 1.7 | 1900 | 3 | 77-80 |
| A-8 | 16 Jun | 2019 | 10.8 | 8.5 | 4.0 | 0.8 | Neutral | 2.2 | 1600 | 5 | 76 |
| A-9 | 17 Jun | 2001 | 10.5 | 8.3 | 6.1 | 0.4 | Neutral | 1.5 | 2000 | 3 | 74-76 |
| A-10 | 18 Jun | 1959 | 9.7 | 9.5 | 5.7 | 0.3 | Neutral | 1.3 | 2500 | 2 | 76-78 |
| B-1 | 31 May | 2007 | 7.2 | 7.7 | 6.3 | ND | Neutral | 1.3 | ND | 8 | 75 |
| B-2 | 1 Jun | 2001 | 10.6 | 9.0 | 5.5 | 0.6 | Neutral | 1.9 | ND | 3 | 69-72 |
| B-3 | 2 Jun | 2000 | 6.0 | 8.5 | 5.6 | 0.7 | Neutral | 2.2 | 3000 | 3 | 66 |
| B-3R1 | 11 Jun | 2000 | 10.7 | 11.0 | 8.5 | 0.5 | Neutral | 0.8 | 1200 | 8 | 75-80 |
| B-3R2 | 14 Jun | 2001 | 8.9 | 10.0 | 4.2 | 0.4 | Neutral | 0.7 | 2000 | 6 | 80-85 |
| B-4 | 9 Jun | 1958 | 8.0 | 9.0 | 5.2 | 0.6 | Neutral | ND | 1300 | 6 | 67 |
| B-5 | 10 Jun | 1953 | 9.3 | 10.0 | 7.1 | 0.6 | Neutral | 0.9 | 1200 | 4 | 67-75 |
| B-6 | 12 Jun | 1943 | 8.8 | 12.0 | 5.1 | 0.9 | Neutral | 1.6 | 1200 | 7 | 72-78 |

^a Time of BG release; FP releases were made prior to and after the BG release.

^b Reading at YAG 40.

^c Readings taken from YAG 40; range from Z to Z + 3 hours.

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Outline Plans for Testing in FY 64 (U)

DESERET TEST CENTER FORT DOUGLAS UT

19 FEB 1963

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HEADQUARTERS
Deseret Test Center
Fort Douglas, Utah

10 SEP 1963

AMCPM-DEPE

SUBJECT: Status of Deseret Test Center FY 64 Chemical - Biological
Testing Program (U)

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AMCFM-DEPE

Y
M

SUBJECT: Status of Deseret Test Center FY 64 Chemical - Biological Testing Program (U)

[REDACTED]

[REDACTED]

3. Three of the test series proposed in Reference b have been deleted or deferred. These include:

a. Test series 64-3 (LITTLE MO). This series is deferred by JCS authority until FY 65 because installation of the protective system to be tested on a Navy destroyer will not be completed until early in FY 65.

b. Test series 64-7 (BIG THUNDER). This series is deleted by authority of JCS.

c. Test series 64-9 (BIG PINEY). This series is deferred with the concurrence of the U. S. Air Force.

[REDACTED]

4. [REDACTED]

[REDACTED]

[REDACTED] 115150
PACIFIC TEST SERIES

1. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

2. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

3. BACKGROUND

The relative efficiency of several selected combinations of shipboard collective protectors and ventilation systems against a biological agent-simulant is being studied at Desert Test Center in test 63-1. This present test series, 64-1, is an extension of the FY 63 test series so that similar data can be obtained on ships exposed to a toxic environment. The agents selected (UL and NU) include representatives from the bacterial and viral groups. Each biological agent possesses a different level of aerosol stability; as a result, tests are required to assess the persistency of aerosols that penetrate the ship as a function of agent viability.

4. OBJECTIVES

To determine the degree of penetration and extent of contamination hazard by biological agent aerosols on and into a ship having various combinations of shipboard collective protectors and ventilation systems.

To evaluate selected protective equipment as required by the Navy.

To obtain information applicable to the Navy's biological training program.

~~CONFIDENTIAL~~

To evaluate the effectiveness of various decontamination procedures for decontaminating exterior surfaces. Water wash down will be one of the procedures tested.

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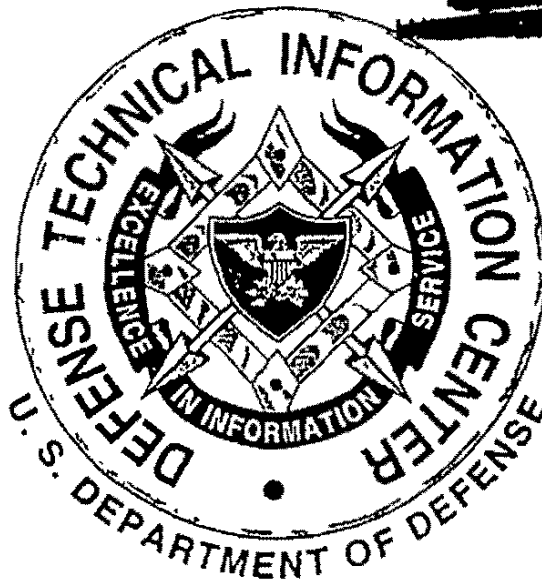
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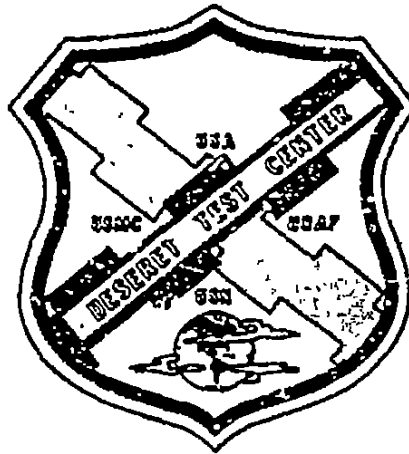
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FORT DOUGLAS
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DECEMBER 1963

OUTLINE PLANS FOR TESTING
IN FY 65 (U)

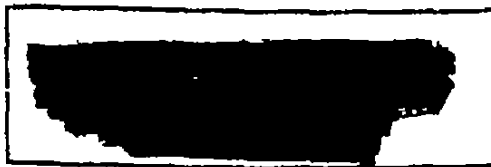
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HEADQUARTERS
Deseret Test Center
Fort Douglas, Utah 84113

①

AMCFM-DEBE

18 June 1964

SUBJECT: Status of Deseret Test Center FY 65 Chemical-Biological Testing Program (U)

TO:

AD-345999 S

1. [REDACTED]

2. [REDACTED]

a. Since the hardware required for Tests 65-2, CHAIN SAW; 65-8, LONE WOLF; and 65-9, SILVER STAR, will not be available before FY 66, these tests are deleted from the FY 65 program and are being considered for inclusion in later programs.

b. [REDACTED] Test 64-6, YELLOW LEAP, and Test 64-8, TALL TIMBER, were suspended on the Canal Zone test site in February 1964, and will be rescheduled if a suitable Hawaiian site becomes available.

c. Approval of Tests 65-13, LITTLE CORPORAL; 65-18, BLACK LABEL; and 65-19, LAUREL GROVE, is deferred until an agreement in principle between the United States and Australia is reached.

d. Approval of Test 65-7, GREAT SOLE, is deferred.

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16 DEC 1964

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OUTLINE PLANS FOR TESTING

IN FY 66 (U)

16 December 1964

12 44 p.

Prepared by

DESERET TEST CENTER
Fort Douglas, Utah

DDC
JUL 26 1975
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1 (4) TABLE 2 (C): SUMMARY OF CARRY-OVER TESTS (U)

| Number ckno: | Test number and nickname | Service | Agent or tracer | Munition, system or concept | Objective & remarks | Estimated number of trials | Location & environment |
|-----------------|-----------------------------|--------------------|--|---|--|----------------------------------|---|
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| DTZ | 66-13 HALF NOTE (U) | USA USAF USN | EG-1, EC-1, SH-1, LVS of UL-1 | Edo rotary-disk disseminator (OV-1 or B-26 aircraft) | Determine viability-decay rate of vegetative nonpathogens EC-1, SH-1, and LVS of UL-1 in a tropic-marine environment. Compare decay data for these nonpathogens with data collected in other environments; also, compare decay data of these vegetative nonpathogens with decay data for pathogenic vegetative organisms from a similar environment. Characterize diffusion processes from a line source release in a marine environment. | 30 | Vicinity of Hawaiian Islands (tropic- marine) |

bill: * Stabilized and unstabilized.

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Fort Douglas, Utah

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23 SEP 1966

AMCPM-DEPE

SUBJECT: Summary Report of Fifth Annual Deseret Test Center Planning Conference (U)

TO: SEE DISTRIBUTION

1. The Fifth Annual Deseret Test Center Planning Conference was held at Fort Douglas, Utah, 29 August through 1 September, 1966. Attached is a summary report of the conference activities.

2. Please note agreements and decisions reached at the conference as they may affect your activity. If it is determined that these agreements or decisions are in conflict with other programs or cannot be fulfilled for any other reason, it is requested that you notify this Headquarters as soon as possible.

1 Incl
as

John J. Bayes
JOHN, J. BAYES
Brigadier General, USA
Commanding

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SUMMARY REPORT OF PROCEEDINGS OF THE FIFTH ANNUAL DESERET TEST CENTER PLANNING CONFERENCE

1. (U) This report summarizes discussions and agreements reached between Deseret Test Center and Service representatives at the Fifth Annual Deseret Test Center Planning Conference held at Headquarters, Deseret Test Center, 29 August through 1 September, 1966.

2. (S) On 29 August 1966, a DTC Executive Council Meeting was held with Service representatives attending.

a. The following problem areas were discussed:

(1) The usefulness of interim reports vs. semi-annual status reports was discussed. The consensus was that semi-annual status reports are satisfactory in presenting interim information to the Services.

(2) The Navy representative asked that a section be included in the final report of 67-12 which compares the efficiency, on a quantitative basis, of the Aero 14B and the A/B 45Y-1 spray tanks using (Y-1 and Aero 14B) efficiency data developed at Eglin Air Force Base.

(3) The Navy representative stressed the need for the development of an adequate VX simulant. This simulant will have to be developed before a number of Navy test requirements can be fulfilled, notably the simulated attack of VX against a marine, amphibious force.

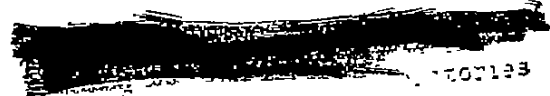
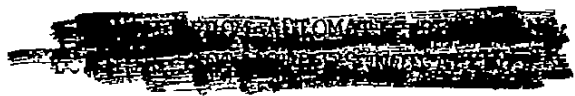
None at TDF

(4) The Service representatives were invited to present problem areas for discussion. The Air Force representative indicated that much confusion exists in determination of proper security classifications in connection with DTC test programs. It was requested that DTC inform higher authority that lack of adequate security classification guidance has presented a severe operating problem, and that decisions should be made as soon as possible to provide classification guidance. It was suggested that Deseret Test Center take the lead in standardizing security guidance because this Headquarters deals with classification problems of all Services.

(5) No problem areas for discussion were presented by either the Army or Navy representatives.

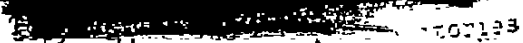
b. Other discussions were held on the following items:

(1) The procedures for conduct of the conference.



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[REDACTED]

(2) [REDACTED]

(3) The test 67-4, BLUE NOTE. A new substitute test was presented with a recommendation that it be submitted to DDR&E for approval. The new test is called TRACTOR HUB and bears the same number designation as BLUE NOTE, 67-4. It was presented as a prepared draft and discussed at the meeting.

[REDACTED]

3. (U) The 30 August sessions were devoted primarily to orientation of conference attendees in preparation for the negotiations to be held the following day. During these sessions, Deseret Test Center progress in completing the FY 66 program was presented and discussed.

4. (U) [REDACTED]

a. 68-1, NARROW TRAIL:

[REDACTED]

UNCLASSIFIED [REDACTED]

UNCLASSIFIED

[REDACTED]

[REDACTED]

[REDACTED]

(3) Decisions.

It was decided to leave this test in the FY 68 Program.

[REDACTED]

b. 68-2, SHARP RAVINE:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(3) Decision.

It was decided that this test should remain in the Outline Plan.

It was decided that this test should remain in the Outline Plan.

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[REDACTED]

c. 68-3, CHANNEL CRAB:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(3) Decisions.

It was decided by the conferees that this test should be included in the Outline Plan.

[REDACTED]

[REDACTED]

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UNCLASSIFIED

[REDACTED]

d. 68-4, RAPID TAN:

[REDACTED]

[REDACTED]

(3) Decision.

It was decided that this test should be included in the FY 68 Outline Plan.

e. 68-5, PRAIRIE CARPET:

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

(3) Decision.

It was decided that this test should remain in the FY 68 Outline Plan.

f. 68-6, EXIT LINE:

[REDACTED]

[REDACTED] these

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

(3) Decision.

It was decided to include this test in the FY 68 test program.

g. 68-7, WICKED SLICE:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(3) Decision.

It was decided that this test should be included in the FY 68 Program.

h. 68-8, LEANING SHOE:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]

(3) Decision.

It was decided that this test should be included in the FY 68 Outline Plan.

i. 68-9, STRANGE FRUIT:

[REDACTED]

(3) Decision.

It was decided that the test will remain in the Outline Plan until it can be determined whether data are in existence to satisfy these requirements.

j. 68-10, MAPLE BOARD:

[REDACTED]

It was decided by the conference to eliminate this test from the FY 68 Program.

k. 68-11, SPECKLED START:

[REDACTED]

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[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(3) Decision.

It was decided to leave this rest in the FY 68 Outline Plan to provide funds to initiate action and to establish a target date for production of agent.

1. 68-12, SHINING POND:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

(3) Decisions.

It was decided that this test should be included in the FY 68 Program.

[REDACTED]

m. 68-13, FOLDED ARROW:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(3) Decision.

It was decided by the conference that this test should remain in the FY 68 Outline Plan.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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UNCLASSIFIED [REDACTED]

UNCLASSIFIED



| <u>Test Number</u> | <u>Priority</u> |
|--------------------|-----------------|
| 68-8 | 14 |
| 68-9 | 16 |
| 68-11 | 12 |
| 68-12 | 7 |
| 68-13 | 13 |
| Herbicide test | 15 |
| 67-1 (carry-over) | 11 |
| 67-3 (carry-over) | 2 |
| 67-4 (carry-over) | 8 |

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206 DMMC Control #
2003154-0000016
2003154-0000018

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3 July 1969

ADE 473232 088



STDPD-PA(S)

SUBJECT: Summary Report of the Proceedings of the Eighth Annual
Deseret Test Center Planning Conference (U)

SEE DISTRIBUTION

This letter transmits the summary report of the proceedings of the
Eighth Annual Deseret Test Center Planning Conference held at Fort
Douglas, Utah, 18-20 March 1969.

FOR THE COMMANDER:

1 Incl
as

LEWIS K. FORTHING
Captain, U. S. Nav,
Director, Plans and Analysis

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EA-5-1000 (69)

H044569 0055

[REDACTED]
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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(h) Dr. Adams discussed two carry-over biological tests, 69-34 and 70-74. Reason for slippage of 69-34 was given as nonavailability of the munition. Test 70-74 was slipped because of delays in a predecessor test, 69-74. There was no comment.

[REDACTED]

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[REDACTED]
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[REDACTED]

Encl. 11
Cc. 11
Cl 206

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[REDACTED]

[REDACTED]

(3) Chemical Tests:

[REDACTED]

[REDACTED]

[REDACTED]

(c) 71-J: The requirement for this test was withdrawn by the USAF. The test was therefore dropped from the FY 71 program by the conference.

[REDACTED]

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[REDACTED]

(4) Carryover Tests: (Presented by Mr. Bert Johns). Mr. Johns stated that there were approximately 8 carry over tests that are not scheduled that will have to be considered in the individual Service meetings:

(a) 68-10 has been deferred. [REDACTED]

(b) 68-12. [REDACTED]

This test has been deferred because of a lack of an adequate test site. [REDACTED]

(c) 69-13 has been deferred due to lack of suitable test site. [REDACTED]

(e) 69-36 has been approved but remains unscheduled due to unavailability of an aircraft carrier. [REDACTED]

(f) 69-70 has been approved for planning to insure a high state of readiness when authority is granted. [REDACTED]

(g) 69-72. There were no comments following presentation of 69-72. [REDACTED]

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Appendix 3

SUMMARY OF FY 70-72
PROPOSED OPERATIONAL TESTS

| FY 70 | FY 71* | | FY 72 |
|-------|--------|-------|----------|
| | A | B | |
| 70-71 | 71A | 68-10 | 72A |
| 70-10 | 71B | 68-12 | 72B |
| 70-72 | 71C | 69-34 | 72C |
| 69-33 | 71E | 70-31 | 72E |
| 70-30 | 71F | 70-50 | 72F |
| 70-11 | 71H | 70-73 | 72G |
| 70-12 | 71K | 70-74 | 1 |
| 70-31 | | 71D | |
| 70-73 | | 71G | |
| 70-74 | | 71L | |
| 70-50 | | | |

* A tests will be conducted with a priority over B tests.

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APPENDIX 4

NEW NUMBER DESIGNATIONS

FOR FY 71 PROGRAM

| <u>Proposed Program Designation (Old)</u> | <u>Recommended Program Designation (New)</u> |
|---|--|
| 71-A | 71-30 |
| 71-B | 71-31 |
| 71-C | 71-32 |
| 71-D | 71-34 |
| 71-E | 71-33 |
| 71-F | 71-70 |
| 71-G | 71-35 |
| 71-H | 71-10 |
| 71-I | eliminated |
| 71-J | eliminated |
| 71-K | 71-11 |
| 71-L | 71-12 |

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[REDACTED]

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WHISTLE DOWN (U)

DESERET TEST CENTER FORT DOUGLAS UT

NOV 1963

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[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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FORWORD

This Final Report outlines the work accomplished during the arctic chemical test series -- nicknamed WHISTLE DOWN -- conducted at the Gerstle River Test Site, Fort Greely, Alaska, during the period 1 December 1962 to 5 February 1963.

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

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UNCLASSIFIED

[REDACTED]

ABSTRACT

[REDACTED]

WHISTLE DOWN, conducted in Alaska during the winter of 1962-63, included sixteen trials using GB-filled M55 Rockets and M121 155mm shells, and VX-filled M23 Land Mines. The test was primarily an investigation of the existence, nature, and extent of the hazard from GB and VX on environmental clothing, snow, and frozen ground. Various aspects of sampling techniques, arctic clothing, decontamination methods, and detection and protection equipment were also investigated. Data for doctrinal concepts for operations in the arctic were developed from these investigations.

[REDACTED]

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[REDACTED]

SECTION I

INTRODUCTION

2. a. Desert Test Center Test 63-3, nicknamed "MISTLE DOME", was designed and enacted to fulfill the Army requirement as stated in the above-referenced documents. The test was conducted at Geratia River Test site about 40 miles southeast of Fort Greely, Alaska, during the period 1 December 1962 to 5 February 1963.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES

[REDACTED]

1. [REDACTED]

2. PRIMARY OBJECTIVES

- a. 1st Objective

"To determine if a hazard exists from the pickup of G and V agents in solid, liquid, and/or vapor forms by environmental clothing under cold weather conditions."

[REDACTED]

- b. 2nd Objective

"To determine the nature and extent of hazard from G and V agents disseminated on snow, ice or frozen ground."

[REDACTED]

- c. 3rd Objective

"To obtain data for the improvement of testing techniques and generation and/or revision of offensive and defensive doctrinal concepts in arctic environment."

[REDACTED]

- d. 4th Objective

"To investigate the problems associated with operating in arctic clothing in a toxic chemical environment."

[REDACTED]

[REDACTED]

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(4) Field Trials with VX

(a) Procedure

Fifteen manikins, as described previously, were exposed in an upright position, facing the burst point of a VX-filled land mine.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

17
11
11
11
11
11
11
11
11
11

TEST 65-3--WEST SIDE. Phase 1 (U)

DESERET TEST CENTER FORT DOUGLAS UT

JUN 1966

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SECTION I

INTRODUCTION

1. BACKGROUND

a. WEST SIDE I

Since sub-arctic regions may constitute potential areas of conflict, the WEST SIDE Phase I test was initiated from an Air Force requirement for an operational evaluation of its newly-developed A/B (air-borne, external) 45Y-4 Dry-agent Disseminator in a frigid environment.

The weapon system under study in WEST SIDE I consisted of the A/B 45Y-4 Disseminator, wing-mounted on an F-105D aircraft (see Fig. 1) and filled with dry biological tracer BG (*Bacillus subtilus var. niger*).

2. WEST SIDE I OBJECTIVES

Since objectives of this test are detailed in subsequent paragraphs, they are covered only in a general manner here:

- 1) First Objective. To evaluate the source strength, dissemination efficiency, and functional characteristics of the dry disseminator with tracer BG
- 2) Second Objective. To measure, under various met conditions, the diffusion of particulate biological aerosols disseminated by line source at low altitudes in this cold-weather test environment.

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[REDACTED]

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To aid this investigation, two other tracer materials--green and yellow FP¹--were disseminated from a light aircraft under similar test conditions (see Fig 2).

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

¹ Fluorescent particles of zinc sulfide and zinc cadmium sulfide, respectively.

[REDACTED]

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[REDACTED]

4. SCOPE

Table 1 lists 22 trials that were successfully completed in this test. These were accomplished in three groups, as based on three types of meteorological conditions that are representative of winter conditions in this cold weather environment. Tests were conducted under temperatures ranging from -6.7°C to -42°C , with the majority of tests being conducted at temperatures below -20°C .

[REDACTED]

[REDACTED] UNCLASSIFIED

SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. OBJECTIVES

The objectives of the test program were:

- 1) To obtain source strength, dissemination efficiency, and operational characteristics of the A/B 45Y-4 dry agent spray tank (filled with dry tracer BG) when operated under a range of cold-weather meteorological conditions from a high-performance jet aircraft.
- 2) To investigate the behavior of biological aerosols in both long downwind travel at moderate windspeeds and in lateral diffusion during calm situations, when released into a cold-weather environment from an elevated line source.
- 3) To investigate the relationship between forest density and the penetration, concentration, and persistence of biological aerosols in a cold-weather environment.
- 4) To provide data for comparing aerial releases of dry BG [WEST SIDE (U)] with aerial releases of wet BG [NIGHT TRAIN (U)].
- 5) To investigate the extent of contamination (equipment and environmental) from the aerial dissemination of BG, under test conditions, and--if significant contamination exists--to provide data for the development of operational methods of decontamination under these conditions.
- 6) To continue research in the standardization of cold-weather aerosol sampling and test techniques, both in the laboratory and in the field.

[REDACTED]

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TABLE 2. SUMMARY OF TRIAL SCHEDULES OF BG AND CORRESPONDING FP RELEASES (U)

| Date (1947) | Trials ^b BG FP ^c | BG release time | Downwind Trials | | | Second FP release ^e | | |
|----------------|---|--------------------|-------------------------------|--------------------|---------|--------------------------------|--------------------|---------------------|
| | | | First FP release ^d | | | time | color ^f | Aircraft heading |
| | | | time | color ^f | heading | | | |
| 18 Jan | A-1 M-7,M-8 | 0852 | 0856 | Y | S | 0906 | G | N |
| 26 Jan | A-2 M-14,M-15 | 1109 | 1113 | Y | S | 1119 | G | N |
| 27 Jan | A-3 M-16,M-17 | 1039 | 1044 | Y | N | 1052 | G | N |
| 28 Jan | A-4 M-18,M-19 | 1026 | 1032 | Y | S | 1039 | G | N |
| 1 Feb | A-5 M-20 | 1002 | 1009 | Y,G | S | ... | ... | ... |
| 2 Feb | A-6 ^g M-21 | 0953 | 1001 | Y,G | S | ... | ... | ... |
| 20 Feb | A-7 M-29 | 1546 | 1553 | Y,G | S | ... | ... | ... |
| 21 Feb | A-8 M-40 | 1256 | 1303 | Y,G | S | ... | ... | ... |
| Flyby trials | | | | | | | | |
| 8 Jan | FD-1 M-1 | 1000 | 1018 | Y | S | ... | ... | ... |
| 9 Jan | FD-2 M-2 | 1021 | 1028 | Y | S | ... | ... | ... |
| 10 Jan | FD-3 M-3 | 1033 | 1037 | G | S | ... | ... | ... |
| 10 Jan | FD-4 M-4 | 1340 | 1343 | Y | S | ... | ... | ... |
| 25 Jan | FD-5 M-13 | 1527 | 1530 | G | S | ... | ... | ... |
| 3 Feb | FD-6 M-23 | 1000 | 1005 | G | N | ... | ... | ... |
| 14 Feb | FD-7 M-32R | 1251 | 1258 | Y,G | S | ... | ... | ... |
| Calm trials | | | | | | | | |
| 26 Jan | B1-1 M-11 | 0636 | 0644 | Y,G | S | ... | ... | ... |
| 17 Feb | B1-2 M-26 | 0802 | 0805 | Y,G | N | ... | ... | ... |
| 17 Feb | B1-3 M-35 | 2035 | 2040 | Y,G | N | ... | ... | ... |
| 18 Feb | B1-4 M-36 | 2150 | 2237 | Y,G | S | ... | ... | ... |
| 21 Jan | B2-1 M-9,M-10 | 0956 | 1000 | Y | S | 1007 | G | N |
| 7 Feb | B2-2 M-28,M-29 | 1900 | 1908 | Y | S | 1914 | G | N |
| 19 Feb | B2-3 M-37,M-38 | 0610 | 0618 | Y | S | 0625 | G | N |

- ^a One or two FP dissemination runs followed each release of BG.
- ^b FP releases were at 61m (200 ft) in Phase A downwind trials and in flyby trials; at 44m (150 ft) in Phase B-1 trials; and at 91m (300 ft) in Phase B-2 trials.
- ^c FP trials that correspond to the BG trial in the column to the left.
- ^d FP color coding was:

- 1) Y - Release of only yellow FP
- 2) G - Release of only green FP.
- 3) Y,G - Release of homogeneous mixture of both colors
- 4) Y,G - Simultaneous release of yellow and green FP, but from different hoppers and in different amounts, i.e., not previously prepared as a homogeneous mix.

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[REDACTED]
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TEST 65-12--DEVIL HOLE (U)

DESERET TEST CENTER FORT DOUGLAS UT

DEC 1966

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[REDACTED]

[REDACTED]

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[REDACTED]

ABSTRACT (U)

DEVIL HOLE, Phase I, was a test conducted in temperate aspen and spruce forests, to determine area-time dosage information for agent GB-filled artillery munitions (M121A1-155mm shell and M55-115mm rocket).

[REDACTED]

Particulate simulants were also utilized to study airflow patterns at the interface of a spruce forest with open terrain.

111

[REDACTED]

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[REDACTED]

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PREFACE

DEVIL HOLE, Phase I, was primarily designed to determine area-time-dosage relationships for artillery-delivered GB munitions detonated in temperate forested terrain and to determine the duration and extent of operational hazards in the burst area.

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[REDACTED]

SECTION I

INTRODUCTION (U)

1. DEVIL HOLE (U), PHASE I

DEVIL HOLE, Phase I, involved the testing of agent GB-filled artillery munitions in a temperate forested environment. Specifically, the M121A1 (155mm) howitzer shell and the M53 (115mm) rocket warhead were tested. Single-static and single- and multiple-round dynamic detonations (Fig. 1) were conducted with the M121A1 shell; testing of the M53 rocket was limited to single-static detonations.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

4. (C) TEST CONDUCT

a. All trials were conducted in forested terrain during the summer of 1965 at the Gerstle River test site, in the vicinity of Fort Greely, Alaska. [REDACTED]

b. The test was performed in accordance with the DEVIL HOLE, Phase I, test plan with one exception--no trials with agent GB were conducted at the junction or interface of a spruce forest with open terrain. (3) Testing with GB was not conducted at the interface due to inclement weather and rugged terrain (Fig. 3) which so hampered operations that all trials of the test could not be conducted in the allotted time. [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. TEST OBJECTIVES AND ACCOMPLISHMENT

[REDACTED]

a. Primary Objective

(1) "To determine area-time-dosage relationships, as a function of burst height and agent diffusion characteristics, for artillery GB munitions fired in temperate forested areas."

[REDACTED]

(2) "To determine the duration and extent of operational hazards in the target areas resulting from the use of artillery GB munitions."

[REDACTED]

b. Secondary Objective

"To determine the vulnerability of representative hard and soft targets to agent GB under test conditions."

[REDACTED]

[REDACTED]

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[REDACTED]

SECTION III

TEST PROCEDURES (U)

1. TEST AREA

a. Location of Test Area

(1) The Gerstle River test area is located in the Tanana River Valley of central-interior Alaska ([REDACTED]). [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

(b) Safety Equipment

Safety equipment--such as protective clothing, protective masks, barriers, etc.--was used during the test as conditions dictated.

[REDACTED]

[REDACTED]

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[REDACTED] UNCLASSIFIED

APPENDIX B

TEST PROCEDURES FOR FP AND SMOKE TRIALS (U)

1. TEST EQUIPMENT FOR FP AND SMOKE TRIALS

a. Munitions

(1) Fluorescent Particles

(a) The fluorescent particles (FP) used in this test were of two colors, green and yellow.¹ [REDACTED]

(2) Bomblet

E-61-type bomblets containing 30 grams of FP were employed and were assumed to have a dissemination efficiency of 30 percent.

(3) Detonation System

The bomblets were fired electronically.

[REDACTED]

¹ The FP was composed of zinc cadmium sulfide particles. FP used for this test was manufactured by the United States Radium Corporation, Morristown, N.J. It had a solid-phase density of approximately 4.0; although, when aerosolized, it will remain suspended in air for considerable periods of time and will exhibit properties with regard to atmospheric diffusion that are quite similar to those of an inert gas. In addition, when the material is excited by light of a specific wave length, it fluoresces, in this instance, green or yellow, depending on the characteristics of the individual particles. A detailed listing of the properties of FP which make it suitable for the study of atmospheric diffusion are presented in a document published by Aeronut Laboratories.⁽¹⁾

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[REDACTED]

APPENDIX E

ENVIRONMENTAL DESCRIPTION (U)

1. TEST SITE AREA

a. Location

The general geographical setting of the DEVIL HOLE I (U) test area is central-interior Alaska, approximately 190km SE of Fairbanks. Located entirely on government-controlled land, near Ft. Greely in the Tanana River Valley, the area is bounded on the north by the Alaskan Highway, the east by the Gerstle River, and the south by the Granite Mountain block. Two separate test grids were used during the DEVIL HOLE I (U) program. The coniferous forest (spruce) site lies between Gerstle River and Sawmill Creek, about 9.6km SE of the Arctic Test Center facility at Gerstle River. The deciduous forest (aspen) site, farther west, is approximately 8km SE of Milepost 1400 of the Alaskan Highway.

[REDACTED]

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[REDACTED]

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DMMC Control #
2003197-0000036
2003197-0000036

[REDACTED]

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DTC TEST 66-1 - DEVIL HOLE. PHASE II (U)

DESERET TEST CENTER FORT DOUGLAS UT

MAY 1968

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[REDACTED]

[REDACTED]

[REDACTED]

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ABSTRACT (U)

DEVIL ROLE (U), Phase II, was a test conducted in temperate aspen and spruce forested terrain with agent-VX-filled M121A1 (155 mm) and M426 (8-inch) artillery shells.

[REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]
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CHAPTER ONE
OPERATIONAL SUMMARY

SECTION I

PURPOSE (U)

The purpose of DEVIL HOLE (U), Phase II was to provide weapons-effects information for artillery-delivered, VX-filled shells detonated in temperate forested terrain.
[REDACTED]

[REDACTED]
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1. MUNITIONS TESTED

VX-filled 155mm (M121A1) and 8-inch (M426) howitzer shells were used.

The agent was dyed with 0.5 percent of DuPont Oil Red.

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SECTION II

OBJECTIVE (U)

The FIRST OBJECTIVE of the test was "...to evaluate the area
--density relationships for liquid agent and dissemination
efficiency of artillery-delivered VX munitions when
functioned in a temperate aspen and a temperate spruce forest."

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[REDACTED]

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SECTION IV

TEST CONDITIONS (U)

1. DATE OF TEST

All trials were conducted in forested terrain during Jul, Aug, and Sep of 1966.

2. TEST AREA

a. Location

The Gerstle River test area is located in the Tanana River Valley of central Alaska. The area is approximately 55 km (by road) from DTC's Alaskan base of operations at Fort Greely. [REDACTED]

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4. TEST EQUIPMENT

a. Detonation System

A simulated fuse (composed of a threaded aluminum plug with a No. 8 blasting cap and a tetrytol burster cup from an M557 fuse) was used for all static trials.

Detonation was initiated by an electrical impulse. For the dynamic trials, an M557 fuse was used.

b. Delivery System for Dynamic Firings

M-109 self-propelled howitzers were utilized to dynamically fire shells on the target.

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[REDACTED]

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SECTION IV
TEST CONDITIONS (U)

[REDACTED]

2. (C) TEST EQUIPMENT

a. Manikins

Manikins clothed in undyed cotton over-garment were used

47

[REDACTED]

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[REDACTED]

to estimate direct contamination on standing personnel.

[REDACTED]

c. Truck and Tent

A 3/4-ton U. S. Army truck and an 8 X 10-foot wall tent were used to measure deposition on equipment. [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

CHAPTER FOUR
PICKUP AND PERSISTENCY

SECTION I
BACKGROUND (U)

[REDACTED]

3. MUNITIONS TESTED

The pickup and indirect contamination trials were limited to the detonation of VX-filled 155mm shells.

[REDACTED]

[REDACTED]

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SECTION III

SCOPE (U)

1. TEST DESIGN

[REDACTED]

The pickup trials with test personnel were conducted as part of the deposition trials with VX-filled 155mm shells.

[REDACTED]

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[REDACTED]

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DTC TEST 66-3 - SWAMP OAK (U)

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MAR 1968

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[REDACTED]

[REDACTED]

[REDACTED] UNCLASSIFIED

ABSTRACT (U)

SWAMP OAK (U) was designed primarily to determine area-time-dosage relationships for artillery-delivered GB munitions detonated in subarctic forested terrain. Agent-GB-filled M121A1 (155mm) artillery shells were the munitions tested. Smoke was used to study airflow patterns at the interface of a subarctic spruce forest with open terrain.

[REDACTED]

[REDACTED]

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[REDACTED]

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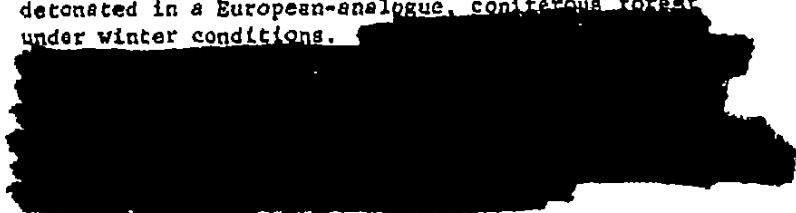
CHAPTER ONE

OPERATIONAL SUMMARY

SECTION I

PURPOSE (U)

The purpose of SWAMP OAK (U) is to provide area-time-dosage information for GB-filled artillery shells detonated in a European-analogue, coniferous forest under winter conditions.



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[REDACTED]

SECTION II

OBJECTIVE (U)

The objective of SWAMP OAK was "to determine area-time-dosage relationships as a function of burst height and agent diffusion characteristics, within subarctic forested areas, for GB-filled artillery munitions fired in the temperature range of -1°C to -18°C (30°F to 0°F)."

[REDACTED]

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1. TEST DESIGN

The test was designed to meet the objective by statically and singly detonating 34 GB-filled M121A1 shells on time-sequenced vapor-sampling grids.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

SECTION IV

TEST CONDITIONS (U)

1. DATE OF TEST

All trials were conducted in forested terrain during March and April of 1966.

2. TEST AREA

a. Location

The Gerstle River test area is located in the Tanana River Valley of central-interior Alaska.

[REDACTED]

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[REDACTED] The test area is approximately 55 km by road from DTC's Alaskan base of operations at Fort Greely. [REDACTED]

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[REDACTED]

[REDACTED] To simulate an air burst, the shell was suspended by use of a cable, a hoist, and a special strap-steel sling.

[REDACTED]

[REDACTED]

[REDACTED]

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DTC Test 66-4, Green Mist. Volume I (U)

DESERET TEST CENTER FORT DOUGLAS UT

JUN 1969

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SECTION 1. INTRODUCTION (U)

1.1 BACKGROUND

The purpose of DTC Test 66-4 was to determine the average area-dosage coverage in a montane rain forest of four chemical weapon systems employing the M139 GB bomblet. The determination involved three steps.

The data obtained provided a sample from which a height-of-burst frequency distribution for the M139 fusing system was estimated. Second, single GB bomblets were statically detonated at several heights below the canopy.

Average performance estimates at several dosage levels for single bomblets within each category were then calculated.

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1.4 TEST OBJECTIVE

The primary test objective was to estimate the effective dosage area coverage that could be expected if GB-filled M139 bomblets were disseminated from MISTEYE II, LITTLE JOHN, SERGEANT, and HONEST JOHN over a rain forest canopy.

[REDACTED]

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[REDACTED]

[REDACTED]

SECTION 2. DETAILS OF TEST (U)

[REDACTED]

Table 2 (U). Summary of Scope

| Trial Group | Number of trials completed | Material disseminated | Purpose |
|-------------|----------------------------|-----------------------|---|
| A | 138 | MAA | Determine burst-height distribution patterns of M139 |
| B | 35 | CB | Determine area-dosage relationship for M139 bomblets statically detonated at representative heights |

[REDACTED]

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DTC Test 66-4, Green Mist. Volume II (U)

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AUG 1970

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[REDACTED]

(C) Terrain (U)

(c) The test site is at an elevation of approximately 3,700 feet above sea level on the eastern slope of Mauna Loa (elevation 13,680) and is southeast of Mauna Kea (elevation 13,796). [REDACTED]

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[REDACTED]

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DTC TEST 67-2 (U)

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ABSTRACT (U)

In DTC Test 67-2, GB-filled BLU-19/S23 bomblets and GB- and simulant-filled M-139 bomblets were tested in a temperate summer forest environment.



[REDACTED]

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(U)

PREFACE (U)

- (U) The USAF and US Navy provided personnel and munitions as requested by DTC. USATECOM provided personnel, test equipment, and laboratory services. 
- 

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[REDACTED]

CHAPTER ONE

OPERATIONAL SUMMARY (U)

SECTION I

PURPOSE (U)

To determine the effectiveness of GB-filled BLU-19/B23 bomblets ejected from an SUU-13/A dispenser, and M-139 bomblets dropped from a Sadaya dispenser in a temperate summer forest environment.

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CHAPTER TWO

AREA COVERAGE FOR THE CBU-15/A WEAPON SYSTEM (U)

SECTION I

BACKGROUND (U)

1. DESCRIPTION OF THE CBU-15/A WEAPON SYSTEM

The BLU-19/B23 bomblet is a USAF bomblet designed to explosively disseminate GB, and it is delivered by means of the SUU-13/A bomblet dispenser. The SUU-13/A dispenser and the BLU-19/B23 bomblet together form the CBU-15/A weapon system.

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[REDACTED]

d. Dugway Test of the CBU-15/A Weapon System

The CBU-15/A weapon system, which consists of the SUU-13/A dispenser and BLU-19/B23 bomblet, was tested at Dugway Proving Ground, Utah.

[REDACTED]

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SECTION IV

TEST CONDITIONS (U)

1. (C) TEST SITE

a. Test Date

The test was conducted during June through July 1967.

b. Test Location

The test was conducted in the vicinity of Fort Greely, Alaska at the Gerstle River test area which is located in the Tanana River Valley of central-interior Alaska (Fig. 1). The area is located approximately 25 km from Delta Junction (Figs. 2 and 3).

c. Climate

The climate can be characterized as typical temperate summer

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with high temperatures in the low 80's and low temperatures in the high 50's (°F)

d. Vegetation

The test area was situated in a heavy stand of deciduous aspen trees. The average height of the aspen trees, which made up approximately 70 percent of the forest (the remainder being coniferous spruce trees), was approximately 18 m. The average diameter of the aspen trees was 15 cm with a spacing of approximately 1.5 m between trees. Intermingled among the aspen trees were spruce trees that averaged 17 m in height, with outstanding members reaching 19 m. The spruce trees were found to have an average diameter of 18 cm, with an average trunk spacing of 1.5 m. Figure 4 is a typical view of the aspen forest.

e. Grid

A grid was established in an aspen forest. Sampling and met stations were located as shown in Figure 5 and Table 1. The grid is shown in Figure 6.

[REDACTED]

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CHAPTER THREE

AREA COVERAGE FOR THE MISTEYE II WEAPON SYSTEM (U)

SECTION I

BACKGROUND (U)

1. The U. S. Navy Misteye II weapon system consists of the Sadeye Mk5, Mod-O cluster bomb and the M-139 bomblet combination. The Sadeye is a cluster-type weapon with a capacity for 83 M-139 bomblets.

[REDACTED]

2. PREVIOUS TESTS

[REDACTED]

b. Dugway M-139 Bomblet Trials

Single-bomblet trials were conducted in open desert at Dugway Proving Ground to measure agent GB dissemination characteristics over a range of meteorological

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CHAPTER FOUR

RELATIONSHIPS (U)

The overall goal of this test was to provide the U. S. Air Force and Navy with performance data for the CBU-15/A and Misteys II weapon systems, respectively, in a temperate summer forest environment. This goal was achieved by conducting a series of burst-height tests and static tests of single munitions and using the data derived from these tests as input for the overlay buildup model.

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| 13. ABSTRACT | | |
| (S) In DTC Test 67-2, GB-filled BLU-19/B23 bomblets and GB- and simulant-filled M-139 bomblets were tested in a temperate summer forest environment. Burst-height distribution was determined for the M-139 bomblet in an aspen forest. Area-dosage-time values were established for single BLU-19/B23 and M-139 bomblets. The CBU-15/A and Misteye II weapon systems were evaluated using the overlay technique to simulate an operational employment. DTC Test 67-2 indicates that the CBU-15/A and Misteye II are of military value in a temperate summer forest environment application. | | |

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DTC TEST 67-7 (U)

DESERET TEST CENTER FORT DOUGLAS UT

31 MAY 1968

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PREFACE (ii)

The RED CLOUD test was conducted in response to military requirements for data on bio-agent aerosols released in cold weather environments. Measurements of the infectivity of TT aerosols for monkeys were made at extremely low ambient temperatures; determinations were also made for the biological decay rates of TT, ZZ, SM, and EG.

[REDACTED]

[REDACTED]

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CHAPTER ONE
OPERATIONAL SUMMARY (U)

SECTION I

PURPOSE (U)

The overall purpose of this test was:

- 1) To obtain biological-decay rate data on TT, ZZ, SM, and EG, and animal infectivity data on TT when disseminated as aerosols in a sub-zero (F.) overland environment
- 2) To obtain source strength and dissemination efficiency data for TT-filled M143 bomblets, as tested in this environment
- 3) To obtain data on the burst-height distribution and percent duds of M143 bomblets dropped into a wintertime spruce forest
- 4) To use these data, where appropriate, for making generalized predictions of casualties and effective area coverage.

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6. [REDACTED]

FUNCTIONING HEIGHTS OF M143 BOMBLET

The M143 bomblet was projected from a tower-mounted gun into a wintertime spruce forest in a manner simulating an operational drop. Eighty-three trials were conducted with single bomblets projected randomly into the forest to determine burst-height distribution. [REDACTED]

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BIOLOGICAL DECAY RATES AND THE VIRULENCE OF TT (U)

SECTION I

BACKGROUND (U)

[REDACTED]

2. RED CLOUD (U) AND RELATED COLD-WEATHER TESTS

The main purpose of RED CLOUD (U) was to obtain biological decay rate and animal infectivity data on aerosols of TT and ZZ disseminated in frigid (field) environments. The E26 and M32 dissemination devices used in this test were not under evaluation, but merely served to disseminate aerosols for BDR measurements.

[REDACTED]

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SECTION II

OBJECTIVES (U)

The trial efforts and results for this chapter are concerned with the objectives listed below:

1. FIRST OBJECTIVE

To determine the biological-decay rates of TT (stabilized), ZZ, SM-1, and EC-1 aerosols when disseminated from test spray devices in a subarctic, winter environment--both during the day (UV radiation) and at night.

2. SECOND OBJECTIVE

Simultaneously, to obtain estimates of the respiratory infectivity of stabilized TT-1 aerosols for monkeys.

3. THIRD OBJECTIVE

To compare, under low-temperature field and chamber conditions, the viability-decay rates of TT, ZZ, SM-1, and EC-1.

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SECTION III

SCOPE (U)

[REDACTED]

[REDACTED]

2. SAFETY RESTRICTIONS ON TESTING

Deseret Test Center had previously established (prior to RED CLOUD test) the feasibility of conducting safe and successful tests with pathogenic agents TT and Z7 at a remote test site in central Alaska. Two contractual studies were conducted in preparation for RED CLOUD: (1) a meteorological investigation; and (2), a long-term ecological survey of the test site.⁽¹⁴⁾⁽¹⁵⁾⁽¹⁶⁾ Additionally, DTC conducted a Special Study, Alaska (U), which was a preliminary field effort with vegetative, nonpathogenic bacteria to prepare for future tests with pathogenic vegetative bacteria at the Alaskan site.⁽¹³⁾ A DTC advisory committee reviewed all available data from these preparatory studies at a meeting in May 1966 and concurred in the proposed method of pathogen testing, subject to certain restrictions on agent dissemination. These restrictions limited the amount of agent dissemination for each field trial and the wind directions allowable for testing, and were imposed to preclude possible travel of agent pathogens over inhabited areas of the valley.

[REDACTED]

[REDACTED]

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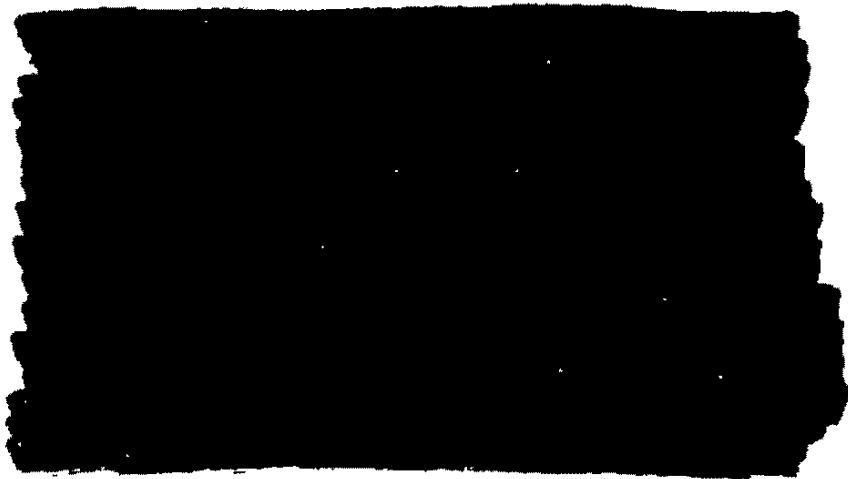
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TABLE 1: TRIAL SUMMARY (U)

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| Group | Completed trials | Pri- ority | Time | Dissemin- ator | Materials disseminated | Purpose |
|----------|------------------|----------------|-------|-------------------|---------------------------|---|
| A-1..... | 0 | 1 ^a | Day | E26 | TT & BG-1 | Viability decay |
| A-2..... | 16 | 1 | Night | E26 | TT & BG-1 | Viability decay, animal infect- ivity |
| B..... | 8 | 2 | Night | E32 | Z2 & BG-2 | Viability decay |
| C-1..... | 14 | 4 | Night | E26 | SM-1 & BG-2 | Viability decay |
| C-2..... | 6 | 4 | Night | E26 | EC-1 & BG-1 | Viability decay |

^a Due to changing weather patterns which did not meet agent safety limitations, a new priority was substituted for the one shown above. The A-1 trials were shifted from No. 1 priority to No. 4, and could not be completed within the time frame and cost limitations imposed on the test.



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SECTION IV

TEST CONDITIONS (U)

1. LOCATION OF TEST

All of the field trials were conducted in the Tanana Valley of central Alaska ([REDACTED]), with operations being directed and supported from Army facilities at nearby Fort Greely. The specific location of the BDR and animal trials was in the "channel" area of Delta Creek [REDACTED].

[REDACTED]

2. TEST PERIOD

Testing began in late November 1966 and was completed in mid-February 1967.

[REDACTED]

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[REDACTED]

SECTION V
TEST PROCEDURES (U)

[REDACTED]

2. (S) OPERATIONAL ASPECTS OF TEST

a. Sampling Grid and Safety Citadels

The grid for the biological decay trials, and for testing TT virulence for monkeys, is shown in Fig. 3. The first downwind safety citadel, with its associated sampling tent and generator facility, is shown in Fig. 4. The citadel and munition release locations are shown in Fig. 3.

b. Dissemination and Sampling

The liquid biologicals TT, SM, and EC were released from E26 disseminators as an intermix with EG-1.

[REDACTED]

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SECTION III

SCOPE (U)

1. NUMBER OF TRIALS

The number of bomblet trials for burst-height and dissemination efficiency determinations are summarized in Table 4.

TABLE 4 TRIAL SUMMARY--M143 BOMBLET (U)

| Group ^a | Completed trials | Priority | Time | Dissemination | Materials disseminated | Purpose |
|--------------------|------------------|----------|-------|-------------------------|------------------------|-----------------------------------|
| D | 12 | 3 | Night | M143 | TI | Efficiency, source strength |
| E | 80 | 3 | Night | M143 (TMC) ^b | Dye marker | Vertical functioning distribution |

^a Continuation of trial groups of Chapter II.

^b Tower-mounted gun (bomblet launcher).

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controlled environment was also required to facilitate immediate assay of samples in an area free of background contamination. "Safety citadels" were designed and used for this purpose. Their use proved highly satisfactory under the test conditions. Together with the use of standard GB protective equipment and an adherence to common precautionary measures (showering, decontamination of equipment, etc.), the safety equipment and procedures resulted in no incidence of agent disease.

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a. Safety Citadel Operations

Sampling crews were stationed in pressurized safety citadels at predetermined intervals, downwind of the agent release line. [REDACTED]

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DTC Test 67-8 (U)

DESERET TEST CENTER FORT DOUGLAS UT

DEC 1968

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ABSTRACT (U)

This report involves field studies conducted in Central Alaska during the summer of 1967 in which biological decay rates (BDR's) were determined for liquid (TT) and dry (ZZ) forms of Pasteurella tularensis and for nonpathogens Escherichia coli (EC) and Serratia marcescens (SM).
[REDACTED]

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[REDACTED]

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[REDACTED]

PREFACE (U)

DTC Test 67-8 (WATCH DOG) was initiated in response to Military Services' requirement to obtain biological decay data on aerosols of TF and ZZ in an environment considered analogous to the temperate humid areas of the northern hemisphere during the summer.⁽¹⁾ This report covers the work accomplished in the remote Delta Creek area, approximately 30 miles west of Fort Greely (in central Alaska), during the summer of 1967.

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CHAPTER ONE

OPERATIONAL SUMMARY (U)

SECTION I

PURPOSE (U)

The purpose of this test was to:

- 1) Obtain data on the biological decay rates of pathogenic organisms TT¹ and ZZ, and on non-pathogenic organisms EC and SM during night-time conditions in a summer, temperate environment.
- 2) Determine biological decay rates of TT and EC released during daylight in a temperate wooded environment.
- 3) Obtain data on the aerosol infectivity of TT to immunized and nonimmunized animals.
- 4) Obtain data for comparison of chamber and drum vs field decay rates and animal infectivity.
- 5) Utilize TT and ZZ data obtained for making predictions of casualties and determining effective area coverage.

¹ Agent TT used in this test contained five percent raffinose and 0.1 percent dipyriddy as additives.

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CHAPTER TWO

BIOLOGICAL DECAY AND VIRULENCE OF TT (U)

SECTION I

BACKGROUND AND RATIONALE (U)

1. INTRODUCTION



b. DTC established the feasibility of conducting pathogenic tests with Pasteurella tularensis (SR) in the remote Delta Creek area of the Tanana Valley near Fort Greely in central Alaska. An ecological contractor who has been working on the distribution of SR in central Alaska since 1955 found agglutinins of this agent in representative species of lagomorphs, carnivores, rodents, big-game animals (including bison), and livestock.^(4,5,6) Other investigators found SR agglutinins in humans. Meteorological studies initiated by DTC and/or their contractors showed that field trials could be conducted safely by adhering to limitations imposed by the WATCH DOG (U) 67-8 test plan. It was concluded by these efforts and other independent serological evidence gathered in 1964, 1965, and 1966, that no epizootic or new endemic areas would be introduced as a result of testing with this agent.

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SECTION II

OBJECTIVES (U)

1. FIRST OBJECTIVE

To determine the viability-decay rates of TT, ZZ, EC, and SM in a temperate summer environment and to compare the field decay rates with chamber decay rates when obtained under similar conditions.

2. SECOND OBJECTIVE

To obtain estimates of the infectivity of stabilized TT aerosols for monkeys.

3. THIRD OBJECTIVE

To estimate the biological decay rate of TT and EC-1 when released in a temperate wooded environment during daylight hours.

4. FIRST OPERATIONAL OBJECTIVE

To provide viability decay and infectivity data on agent TT for the purpose of estimating the weapons effectiveness of the TT-filled F105/A/B45Y-1 system in a temperate environment.

5. SECOND OPERATIONAL OBJECTIVE

To provide viability decay data on agent ZZ for the purpose of estimating the weapons effectiveness of the ZZ-filled F105/A/B45Y-4 weapon system in a temperate environment.

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SECTION III

SCOPE (U)

TABLE 2: SUMMARY OF TRIAL CONDITIONS (U)

| Group | Number of trials | Time of day | Material | Tracer | Purpose |
|----------------|------------------|-------------|----------|--------|-------------------------------------|
| A ^a | 11 ^b | Darkness | TT | Wet BG | Viability decay; animal infectivity |
| B | 8 | Darkness | ZZ | Dry BG | Viability decay |
| C | 8 | Darkness | EC-1 | Wet BG | Viability decay |
| D | 10 | Darkness | SM-1 | Wet BG | Viability decay |
| E | 6 | Daylight | TT | Wet BG | Viability decay |
| F | 4 | Daylight | EC-1 | Wet BG | Viability decay |

^a The last six Group A trials (A10-A15) included animals.

^b A total of 15 Phase A trials were run. For the first three trials, a bad lot of plates was used and no data were obtained. Trial A8 was excluded from the analysis because of significant wind shifts following dissemination.

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[REDACTED]

[REDACTED]

3. (U) DAYLIGHT TRIALS

The daylight trials were conducted in a forested environment (basically spruce) [REDACTED]

[REDACTED]

The method of dissemination was the same as that used in conducting the darkness trials with the E26 disseminator.

SECTION IV

TEST CONDITIONS (U)

1. (U) TEST SITE DESCRIPTION

All trials for this test were conducted in a multi-channeled area of Delta Creek approximately 50 km west of Fort Greely in the Tanana Valley of central Alaska [REDACTED]. [REDACTED]

[REDACTED]

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DTC Test 69-75. Volume I (U)

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ABSTRACT (U)

DTC Test 69-75 was conducted as a joint effort with the USAF (TAC Test 68-43) to evaluate the effectiveness of the F4/AB45Y-2/TX anticrop weapon system to reduce wheat crop yields. It was the first test in which live agent TX has been released with the A/B45Y-2 spray tank. Eleven successful trials were conducted, seven with live agent TX and four with killed TX, from 31 Oct to 1 Dec 68. [REDACTED]

[REDACTED] The grid, centered over Yeehaw Junction, Florida, covered a 5600-square-kilometer area (2160 sq. mi.). [REDACTED]

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1.4.1 Agent TX

1.4.1.1 TX is the agent symbol for the fungus Puccinia graminis var. tritici, Race 56, commonly known as stem rust of wheat.

[REDACTED]

1.4.1.2 Killed TX is defined as spores killed by a gaseous mixture of ethylene oxide. Dead TX spores are those which have died as a result of causes other than intentional killing.

[REDACTED]

1.4.1.3 Viable stem rust (VSR), as defined in par. 3.3.3.4, Vol. II, is a means of determining percent of viable stem rust in a given amount of agent.

1.4.2 Wheat Stem Rust Disease

Wheat stem rust is characterized by the development of rust-colored pustules on the plant which break through the stem, leaf, and sheath surfaces. The crop is damaged by the growth of the fungus on the wheat stems and leaves and by the developing spores, both of which use the water and nutrient materials needed for developing wheat kernels.

[REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]

1.5 OBJECTIVE

1.5.1 The objective of this test was to investigate the effectiveness of the F4/AB45Y-2/TX weapon system to reduce wheat crop yields in selected geographic areas.

1.5.1.1 The objective was sub-divided into specific tasks as follows: to determine the downwind travel of agent TX released from the F4/AB45Y-2/TX weapon system; to estimate the yield reduction and loss of wheat crops attacked by this weapon system; to study the effectiveness of killed TX as a simulant for agent TX; and to evaluate the adequacy of the ARCHON system to predict downwind dosages of TX.

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SECTION 2. DETAILS OF TEST (U)

2.1 INTRODUCTION

2.1.1 Scope of Test

Four killed FX trials and seven live agent trials were conducted. The killed agent trials were designated "Group A" and the live trials "Group B." All trials were conducted in the vicinity of Yachaw Junction, Florida, from 11 October 1968 to 1 December 1968. [REDACTED] [REDACTED]

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[REDACTED]

1.1.4 Dissemination

The test aerosols were disseminated from the A/B45Y-2 spray tank carried by an F-4 aircraft along one of four release lines [REDACTED].

[REDACTED]

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[REDACTED]

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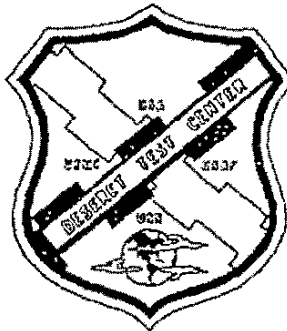
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Report Number: DTC 66-444

DESERET TEST CENTER
SEMI-ANNUAL STATUS REPORT (U)
— CURRENT ACTIVITIES TO 15 FEBRUARY 1966 —



FEBRUARY 1966

Prepared by

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BIOLOGICAL TEST SERIES
INTRODUCTION

2. DEFERRALS

It will be noted that some tests have been deferred; IRON CLAD (U) was deferred because of aircraft carrier nonavailability due to the Viet Nam conflict; Test 66-9 MAGIC SWORD (U) Phase II was deferred, primarily because it was considered of low priority and funds available for testing were insufficient.

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3. CURRENT STATUS

[REDACTED]

However, due to an urgent requirement for testing CS munitions it has been temporarily deferred and is now scheduled for FY 67.

[REDACTED]

4. [REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

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3. CURRENT STATUS

[REDACTED]

However, in order to accommodate the urgent requirement for testing CS munitions, this test will be deferred to the last quarter of FY 67.

[REDACTED]

4. [REDACTED]

[REDACTED]

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Feb 9 67

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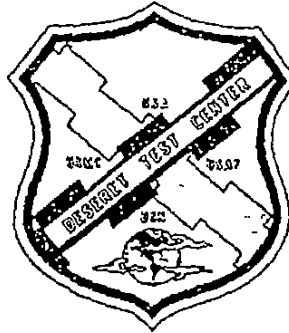
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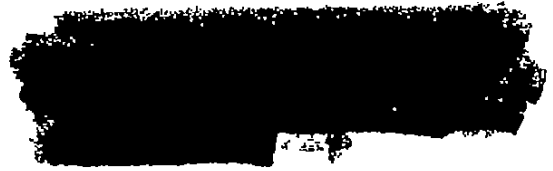
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BIOLOGICAL TEST SERIES

INTRODUCTION

2. DEFERRALS

Several of the test programs that were originally scheduled have been deferred because of lack of funds. These include 66-9, MAGIC SWORD II (U); 67-5, WORK HORSE (U); 67-6, BLUE TANGO, Phase II (U); and the second and third year study for GLOBE TROTTER (U). A portion of test 67-8, AUTOBIOGRAPHY (C), was deleted because of lack of suitable stabilizer for the dry agent. Lack of equipment made it advisable to slip test 67-11, EXPUNGE (C), over into the FY 68 program. BLUE NOTE, 67-4, has been withdrawn and may be submitted later pending further study of the requirement. Tests 67-9, KEYFRUIT (C) and 67-10, MEDDLED (C), have been withdrawn due to the acceptance of the higher priority program 67-12, EXPULSION (C).

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TABLE 12. DTC Test Program JOP 85 65 (0)

| Test number - Package | Status |
|--------------------------|---|
| 63-7 CHAIN SIN | Cancelled objectives incorporated in PT 85 7 |
| 63-8 CREAK 204 | Cancelled until stabilized DCT can be developed high level of high 3 3 |
| 63-9 LONG WOLF | Cancelled objectives incorporated in 63 20 |
| 63-9 SILVER 171A | Cancelled - hardware not available - incorporated in proposed IV 68 171A |
| 63-10 LITTLE COYOTE | Cancelled for lack of data - objectives incorporated in 63 8 (DTC 71000 11). |

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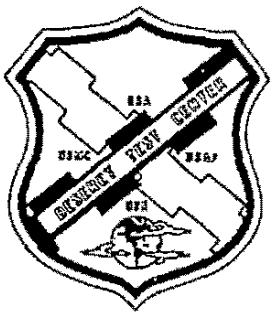
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BIOLOGICAL TEST SERIES

INTRODUCTION

2. DEFERRALS AND CANCELLATIONS

Several tests that were originally scheduled and have been deferred or cancelled because of lack of funds, or withdrawal of the test requirements include 66-9 (MAGIC SWORD II), 67-5 (WORK HORSE), 67-4 (BLUE NOTE), 67-6 (BLUE TANGO II), 68-31 (TRACTOR HUB), 68-33 (WICKED SLICE). Test 67-11 (SLOW WALTZ) was deferred to FY 68 and its test objectives are now included in Test 68-71 (FOLDED ARROW).

[REDACTED]

[REDACTED]

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CHEMICAL TEST SERIES

INTRODUCTION

2. DEFERRALS AND CANCELLATIONS

Revised test schedules and publication dates of Final Reports provided in Table 9 result from priority changes and funding limitations. LITTLE CORPORAL, 65-15, BLACK LABEL, 64-18, LAUREL GROVE, 64-19, and STEEL POINT, 67-13 have been cancelled.

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[REDACTED]
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TABLE 21 DTC TEST PROGRAMS FOR FY 64 (U)

| Test number- nickname | STATUS |
|--------------------------|--|
| 64-3 ERRAND BOY | Penetration aspect called. Decontamination study published 10 Nov 65 [REDACTED] |

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TABLE 25 Contd

| Test number- if fictitious | Status |
|-------------------------------|--|
| 68-14 CHARTEL GRAB | Contingency program, will be conducted only if higher priority programs are cancelled or deferred or if additional funds become available |
| 68-70 PRAIRIE CARPET | Contingency program, will be conducted only if higher priority programs are cancelled or deferred or if additional funds become available. |

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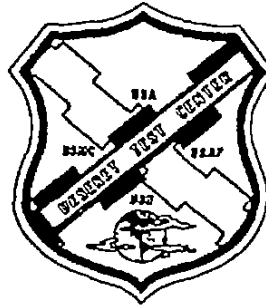
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FOREWORD

[REDACTED]

[REDACTED]

Nicknames
will not be given to any FY-69 tests or tests in later programs. ⁷ Those nicknames assigned to FY-68 and earlier tests will continue to be used.

[REDACTED]

[REDACTED]

[REDACTED]

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BIOLOGICAL TEST SERIES

INTRODUCTION (U)

1. GENERAL

[REDACTED]

With the exception of 68-70, SHINING POND, all FY-68 contingency tests were reconsidered at the Sixth Annual Planning Conference and were given new numbers as follows: Special Study B-13 was changed to 69-32; EXIT LINE, 68-31, to 69-33; PRAIRIE CARPET, 68-30, to 69-74; SHARP NAIL, 68-72, to 69-70; and LEANING SHOE, 68-73, to 69-73.

[REDACTED]

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[REDACTED]
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CHEMICAL TEST SERIES

INTRODUCTION (U)

1. GENERAL

[REDACTED]

b. [REDACTED]

A test plan for the new test (No. 68-52) was prepared and published on 3 Oct 1967 and testing was conducted at three separate test sites between Sep 1967 and Jan 1968. [REDACTED]

[REDACTED]

2. DEFERALS

a. As a result of the scheduling of test 68-52 (CLIFF ROSE), test 68-15 (RED OAK II) was rescheduled then cancelled when it was decided that reanalysis of the requirement in light of current data should be investigated before proceeding. [REDACTED]

[REDACTED]

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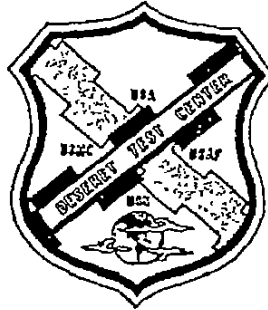
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AGENT SYMBOLS (U)

A. BIOLOGICALS

| <u>SYMBOL</u> | | <u>DISEASE</u> | <u>NAME</u> | <u>EFFECT</u> |
|---------------|----------------------------|---------------------|---|-------------------------------------|
| <u>Old</u> | <u>New</u> | | | |
| BG | ... | None | <u>Bacillus globigii</u> | None (bio tracer) |
| SM | ... | None | <u>Serratia marcescens</u> | No effect (vegetative non pathogen) |
| EC | ... | None | <u>Echerichia coli</u> | No effect (vegetative non pathogen) |
| UL | SR TT (wet) ZZ (dry) | (Rabbit Fever) | <u>Francisella tularensis</u> | Lethal |
| NU | DK FX (wet) TD (dry) | Encephalomyelitis | Virus of Venezuelan Equine Encephalomyelitis | Incapacitating |
| N | TR (wet) TR 2 (dry) | Inhalation anthrax | <u>Bacillus anthracis</u> | Lethal |
| OU | LM MN (wet) NT (dry) | Q Fever | <u>Coxiella burnetii</u> | Incapacitating |
| OJ | LU | Yellow Fever | Yellow Fever Virus | Lethal |
| OJAP | UT | Yellow Fever | Yellow Fever virus- infected mosquitoes | Lethal |
| KC | RR | Chipungunya Fever | Chipungunya Virus | Incapacitating |
| LE | ... | Plague | <u>Pasturella pestis</u> | Lethal |
| FA | ... | Rift Valley Fever | Rift Valley Virus | Incapacitating |
| SI | ... | Psittocosis | Psittocosis Virus | Incapacitating |
| ZQ | .. | O'Nyong-Nyong Fever | O'Nyong-Nyong Fever Virus | Incapacitating |
| TX | ... | Wheat stem rust | <u>Fuccinia graminea</u> | Anti-crop |
| SX | ... | Rye stem rust | | Anti-crop |

VII

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A. BIOLOGICALS (Contd)

| <u>SYMBOL</u> | | <u>DISEASE</u> | <u>NAME</u> | <u>EFFECT</u> |
|---------------|----------------|----------------|---------------------------|---------------|
| <u>Old</u> | <u>New</u> | | | |
| LX | | Rice blast | <u>Piricularia oryzae</u> | Anti-crop |
| AB | OZ NX (wet) | | <u>Brucella suis</u> | |

B. CHEMICALS

| <u>SYMBOL</u> | <u>COMPOUND</u> | <u>TYPE</u> | <u>EFFECT</u> |
|-----------------|----------------------|-----------------------------|----------------|
| SO ₂ | Sulfur dioxide | GB simulant | None |
| MAA | Methyl aceto acetate | GB simulant | None |
| TOF | Triocetyl phosphate | VX simulant | None |
| BZ | Benzolate | Pyrogenic non-persistent | Incapacitating |
| GA | Organic phosphate | Non-persistent nerve agent | Lethal |
| GB | Organic phosphate | Non-persistent nerve agent | Lethal |
| GD | Organic phosphate | Semi-persistent nerve agent | Lethal |
| VX | Organic phosphate | Persistent nerve agent | Lethal |
| PG* | Toxin | Staphylococcus Enterotoxin | Incapacitating |
| HD | Bis-Sulfide | Mustard Gas (persistent) | Incapacitating |
| CS | Malononitrile | Super tear gas | Incapacitating |
| INA | Butyl 24-D | ... | Herbicide |
| LNB | Butyl 245-T | ... | Herbicide |
| XR | Toxin | Botulinum Toxin | Lethal |

*Old symbol - UC.

IRMS NUMBER

IRMS NUMBER



VIII

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CHAPTER ONE
CHEMICAL TEST SERIES (U)

SECTION I
INTRODUCTION (U)

2. DEFERALS

a. As a result of experience gained from the sheep incident near Dugway Proving Ground, tests 68-10, and 68-12 have been deferred pending the acquisition of a new test site with sufficiently large buffer zone to assure maximum safety for these operations and to permit the conduct of that portion of PROGRAM SAFE which applies to these tests.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

TABLE 1 (U): STATUS OF CURRENTLY ACTIVE CHEMICAL TESTS (U)

| Test no. | Date test plan completed | Date test conducted or scheduled | Estimated publication date of final report |
|----------|--------------------------|----------------------------------|--|
|----------|--------------------------|----------------------------------|--|

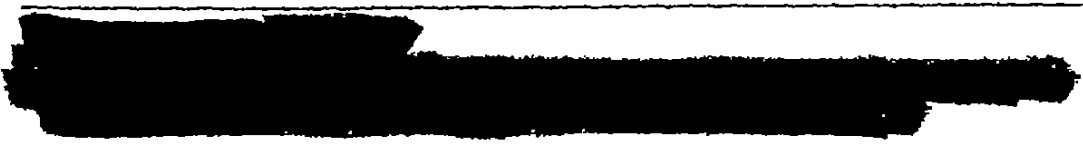
| | | | |
|-----------------|-----------|-----|-----|
| 69-15 | Cancelled | ... | ... |
| 69-16 | Cancelled | ... | ... |



TABLE 1 (U): STATUS OF CURRENTLY ACTIVE CHEMICAL TESTS (U)

| Test no. | Date test plan completed | Date test conducted or scheduled | Estimated publication date of final report |
|----------|--------------------------|----------------------------------|--|
|----------|--------------------------|----------------------------------|--|

| | | | |
|-----------------|-----------|-----|-----|
| 69-15 | Cancelled | ... | ... |
| 69-16 | Cancelled | ... | ... |



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CHAPTER TWO
BIOLOGICAL TEST SERIES

SECTION I

INTRODUCTION (U)

[REDACTED]

[REDACTED]

2. (U) DEFERRALS

[REDACTED]

These include 69-35, which was cancelled, and 69-33 and 69-34, which were deferred until FY 70.

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TABLE 4: STATUS OF CURRENTLY ACTIVE AND PROGRAMMED BIOLOGICAL TESTS (U)

| Test no. | Date test plan completed | Date test conducted or scheduled | Estimated publication date of final report ^a |
|-----------------|--------------------------|----------------------------------|---|
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| 69-36 | [REDACTED] | Not scheduled | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| 69-71 | [REDACTED] | Not scheduled | [REDACTED] |
| 69-72 | [REDACTED] | Not scheduled | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| 69-74 | [REDACTED] | Not scheduled | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |

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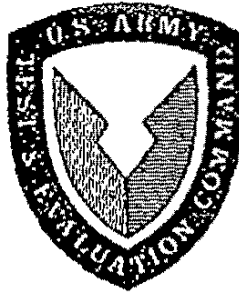
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Table 1. Summary of DTC Test Program (U)

| Test/Study Number | Cognizant Agency | Purpose | Status |
|-------------------|------------------|------------|------------|
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| 60-33 | [REDACTED] | [REDACTED] | [REDACTED] |

2

Chamber work at Cornell University has been completed. Report covering results of chamber trials to be published in February 1972. Remainder of requirement to be integrated into DTC Test 72-70.

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Outline Plans for Testing in FY 69. Supplement II (U)

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IV

TABLE 1: SUMMARY OF CONTINGENCY TESTS IN THE FY-69 PROGRAM (U)

| Test | Requesting agency | Agent, tracer, or concept | Mission, system, or concept | Purpose of test | Environment (location) |
|------------|-------------------|---------------------------|-----------------------------|-----------------|------------------------|
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| 69-74 | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |

69-7

69-74

*Pr

*Previously numbered 69-37

NO. 45711

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[REDACTED]

[REDACTED]

b. Rationale

[REDACTED]

(2) With some alteration, this test is the previously approved DTC Test 65-5 (IRON CLAD (U)).

[REDACTED]

[REDACTED]

[REDACTED]

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**DTC Test 68-13, Phases I, II, III and DTC Test 69-12.
Volume I (U)**

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DELETION OF PROPOSED TEST 69-30
FROM THE FY 69 PROGRAM

[REDACTED]

In view of the above
considerations, Test 69-30 has been deleted from the FY-69 program.

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[REDACTED]

ABSTRACT (U)

Deseret Test Center (DTC) Test 68-13 was a joint U.S., U.K., and Canadian program designed to investigate the extent and duration of hazard following a GA, GD or V agent attack. Phases I and III were annulus trials involving agents GA, GB, GD and VX spray in both open grassland and wooded terrain at the Chemical Defence Establishment, Porton Down, England. Phase II consisted of both GA and GD spray and munition (GD-filled) trials at the Suffield Defence Research Establishment, Ralston, Canada. DTC Test 69-12 was planned as a more detailed investigation of the problem at a test site at Edgewood Arsenal. This program was cancelled shortly after initiation due to restrictions placed on open air toxic releases.

The purpose of Test 68-13 and 69-12 was to obtain rate-of-vapor return data for agent GA and GD when sprayed on different terrain types in a Summer (temperate) environment. GB and VX trials were also conducted to strengthen confidence in the GA and GD data by allowing comparisons of data from GB and VX munition tests conducted in the same environment.

[REDACTED]

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[REDACTED]

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[REDACTED]

SECTION I. [REDACTED] SUMMARY (U)

1.2 (U) DESCRIPTION OF MATERIEL (U)

1.2.1 Pertinent Weapons Systems

The weapons systems germane to this test were explosive munitions (GD-filled), aircraft spray, rain-type munitions (using both GA and GD), and massive bombs (GA- and GD-filled).

1.2.2 Apparatus and Weapons Systems Used to Disseminated Agent in DTC Test 68-13 Trials.

The agents were disseminated by the following methods:

- a. 155mm Howitzer shell (GD-filled) was the explosive munition used.
- b. A crop sprayer shown in Figure 1 was used to simulate the dissemination of agent spray from aircraft, rain type munitions, and massive bomb dissemination.

[REDACTED]

1.3 OBJECTIVE (U)

To determine rate of evaporation of GA, GB, GD and VX as a function of contamination density, drop size and terrain cover under a variety of meteorological conditions in a temperate environment.

1.4 SCOPE (U)

[REDACTED]

DTC Test 68-13, Phases I and III, was conducted at the Chemical Defense Experimental Establishment, Porton, England^{1,2}. DTC Test 68-13, Phase II, was conducted at the Suffield Defence Research Establishment, Ralston, Canada³. DTC Test 69-12, the final test in

[REDACTED]

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[REDACTED]

this program, was originally scheduled for conduct near Fort Greeley, Alaska⁴. However, due to testing complications, the test site was moved to Edgewood Arsenal, Maryland. Only three trials (of 54) were completed in the spring of 1969 prior to imposition of open-air toxic test restrictions.

[REDACTED]

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[REDACTED]

2.3 [REDACTED] DTC TEST 68-13, PHASE I AND III (U)

[REDACTED]

[REDACTED]

2.3.2 [REDACTED] Design of Grid (U)

[REDACTED] In Phases I and III, 82 spray trials were conducted at the Chemical Defence Establishment, Porton Down, England; these trials were conducted jointly with Desert Test Center. The trials were run both in open and forested terrains, using the nerve agents GA, GB, GD and VX. The trials were conducted during three time periods: (1) July-August 1967; (2) May-June 1968; and, (3) August-September 1968.

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

2.4 DTC TEST 68-13, PHASE II (U)

2.4.1 Spray Trials - Canada (U)

This phase of the series (Test 68-13, Phase II) was conducted at the Suffield Defence Research Establishment, Ralston, Alberta, Canada, to provide data on the evaporation characteristics of GA and GD

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2-30

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[REDACTED]

2.6 DTC TEST 69-12 (U)

(U) DTC Test 69-12 was suspended due to restrictions imposed on open-air toxic testing. Three trials were completed out of 54 trials scheduled.

[REDACTED]

[REDACTED]

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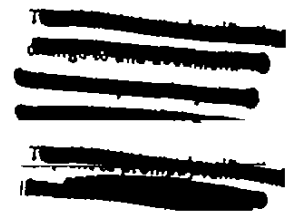


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Report No. DTC 6513118R

TEST 65-13 - HIGH LOW (U)

FINAL REPORT



July 1966

Prepared by
Frank D. Bagley

Headquarters • Desert Test Center • Fort Douglas, Utah • 84113

AD 388992

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ABSTRACT

DTC Test 65-13, HIGH LOW (U), was a test program designed to assess the vulnerability of ships to an enveloping cloud of toxic G agent. The test agent was methyl acetoacetate, a GB simulant for which an agent-simulant relationship had previously been established in DTC Test 64-2, FLOWER DRUM (U), Phase I. Each of four U.S. Navy ships--(1) a FRAM MK I Destroyer, (2) a Guided Missile Destroyer, (3) a Landing Ship, Tank, and (4), an Attack Personnel Transport--were tested under each of the three standard material readiness conditions. Each ship was enveloped by release of the test agent through a turbine disseminator which was located on the bow of the test ship.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]
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SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. OBJECTIVE ONE

a. Objective One of DTC Test 65-13, HIGH LOW (U), [REDACTED]
[REDACTED]

b. Objective One was attained through envelopment of a FRAM MK-I Destroyer (DD), a Guided Missile Destroyer (DDG), a Landing Ship, Tank (LST), and an Attack Personnel Transport (APA) by GB simulant, methyl acetoacetate (hereinafter designated MAA); [REDACTED]
[REDACTED]

2. OBJECTIVE TWO

a. Objective Two was to estimate the penetration of GB into the four types of operational naval ships by evaluating the results of Objective One in conjunction with the GB/GB-simulant relationship established in FLOWER DRUM (U), Phase I, as amended.
[REDACTED]

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[REDACTED]
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(C)

SECTION III

TEST PROCEDURES (U)

1. TEST LOCATION AND DATE

The trials were conducted in an operational area of the Pacific Ocean, off San Diego, during the period 11 January thru 26 February 1966. The base of operations was the San Diego Naval Station.

2. SCOPE

Four operational Navy ships were used for testing--a DD, a DDG, an LST, and an APA. There were 36 satisfactory envelopment trials, three under each of three material readiness conditions for each of the four ships (i.e., nine trials per ship).

3. [REDACTED]

[REDACTED]

[REDACTED]
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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

4. TEST SHIPS

The ships assigned to the HIGH LOW test were the USS Fechteler (DD870), USS Berkely (DDG15), USS Wexford County (LST1168), and USS Okanogan (APA220) (Figs 1-4, respectively).

[REDACTED]

5. TEST METHOD

[REDACTED]

The cloud was generated by dissemination of agent from a modified Model T-4SM-2 MARS Portable Gas Turbine which was located on the bow of the test ship (Fig. 5).

[REDACTED]

6. [REDACTED]

[REDACTED]

[REDACTED]

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b. [REDACTED] All personnel (ships' crews and civilian test personnel) were instructed in the use of the protective mask, and masks were worn by personnel directly exposed to significant quantities of MAA.

[REDACTED]

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[REDACTED]

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Test 65-14 -- Elk Hunt (U)

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SEP 1966

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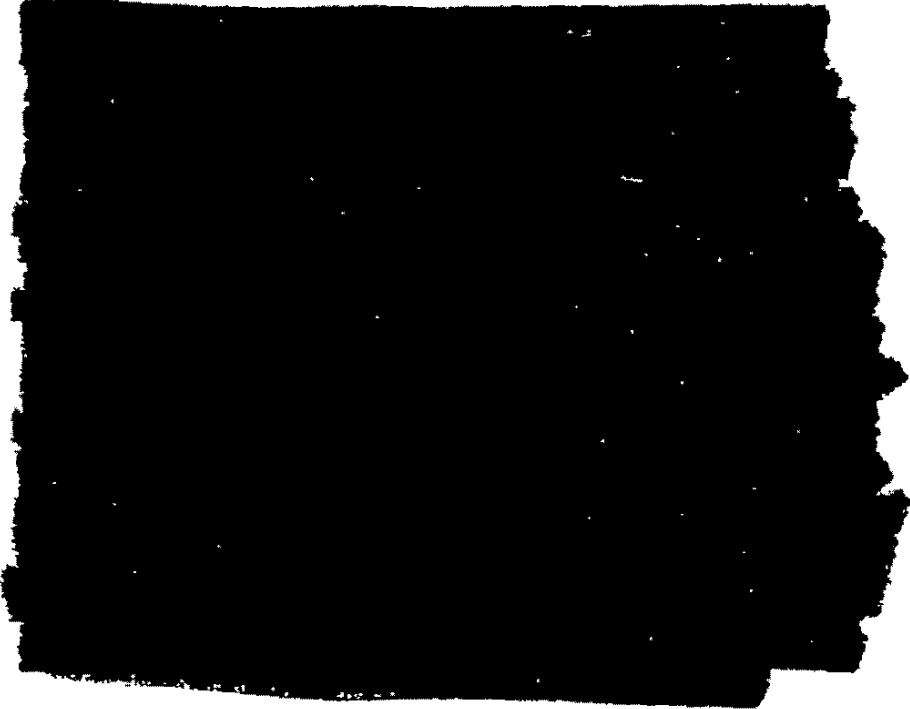
[REDACTED]

[REDACTED]

[REDACTED]
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ABSTRACT

1 Tests were conducted to determine the amount of standard VX picked up on the clothing of personnel traversing paths formed by the breaching of minefields and areas contaminated to approximately 2.5 g/m² by detonation of M23 mines. 2 Shortly after contamination and breaching of shrub-covered and dead-grass-covered terrain, the paths were traversed by personnel assuming various tactical postures. 3 Tests were made to determine the amount of VX picked up by personnel contacting vehicles contaminated either by traversing contaminated areas or by having M23 mines detonated beneath them. 4 These personnel, who performed maintenance and repair activities, as well as riding infantry (simulated by manikins), had their clothing analyzed for VX. 5 Tests were made to assess the effectiveness of wet steam, high-pressure cold-water hosing, and the wallow pit, for decontaminating vehicles.



[REDACTED]

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[REDACTED]
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[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

e. ELK HUNT I

[REDACTED]

(2) The 20 trials conducted near Fort Greely, Alaska, during July and August 1964 were designed to determine: (1) the amount of either standard or modified agent VX pickup on the clothing of personnel traversing, (2) the length of time a barrier is effective in producing casualties, and (3) the comparative pickup of agent when M23 mines filled with standard or modified VX were detonated underwater and underground.

[REDACTED]

[REDACTED]

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[REDACTED]

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PREFACE (U)

- 1. (●) Thirty-five trials, identified as ELK HUNT (U), Phase II, DTC 65-14, were conducted near Fort Greely, Alaska, between 7 June and 27 July 1965. In support, Chemical Research and Development Laboratories (CRDL), Edgewood Arsenal, Md, performed 11 additional vehicle decontamination trials from 27 Oct to 17 Dec 1965.
- 2. (●) This test series is related to the overall effort to obtain data required to evaluate the military effectiveness of VX in various environments and to devise defensive countermeasures against such agents. ELK HUNT (U), Phase I, conducted 3 July through 15 August 1964, contributed information on personnel hazards incident to traversing VX-contaminated areas.

[REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]

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[REDACTED]

[REDACTED]

(S)

SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. TEST OBJECTIVES

a. Primary Objective One

This objective was "to investigate selected minefield breaching devices, and to evaluate the resulting contamination in the cleared paths when detonating buried M23 mines and M23 mines integrated with M15 mines."

[REDACTED]

b. Primary Objective Two

This objective was "to investigate selected methods of breaching and crossing VX-contaminated areas; also, attendant hazards created."

[REDACTED]

c. Primary Objective Three

This objective was "to investigate contamination and decontamination problems associated with VX-contaminated vehicles."

[REDACTED]

d. Additional Objective

This objective was "to determine if vapor hazard increases in brush-covered terrain after terrain has become contaminated-- as opposed to vapor hazard that exists where open short grass and/or bare ground are involved."

[REDACTED]

[REDACTED]

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SECTION III

TEST PROCEDURES (U)

1. SCOPE

a. Test Sites

(1) The 35 DTC trials were conducted near Fort Greely, Alaska. The Canadian government performed five trials in conjunction with the DTC trials.

[REDACTED]

c. Equipment

(1) All 46 trials were conducted with standard VX, disseminated from 169 M23 mines buried with pressure plates flush with the ground.

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[REDACTED]

(4) In the group-C trials, a truck, a tank, and a tank-dozer crossed the contaminated areas. In groups D and E and in the CRDL trials, tanks and trucks were contaminated by detonation of M23 mines beneath them and then decontaminated by steam, cold-water hosing, or wallow pit (tank only).

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED] UNCLASSIFIED

[REDACTED]

(4) In the group-C trials, a truck, a tank, and a tank-dozer crossed the contaminated areas. In groups D and E and in the CRDL trials, tanks and trucks were contaminated by detonation of M23 mines beneath them and then decontaminated by steam, cold-water hosing, or wallow pit (tank only).

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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(2) Group-C Trials

Four trials were conducted in which a truck, a tank, and a tankdozer dozing a path, crossed a shrub-covered area recently contaminated by detonation of M23 mines. The VX picked up on the clothing of passengers simulated by manikins, and the clothing of vehicle crewmen who subsequent to their crossing performed maintenance on their vehicles, was assayed (Table 3). The clothing of personnel making traversals in the tankdozed path was analyzed for VX picked up (Tables 1 and 2).

c. Primary Objective three

(1) Group-D Trials

Five trials were conducted in which an M23 mine was detonated beneath an M41 tank. The clothing of passengers simulated by manikins, and of personnel performing maintenance on the tank, was assayed for VX. The VX picked up on the clothing of personnel who removed the manikins from the interior positions was added to that of the manikins as an estimate of the amount of VX that might be picked up by troops leaving a contaminated tank and walking out of the contaminated area (Table 3).

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d. Additional Objective (Group-F Trials)

Two trials were conducted in which M23 mines were detonated to form contaminated areas. Both liquid and vapor VX contamination of the shrub-covered terrain were measured. The clothing of personnel making traversals across the area was assayed for amount of VX picked up. [REDACTED]

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4. VX SAMPLING (TABLE 19)

a. Clothing

(1) Description of Clothing

Personnel wore complete, impermeable butyl-rubber outfits and M9A1 masks.

[REDACTED]

[REDACTED]

[REDACTED]

TEST 66-10--PIN POINT

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DEC 1966

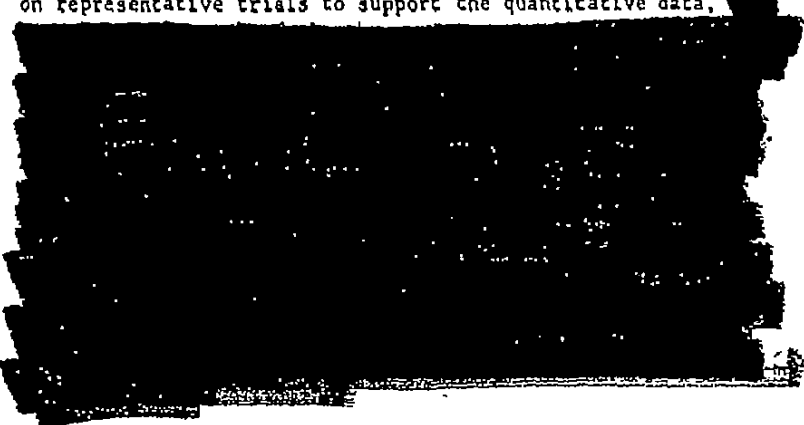
Distribution limited to U.S. Gov't. agencies only; Test and Evaluation; 1 Jun 1983. Other requests for this document must be referred to Commander, US Army Dugway Proving Ground, Attn: MT-DA-L. Dugway, UT 84022.

[REDACTED]

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ABSTRACT

In the test, PIN POINT, the riot-control-agent-CS-dispensing, man-portable E8 launcher, and the aerially-delivered CBU-19/A and CBU-30/A munitions were operationally evaluated for area-coverage-time-dosage relationships in a tropical jungle environment. The reactions to agent CS of unmasked personnel operating in emplacements within the impact area were evaluated on representative trials to support the quantitative data.



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[REDACTED]

SECTION II

ACCOMPLISHMENT OF TEST OBJECTIVES (U)

1. [REDACTED]

2. PRIMARY OBJECTIVES

a. First Objective

This objective was to determine for a tropical-jungle environment, the area-time-dosage relationships resulting from CS-filled submunitions released from single and double dynamic drops of the CBU-19/A munition, CBU-30/A munition, and from the firing of the E8 launcher. In response to this objective, there was a total of 34 successful trials conducted. This included four trials using single E8's on the target, eight trials employing two E8's on the same target area, 13 trials with single dynamic drops of the CBU-19/A, four successful trials where two CBU-19/A's were dropped simultaneously, and five successful trials employing the CBU-30/A. The results and a discussion of results for this objective are presented in § IV, ¶'s 1.a, b., and c. Conclusions are given in § V, ¶'s 2. a. thru e.

b. Second Objective

This objective was to determine the human response--of masked and unmasked personnel operating in tactical defensive and offensive attitudes within the target area--to agent CS. In ten trials, unmasked personnel and personnel wearing M9A1 masks and personnel wearing copies of a VC improvised mask were positioned within emplacements located in or on the periphery of the impact area. The results and a discussion of results for this objective are given in § IV, ¶'s 1.a., 3.a. (1) and (2), and 4. Conclusions are presented in § V, ¶ 2.f. and g.

c. Third Objective

This objective was to obtain qualitative data on the persistency effects of agent CS. Persistency of the agent on the grid area was observed quantitatively by noting when the

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samplers ceased to measure agent and qualitatively, by having the field crews record evidence of the presence of agent when they picked up the samplers for a trial and set out the samplers for the next trial. The results and discussion for this objective are given in §IV, ¶ 5. Conclusions are presented in §V, ¶ 2.h.

d. Fourth Objective

This objective was to determine the degree of protection afforded masked and unmasked personnel within representative sheltered complexes. For six trials during the test (four CBU-19/A and two CU-30/A trials), the emplacements on the grid were covered with camouflage material made from the surrounding vegetation. The penetration rate was determined by taking the ratio between the outside and inside agent concentrations as a function of time after dissemination. The results and a discussion of results are given in §IV, ¶ 1.a.(5), 1.b.(3), 1.c.(2); and 3.a.(1) and (2). Conclusions are given in §V ¶ 2.i.

e. Fifth Objective

This objective was to determine the capability of the two air-delivered CS weapon systems tested to reduce the effectiveness of hostile forces performing anti-aircraft missions. In two of the CBU-19/A trials, data were collected in response to this objective. The results for this objective are presented and discussed in §IV, ¶ 1.b. (3). Conclusions are given in §V ¶ 2.j.

f. Sixth Objective

This objective was to determine the requirement for ointments and lotions in preventing and reducing the irritation induced by exposure of personnel to a CS cloud. This objective was answered by medical observation of all human volunteers who were subjected to the agent cloud. The results for this objective are presented and discussed in §IV, ¶ 7. The conclusions are in §V ¶ 2.k.

g. Seventh Objective

This objective was to obtain qualitative information on the effectiveness of the weapon systems being tested in open-marsh and savannah-grassland environments by either field trials or laboratory tests. Data to partially answer this objective were furnished by studies conducted for DTC by Edgewood Arsenal. The results and a discussion of results for this objective are given in §IV, ¶ 2. Conclusions are in §IV, ¶ 2.e.

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h. Eighth Objective

This objective determined the effectiveness of the three munitions when employed against personnel in a Viet Nam jungle village (simulated). Quantitative data to answer this objective was collected on three trials of the E8 launcher and three trials for the CBU-19/A Munition. The results for this objective are presented and discussed in § IV, ¶ 3. Conclusions are presented in § V, ¶ 2.m.

i. Ninth Objective

This objective was to evaluate the incendiary properties of the BLU-39 Bomblet (E49 Canister) and E23 Cartridge when dropped into a Viet Nam jungle village (simulated). The incendiary effects of the two submunitions were evaluated in all six trials conducted for the Eighth Objective. Additional laboratory data were obtained for DTC by Edgewood Arsenal. The results and discussion for this objective are presented in § IV, ¶ 3. Conclusions are given in § V, ¶ 2.n.

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[REDACTED]
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[REDACTED]

SECTION III

TEST PROCEDURES (U)

1. (U) TEST SITE AND GRID

a. The test site for PIN POINT was located in a tropical jungle environment. [REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

1. Both the CBU-19/A and the CBU-30/A were delivered on the target by a COIN type aircraft (A-1E). [REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

4. SUMMARY OF VOLUNTEER PARTICIPATION

a. Human volunteers were exposed to the agent CS on both Group-A and Group-C trials.

[REDACTED]

[REDACTED]

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[REDACTED]

7. NEED FOR PROTECTIVE OINTMENTS OR LOTIONS

a. Human volunteers were used on several trials to evaluate agent effects on individuals exposed to incapacitating dosages of GS under simulated operational situations in a tropical jungle environment. All volunteers were given a medical examination before and after being exposed to the agent. Volunteers experienced typical GS symptoms (choking, nausea, eye and nose irritation, burning sensation on exposed skin areas, etc.); however, skin irritation requiring medical treatment was not observed. A mixture of alcohol and soda for neutralizing the agent was available but it was not needed.

[REDACTED]

DTC Test 68-53, Phase I. Volume I

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MAR 1971

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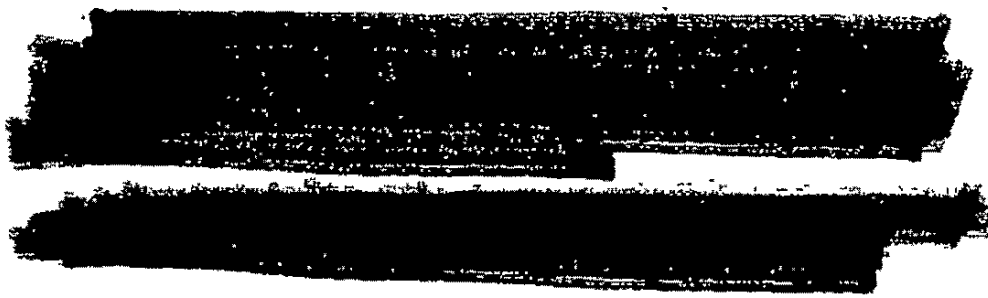
ABSTRACT

Deseret Test Center (DTC) Test 68-53, Phase I, was conducted during the period April to December 1969 at Dugway Proving Ground (DPG), Dugway, Utah.

The primary test objective was to establish safety distances downwind of CS2 drop zones.

Secondary objectives required the determination of agent deposition patterns, percent of agent recovery, and airborne agent particle size in defining direct assault effects such as those related to rescue operations.

The current family of bulk CS2 munitions, including the BLU-52A/B, Mk77, Mk20, and XM925 bombs and the XM28 dispenser system were tested in open terrain.



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1.2.1.6 Agent CS. CS munitions are filled with a pyrotechnic CS mixture or micropulverized (powdered) CS which is designated CS1 or CS2.

a. CS, in a pyrotechnic mixture, is used in burning-type munitions such as grenades, cartridges, projectiles, rockets, and canisters. Initial concentrations of CS disseminated by pyrotechnic means remain effective for only short periods.

b. CS1 is powdered CS, blended with an aerogel which reduces agglomeration and increases the effectiveness of the agent. It is used only if CS2 is unavailable. The effectiveness of CS1 in many situations depends on its re-aerosolization when troops and vehicles traverse the area. Effective re-aerosolization will occur for as long as 14 days. Heavy rains tend to cake the agent, minimizing re-aerosolization effects. Also, high winds tend to dissipate the agent.

c. CS2 is powdered CS, blended with silicone-treated aerogel. The silicone-treated aerogel decreases agglomeration and increases flowability, but also markedly increases resistance to water. These characteristics prolong the effectiveness of the agent on terrain, vegetation, personnel, and equipment.

[REDACTED]

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1.4 SCOPE

Five types of CS2 munitions were tested in flat, open terrain at Dugway Proving Ground, Utah, during April through December 1969. The XM925 drum was tested statically and in dynamic drops from a CH47 helicopter. Bq submunitions were released from an XM28 dispenser carried by a UH-1B helicopter. The Mk20 and the Mk77 bombs were deployed in pairs from high performance aircraft. One BLU-52A/B bomb per trial was delivered by high performance aircraft.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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Table 1. Test 68-53 Trials

| Munition Type and Trial No. | Number of Munitions per Trial | Date (1969) | Fire Time (MDT) | Release Altitude (Pt AGL) | Delivery |
|-----------------------------|-------------------------------|-------------|-------------------|---------------------------|-------------------|
| Mk77 bomb: | | | | | A-4 aircraft: |
| A-1 | 2 | 15 Jul | 0647 | 40 | Level |
| A-2 | 2 | 16 Jul | 1241 | 50 | Level |
| A-3 | 1 | 15 Sep | 1440 | 450 | 8° dive |
| A-4 | 2 | 18 Sep | 1243 | 425 | 7° dive |
| A-5 | 2 | 23 Sep | 1145 | 425 | 5° dive |
| A-6 | 1 | 13 Nov | 1359 ^d | 500 | 10° dive |
| XM28 dispenser: | | | | | UH-1B helicopter: |
| B-1 | 1 | 21 Nov | 1220 ^d | 1500 | 70 KIAS |
| B-2 | 1 | 1 Dec | 1453 ^d | 1500 | 70 KIAS |
| B-3 | 1 | 5 Dec | 1320 ^d | 1500 | 70 KIAS |
| XM923 drum: | | | | | |
| C-1 | 1 | 25 Apr | 1544 | Ground | Static |
| C-2 | 1 | 2 May | 1442 | Ground | Static |
| C-3 | 1 | 26 May | 1533 | 2000 | UH-1B (60 KIAS) |
| C-4 | 1 | 27 May | 0739 | 2000 | UH-1B (70 KIAS) |
| C-5 | 1 | 19 Sep | 1220 | Ground | Static |
| C-6 | 1 | 22 Sep | 1528 | Ground | Static |
| C-7 | 2 | 14 Oct | 1409 | Ground | Static |
| C-8 | 2 | 14 Nov | 1326 ^d | Ground | Static |
| Mk20 bomb: | | | | | A-4 aircraft: |
| D-1 | 2 | 5 Jun | 0619 | 200 | Level |
| D-2 | 2 | 12 Jun | 0646 | 400 | Level |
| D-3 | 2 | 13 Jun | 0651 | 650 | Level |
| D-4 | 2 | 30 Jun | 1312 | 50 | Level |
| D-5 | 1 | 1 Jul | 1439 | 75 | Level |
| D-6 | 2 | 9 Jul | 1226 | 65 | Level |
| D-7 | 2 | 10 Jul | 1413 | 60 | Level |
| D-8 | 2 | 24 Sep | 1711 | 350 | 10° dive |
| D-9 | 2 | 31 Oct | 1238 ^d | 500 | 10° dive |
| D-10 | 2 | 4 Nov | 1058 ^d | 625 | 10° dive |
| BLU-52A/B: | | | | | A-4 aircraft: |
| E-1 | 1 | 30 Sep | 0852 | 600 | 13° dive |
| E-2 | 1 | 30 Sep | 1605 | 615 | 10° dive |
| E-3 | 1 | 6 Oct | 1434 | 700 | 10° dive |
| E-4 | 1 | 8 Oct | 0938 | 650 | 11° dive |
| E-5 | 1 | 19 Nov | 1412 ^d | 500 | 10° dive |

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