Description of document:	Defense Intelligence Agency report, Chemical and Biological Warfare Capabilities - Asian Communist Countries, Supplement One, October 1978
Requested date:	23-October-2008
Released date:	10-June-2013
Posted date:	13-August-2013
Source of document:	Commander US Army Intelligence & Security Command Freedom of Information/Privacy Office ATTN: IAMG-C-FOI 4552 Pike Road Fort George G. Meade, MD 20755-5995 Fax: (301) 677-2956 Email: FOIA/Privacy Office Online FOIA Request Form
Note:	This report is one of 16 reports released under Mandatory Declassification Review by the US Army Intelligence & Security Command. All of these reports may be accessed here: http://www/governmentattic.org/inscomBWCW.html

DEPARTMENT OF THE ARMY
UNITED STATES ARMY INTELLIGENCE AND SECURITY COMMAND
FREEDOM OF INFORMATION/PRIVACY OFFICE
FORT GEORGE G. MEADE, MARYLAND 20755-5995

REPLY TO
ATTENTION OF:

Freedom of Information/
Privacy Office

10 JUN 2013

This is in further response to your Freedom of Information Act (FOIA) request of October 23, 2008, and supplements our electronic message of May 12, 2010.

Coordination has been completed with another element of our command and other government agencies and records returned to this office for our review and direct response to you. We have reviewed the records and determined the records are partially releaseable to you. A copy of the records are enclosed for your use.

We have completed a mandatory declassification review in accordance with Executive Order (EO) 13526. As a result of our review information has been sanitized and 4 pages have been withheld in their entirety as the information is currently and properly classified TOP SECRET, SECRET and CONFIDENTIAL according to Sections 1.2(a)(1), 1.2(a)(2), 1.2(a)(3) and 1.4(c) of EO 13526. This information is exempt from the public disclosure provisions of the FOIA pursuant to Title 5 U.S. Code 552 (b)(1). It is not possible to reasonably segregate meaningful portions of the withheld pages for release. The records are enclosed for your use. A brief explanation of the applicable sections follows:

Section 1.2(a)(1) of EO 13526, provides that information shall be classified TOP SECRET if its unauthorized disclosure reasonably could be expected to cause exceptionally grave damage to the national security.

Section 1.2(a)(2) of EO 13526, provides that information shall be classified SECRET if its unauthorized disclosure reasonably could be expected to cause serious damage to the national security.

Section 1.2(a)(3) of EO 13526, provides that information shall be classified CONFIDENTIAL if its unauthorized disclosure reasonably could be expected to cause serious damage to the national security.

Section 1.4(c) of EO 13526, provides that information pertaining to intelligence activities, intelligence sources or methods, and cryptologic information shall be considered for classification protection.

In addition, information has been sanitized from the records and 4 pages have been withheld in their entirety as the release of the information would reveal sensitive intelligence methods. This information is exempt from public disclosure pursuant to Title 5 U.S. Code 552 (b)(7)(E) of the FOIA. The significant and legitimate governmental purpose to be served by withholding is that a viable and effective intelligence investigative capability is dependent upon protection of sensitive investigative methodologies. It is not possible to reasonably segregate meaningful portions of the withheld pages for release.

The withholding of the information described above is a partial denial of your request. This denial is made on behalf of Major General Stephen G. Fogarty, the Commanding General, U.S. Army Intelligence and Security Command, who is the Initial Denial Authority for Army intelligence investigative and security records under the FOIA. You have the right to appeal this decision to the Secretary of the Army. Your appeal must be postmarked no later than 60 calendar days from the date of this letter. After the 60-day period, the case may be considered closed; however, such closure does not preclude you from filing litigation in the courts. You should state the basis of your disagreement with the response and provide justification for a reconsideration of the denial. An appeal may not serve as a request for additional or new information. An appeal may only address information denied in this response. Your appeal is to be made to this office, for forwarding, as appropriate to the Secretary of the Army, Office of the General Counsel.

Coordination has been completed and we have been informed by the Central Intelligence Agency (CIA) that information is exempt from public disclosure pursuant to Title 5 U.S. Code 552 (b)(1) and (b)(3) of the FOIA.

The withholding of the information by the CIA constitutes a denial of your request and you have the right to appeal this decision to the Agency Release Panel within 45 days from the date of this letter. If you decide to file an appeal, it should be forwarded to this office and we will coordinate with the CIA on your behalf. Please cite CIA #F-2010-01292/Army #57F-09 assigned to your request so that it may be easily identified.

Coordination has been completed and we have been informed by the Defense Intelligence Agency (DIA) that their information is exempt from public disclosure pursuant to Title 5 U.S. Code § 552 (b)(1), (b)(2) (b)(3) and (b)(4) of the Freedom of Information Act and Executive Order (EO) 13,526 § 1.4 (c) (d) and (h). The statute invoked under Title 5 U.S. Code 552 (b)(3) is 10 U.S.C. §424, which allows for the protection of organizational and personnel information for DIA.

The withholding of the information by the DIA constitutes a partial denial of your request and you have the right to appeal this decision directly to the DIA. If you decide to file an appeal, it should be forwarded to the Director, Defense Intelligence Agency, ATTN: DAN-1A-FOIA, Washington, DC 20340-5100. Please cite MDR #0155-2010 assigned to your request so that it may be easily identified.

You have received all Army intelligence investigative records pertaining to this request.

There are no assessable FOIA fees.

If you have any questions regarding this action, feel free to contact this office at 1-866-548-5651, or email the INSCOM FOIA office at: INSCOM_FOIA_ServiceCenter@mi.army.mil and refer to case #57F-09.

Sincerely,

Brad S. Dorris
Director
Freedom of Information/Privacy Office
Investigative Records Repository

Enclosure

SECRET [redacted] DST-1600S-148-76-SUP 1

DEFENSE
INTELLIGENCE
AGENCY

CATALOGED

CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES—ASIAN COMMUNIST COUNTRIES (U)

SUPPLEMENT 1

DIST
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DST76C015626 (C03)

FICHED

AUGUST 1976

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SECRET

October 1978 DST-1600S-148A-76-SUP 1

Publication No.
DST-1600S-148-76-SUP 1
Amendment A

US ARMY MATERIEL
DEVELOPMENT AND READINESS COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER
Charlottesville, VA 22901

CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES— ASIAN COMMUNIST COUNTRIES (U)

Publication No. DST-1600S-148-76-SUP 1, published August 1976, is amended as follows: The pages listed below are to be removed and destroyed in accordance with existing security regulations, and new pages are substituted therefor, or are added.

Remove pages:	Insert new pages:
Front and back covers ✓	Front and back covers ✓
Title page ✓	Title page ✓
iii thru v (Reverse Blank) ✓	iii thru vi ✓
ix thru xviii ✓ pg xiv (S) pg xvii + xviii (S)	ix thru xviii ✓
1 and 2 ✓ pg 2 (C)	1 thru 2.2 ✓
5 and 6 ✓ (S)	5 and 6 ✓
11 and 12 ✓ pg 12 (S)	11 thru 12.2 ✓
17 and 18 ✓ pg 18 (S)	17 thru 18.2 ✓
37 and 38 ✓ pg 37 (S)	37 and 38 ✓
47 thru 50 ✓ (C)	47 thru 50.2 ✓
55 and 56 ✓ (C)	55 thru 56.2 ✓
59 thru 70 ✓ 59-61 (S) 66 (S)	58.1 thru 70.2 ✓
97 thru 108 ✓ pg 100 (S) pg 105 (S) No pgs 103 + 104 in book to remove	97 thru 108 ✓
111 thru 114 ✓ 113 (S)	111 thru 114 ✓
117 thru 122 ✓ 121 + 122 (S)	117 thru 122 ✓
125 thru 130 ✓ pg 129 and 130 (S)	125 thru 130 ✓
133 thru 136 ✓	133 thru 136.8 ✓
	142.1 thru 142.8 ✓
243 and 244 ✓	243 thru 245 (Reverse Blank) ✓

Amendment A, STS8 6028C 3 of 31 cys incorporated into basic document, STS 4106 cy 5 of 30 cys.

~~Cy 30~~ 31
~~STS8-6028~~

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Unauthorized disclosure subject to criminal sanctions

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SECRET

(This page is UNCLASSIFIED)

ERRATA

Publication No.
DST-1600S-148-76-SUP 1

US ARMY MATERIEL
DEVELOPMENT AND READINESS COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER
Charlottesville, VA 22901

CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES--
ASIAN COMMUNIST COUNTRIES (U)

1. Recipients of subject study are to remove or excise caveats as indicated in paragraph 2.

2. Specific corrections are as follows:

a. Front cover, bottom of page--"NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS" and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

b. Page i, (Title Page), bottom of page--"NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS" and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

c. Page 1, bottom of page--"NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS" and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

d. Page 47, para 24--"ORCON-NO CONTRACT", "NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS", and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

e. Pages 49, 50, 51, 52, 53, 54, paras 24b, 24b(5), 24e, 24e(1), 24e(2), 24e(4) and bottom of applicable pages: "ORCON-NO CONTRACT", "NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS" and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

f. Pages 123, 124, paras 21, 21a, and the bottom of each page--"ORCON-NO CONTRACT", "NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS", and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

g. Back cover--"NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS" and "DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR."

Date of Errata: September 1976

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PREFACE

(U) This comprehensive study assesses the capabilities of the Asian Communist countries to conduct chemical and biological warfare, both offensively and defensively. DST-1600E-148-82, Chemical and Biological Warfare Capabilities--Asian Communist Countries: Summary Report (U), August 1982 (SECRET-NOFORN-WNINTEL), provides a concise, inclusive summary of the capabilities of these countries.

★ (U) The first five sections of the study are arranged by country. The sixth section contains technological threat projections. A minimum of information is included on smoke, flame, and incendiaries. Additional information can be found in separate studies DST-1620S-146-82, Flame and Incendiary Materials and Devices--Foreign (U), dated February 1982 (~~SECRET-NOFORN-WNINTEL~~) and DST-1620S-145-81, Smoke and Other Chemical Obscurants--Foreign (U), dated August 1981 (~~SECRET-NOFORN-WNINTEL-ORCON~~). Appendixes to the study include the following: a list of investigators in the field of chemical and biological warfare or related research, the facilities with which they are associated, and their special research interests; a list of the Chinese facilities reported as having CBW functions; and a numerical listing of pertinent Foreign Materiel Catalog items, with detailed information on, as well as technical characteristics of, chemical and biological materiel reportedly produced in the Asian Communist countries. Change 3 includes, as appendix III, a copy of State Department Special Report No. 98, Chemical Warfare in Southeast Asia and Afghanistan, March 1982, which presents evidence on chemical and biological warfare activities. The sections on China, North Korea, and the Mongolian Peoples Republic have not been changed. Although some details have become dated, most of the information remains valid.

(b)(1)

(U) This document will be used to satisfy the needs of US policy planners, Department of Defense staff, military departments, commanders in the field, intelligence collectors and analysts, and research and development personnel. It will also be used to satisfy Department of Defense quick-reaction requirements, both formal and informal.

(U) This study is being disseminated devoid of bibliographic material to facilitate wider distribution. A compiled bibliography has been prepared separately and can be made available to authorized recipients upon request to the Commander, US Army Foreign Science and Technology Center, 220 Seventh St., NE., Charlottesville, VA 22901 (ATTN: DRXST-PO). Individuals making such requests are cautioned that the addition of the bibliography to (or its association with) the study makes mandatory a more restricted distribution of the study. When the bibliography is attached, the study must carry the additional caveats DISSEMINATION AND EXTRACTION OF INFORMATION CONTROLLED BY ORIGINATOR and NOT RELEASABLE TO CONTRACTORS OR CONTRACTOR/CONSULTANTS.

(U) Most illustrations appearing in this document are identified by a six-digit negative number printed in the lower left corner of the figure. Users can request prints of these illustrations by citing the negative numbers and the short title of this study in a request addressed to the Commander, US Army Foreign Science and Technology Center, 220 Seventh Street, NE., Charlottesville, VA 22901 (ATTN: DRXST-PO).

(U) A star in the left margin indicates that the adjacent paragraph contains significant new or revised information since the last edition of this study. A star preceding a table or figure caption indicates either that the table or figure is new or that it has been changed in some respect.

(U) Constructive criticisms, comments, or suggested changes are encouraged, and should be forwarded to the Commander, US Army Foreign Science and Technology Center, 220 Seventh Street, NE., Charlottesville, VA 22901 (ATTN: DRXST-PO).

Voided change 27 Nov 76 H.M.B.

ERRATA

DST-1600S-148-76 SUP 1
August 1976

US ARMY MATERIEL
DEVELOPMENT AND READINESS COMMAND
FOREIGN SCIENCE AND TECHNOLOGY CENTER
Charlottesville, VA 22901

CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES—
ASIAN COMMUNIST COUNTRIES (U)

Page 43: Formula For G-type nerve agent—change Cl to F.

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CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES— ASIAN COMMUNIST COUNTRIES (U)

AUTHORS
(b)(6) [redacted]

DST-1600S-148-76-SUP 1-CHG 3

(b)(3):10 U.S.C. 42 [redacted]

DATE OF PUBLICATION
27 August 1982

Information Cutoff Date
July 1982

This study supersedes ST-CS-03-148-75 and ST-CS-03-170A-74, as amended.

This is a Department of Defense Intelligence Document prepared by the Foreign Science and Technology Center, US Army Materiel Development and Readiness Command, under the DOD S&T intelligence program, with contributions from the Defense Intelligence Agency, the US Army Medical Intelligence and Information Agency, the Naval Intelligence Support Center, and the Foreign Technology Division of the US Air Force Systems Command, and approved by the Assistant Chief of Staff for Intelligence, US Army.

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LIST OF EFFECTIVE PAGES

RECORD OF CHANGES

CHANGE NUMBER	DATE OF CHANGE	DATE ENTERED	SIGNATURE, RANK/RATE AND ORGANIZATION OF INDIVIDUAL ENTERING CHANGE
ERRATA	Sept. 1976	12 Nov 76	(b)(6)
Amendment#	Oct 78	25 Sep 78	
2	14 Jul 80	9 Aug 80	
3	27 Aug 82	7 Oct 82	

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

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LIST OF TABLES

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SUMMARY

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SECTION I

CHINA (U)

A. INTRODUCTION AND BACKGROUND (U)

1. Introduction (U)

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2. Background (U)

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2.1. General Health Conditions (U)

a. (U) Basic medical problems in China include a generally inadequate level of professional medical training and a lack of facilities and material. Fully trained physicians and specialists are in critically short supply. Hospitals frequently lack modern medical equipment. The diet of most Chinese is currently only minimally adequate, and malnutrition could occur in the event of a major drought or natural disaster, or as a result of a disruption of the food distribution system. Disease problems include a high incidence of cancer (particularly nasopharyngeal, gastrointestinal, esophageal, and liver cancers) and an increase in tuberculosis and cardiovascular disease. The prevalence of most parasitic diseases (such as schistosomiasis, filariasis, and hookworm) has been substantially reduced.

b. (U) Despite these shortcomings the health services have continued efforts to institute effective disease-control measures, contain epidemics, enforce public health regulations, supervise medical educational standards adequately, and carry out countrywide health education programs. There is a fair to good capability to activate and operate emergency medical services in response to disasters. The life expectancy at birth in 1975 was 62 years. The death rate dropped from 24 deaths per 1000 population in 1962 to under 12 per 1000 in 1971.

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B. POLICY AND DOCTRINE (U)

★3. Policy (U)

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Table 0. (U) Higher-Level Chinese Military Organizations[197] [198]

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Table I. (U) Functions of PLA Chemical Units (Continued)

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Neg. 560610 (~~SECRET~~)

Figure 1. (U) CW Organization in China

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(S) 6. **Assignment of Chemical Units and Troops (U)**

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(S) c. **Division (U).**

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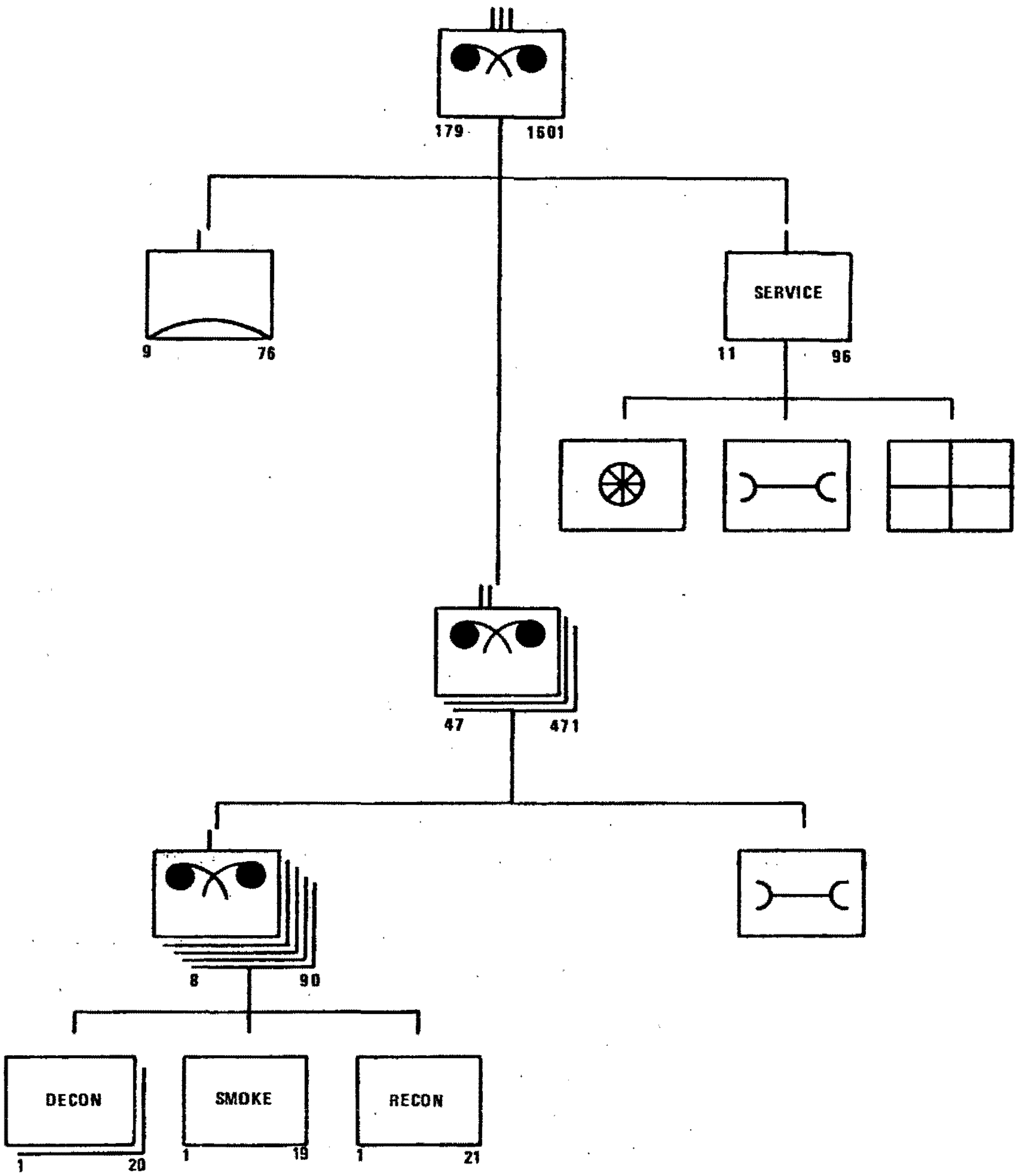

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★ Figure 2. (U) Probable Organization of an Independent Chemical Defense Regiment

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Figure 3. (U) Army-Level Chemical Battalion, China

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Neg. 560612 (~~SECRET~~)

Figure 6. (U) Organization of Chemical Platoon, China

(C) 7. <u>Strategy and Tactics (U)</u>

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(1) (U) The Chinese troops will use individual CW equipment, such as cape-groundsheets, and unit vehicles to cross contaminated areas in offensive operations. Contaminated personnel will not be evacuated until the mission has been accomplished.

(2) (U) Chemical personnel are assigned to assault units, probably to conduct CW reconnaissance, operate CW-agent detection and identification equipment, and mark routes through and around contaminated areas.

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(4) (U) The Chinese advocate the use of smoke to support combat operations.

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c. Defense (U).[20]

(1) (U) In defense against a chemical attack, the chemical staff officer at unit level recommends the location of the command post, prepares the unit chemical defense plan and submits it for approval, and insures that CW and other subordinate units are prepared to execute the plan. His recommendations include the establishment of weather observation and agent detection outposts operated by CW personnel, the location of decontamination stations, and the number of non-CW personnel to be posted by combat units to warn of a CW attack. The chemical staff officer probably advises the commander on other matters, including CW logistics and the control of the local population subjected to a CBW attack.

(2) (U) In defense against a CBW attack, chemical units perform the following functions to support the command: reconnaissance and technical intelligence gathering; meteorological forecasting; decontamination; detection and identification; technical supervision for CBW defense measures and training programs; and technical supervision of unit supply, maintenance, and salvage activities.

(3) (U) In order to perform his defensive mission after CW training, the individual soldier is required to know the characteristics and physical effects of agents; recognize a CBW attack and be able to give warning signals and spread an alarm; properly use and maintain his individual equipment; perform his mission while masked and wearing protective clothing; and accomplish his military mission regardless of contamination.

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8. Chemical, Biological, and Radiological Training (U)

(S) a. Chemical Troops (U).

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TABLE II. (U) Reported CBR Training Facilities in China

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Figure 7. (U) Decontamination Exercise, China

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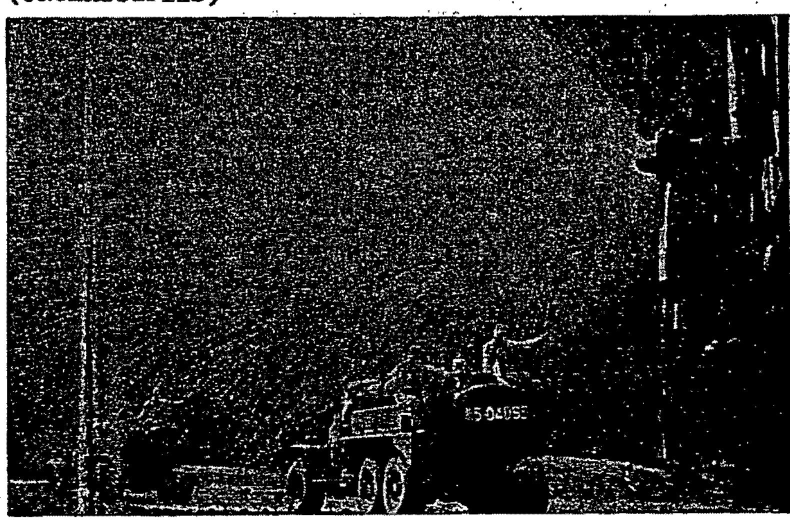

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Figure 8. (U) Road Decontamination Exercise, China

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Figure 9. (U) Troops Preparing to Ford Stream in Full Protective Clothing

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b. Other Troops (U).

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D. CHEMICAL AND BIOLOGICAL AGENTS AND MUNITIONS (U)

~~(S)~~ 10. General (U)

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(~~S~~) 11. Chemical Warfare Agents (U)

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(~~S~~) 12. Biological Warfare Agents (U)

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~~(S)~~ 13. Chemical Warfare Delivery Systems (Including Flame, Smoke, and Incendiaries (U)

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14 July 1980

Table III. (U) Characteristics of Probable Chemical Ground Munitions

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d. (U) The Chinese have studied the transovarian transmission of *Rickettsia tsutsugamushi* by two types of *Trombicella deliensis*, which provides basic information for establishing vector colonies and their subsequent infection for possible use in a vector-agent system.[43] A 1966 publication urged that extensive studies of insect culture be undertaken in order to remain abreast of foreign developments.[44]

e. (U) The Institute of Genetics, Chinese Academy of Sciences (CAS), studies special topics in microbiology and entomology, areas of research considered the "vanguard for future bacteriological warfare."[45] Allegedly, discoveries in the field of bacteriology made by this institute have had profound effects on the entire mainland, but these discoveries have not been disclosed.

E. DEFENSE AND PROTECTION

15. General (U)

[redacted] (b)(1)

16. Individual and Collective Protection (U)

★ a. ~~(C)~~ Protective Masks and Canisters (U). (b)(1) [redacted]

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Figure 9.1. (U) CBR Protective Mask With Left-Cheek-Mounted Canister

b. Protective Clothing (U).

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17. ~~(C)~~ Detection and Identification

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18. ~~(C)~~ Decontamination

a. First-Aid Kits.

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(b)(1)

(b) (~~C~~) Manpack Decontamination Equipment (U). (b)(1)

(b)(1)

c. Truck-Mounted Decontamination Equipment (U).

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d. (~~C~~) Biological Warfare Decontamination Equipment (U). (b)(1)

(b)(1)

19. Prophylaxis and Therapy (U)

a. Chemical Warfare (U).

(1) (U) Some locally made individual kits contain solutions to minimize the effects of WP.[5]

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★ Table III.1. (U) Nerve Agent Antidotes

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(5) (U) Chinese scientists claim that trypsin treatment is effective against a wide variety of elapid (cobra, mamba, krait, etc.)

snakebites.[58] Injection into mice of trypsin close to the "bite site" 10 to 15 minutes after a lethal dose of cobra venom effected a 100% survival rate. The powdered trypsin is cheaper and more stable than specific antisera and apparently as effective.

(b)(1)

(2) (U) Chinese military cadres are inoculated with a combined cholera and typhoid vaccine once a year.[2] Claims have been made that all people have received vaccinations for smallpox and that the disease has been eradicated. Vaccines or antisera for typhoid, paratyphoid, typhus, diphtheria, tetanus, rabies, plague, cholera, yellow fever, and Japanese B encephalitis (JBE) have been developed, but the scale of use is not known. The use of live vaccines has been exploited in China and such vaccines for brucellosis, plague, and anthrax are available. Vaccines for the more serious animal diseases, such as swine plague, hog cholera, rinderpest, and foot-and-mouth disease, have been developed. In 1964, a method of aerosol immunization was introduced into veterinary practice.[60] The vaccine material is sprayed or dusted into a room where animals are exposed and immunized.

(b)(1)

(5) (U) Quantities of vaccines, antibiotics, and antisera are believed to be sufficient for military needs, but not for all domestic requirements.[39]

(6) (U) Some locally made individual kits are provided with soap and antiseptics to prevent infections.[5]

F. PRODUCTION AND STOCKPILES (U)

20. Production (U)

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b. Toxic Chemical Warfare Agents (U).

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c. (S-~~NOF~~ORN) Smoke, Flame, and Incendiary Munitions (U). (b)(1)

(b)(1)

★ d. ~~(C)~~ Biological Warfare Agents (U). (b)(1)

(b)(1)

e. Defensive Materiel (U).

~~S~~ (1) Chemical and Biological Warfare Materiel (U).

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(2) (S-~~NOFORN~~) Biological Warfare Materiel (U). (b)(1)

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(b)(1)

21. ~~(S-NOFORN~~-WNINTEL) Stockpile/Storage Facilities

(b)(1)

b. ~~(S-NOFORN-WNINTEL)~~ Storage Facilities.

(b)(1)

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~~(SECRET NOFORN WNINTEL)~~

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SOURCES AND METHODS INVOLVED

G. RESEARCH AND DEVELOPMENT (U)

C 22. General (U)

(b)(1)

C

(b)(1)

C 23. Chemical Warfare Agents (U)

(b)(1)

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Figure 13. ((S-NOFO~~RN-WN~~INTEL) (b)(1)

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C

(b)(1)

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c

(b)(1)

c

Table IV. Potential BW Agents (U)

(b)(1)

(~~CONFIDENTIAL~~)

b. Research Related to Agent Development (U).

(b)(1)

(3) (U) The propagation and characterization of Rickettsia prowazekii (typhus fever),[106 107] Salmonella and Shigella species (typhoid fever and dysentery),[108 109] and JBE virus have been studied at the Institute of Biological Products, Chengtu. None of this work has been related to BW research, but the accumulated data could be used to support related R&D efforts.

(4) (U) Investigators at the Fukien Institute of Epidemiology, Foo-chou, have studied the vectors of Rickettsia tustusgamushi,[110] the detection of Leptospira,[111] and immunological methods for identifying Coxiella burnetti. The antibiotic resistance of a large number of strains of Shigella was studied by the China Medical College and the Inner Mongolia Medical College, Huhenot.[112] These studies might have some application to a BW program, although these diseases are prevalent public health problems.

(b)(1)

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c. ~~(C)~~ Bioengineering.

(b)(1)

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c

(b)(1)

e. Crop-Pest Control (U).

c

(b)(1)

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SOURCES AND METHODS~~ INVOLVED

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WARNING NOTICE: INTELLIGENCE
SOURCES AND METHODS INVOLVED

(b)(1)

b. Biological Warfare (U).

★ (1) (U) Little research can be related directly to the detection and identification of BW agents; however, it should be noted that methods used to detect and identify organisms causing diseases provide a basic knowledge applicable to the rapid detection of BW agents. Antiepidemic stations located in each ward could provide a unified disease reporting system in the event of hostilities.[296]

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(2) (U) The Wuhan Army General Hospital obtained rapid results in identifying 55 different species of bacteria by their biochemical reactions in 20 to 24 hours, as opposed to 4 to 5 days by conventional means.[146] Various authors have summarized methods for the rapid identification of B. anthracis.[148] Other studies suggestive of rapid identification methods have described experiments with incomplete antibodies for the diagnosis of brucellosis and compared various methods for identifying brucella.[149]

(b)(1)

26. Prophylaxis and Therapy (U)

a. Chemical Warfare (U).

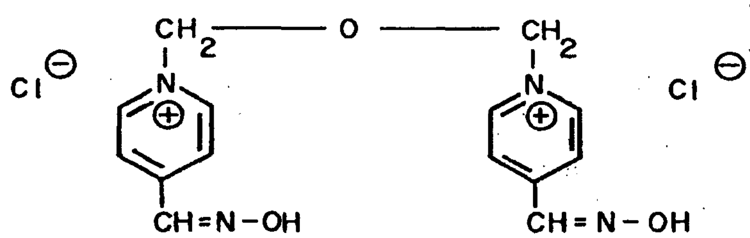
(b)(1)

(~~CONFIDENTIAL~~)

(b)(1)

The structural formula of toxogonin is:

(UNCLASSIFIED)



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(b)(1)

(b)(1)

(7) (U) Drug regimens being tested for the treatment of cyanide poisoning include intramuscular injection of 100 mg of hydrocobalamine or chlorocobalamine per kilograms of body weight, and slow intranevous injection of an EDTA-glucose solution.

b. ~~(C)~~ Biological Warfare (U). (b)(1)

(b)(1)

27. Chemical and Biological Test Sites (U)

~~(S)~~

(b)(1)

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~~(S)~~

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(b)(3):50 U.S.C. 403 per CIA

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~~WARNING NOTICE: INTELLIGENCE SOURCES AND METHODS INVOLVED~~

~~(SECRET-NOFORN-WNINTEL)~~

(b)(1)

Neg. 561094 ~~(SECRET-NOFORN-WNINTEL)~~

Figure 15.2. (U) Tower at Center of Grid Pattern

(SECRET-NOFORN-WNINTEL)

(b)(1)

(b)(1)

(SECRET-NOFORN-WNINTEL)

(b)(1)

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SOURCES AND METHODS INVOLVED

H. AEROSPACE CHEMICAL AND BIOLOGICAL WARFARE CAPABILITY (U)

28. Policy, Doctrine, Organization, and Training (U)

a. ~~(C)~~ Policy and Doctrine (U). (b)(1)

(b)(1)

b. ~~(S)~~ Organization (U). (b)(1)

(b)(1)

c. (~~C~~-RELUKCAASNZ) Training (U). (b)(1)

(b)(1)

29. Agents and Munitions (U)

(b)(1)

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SOURCES ~~AND METHODS~~ INVOLVED

~~S~~

(b)(1)

~~S~~

(b)(1)

~~S~~ 30. Defense or Protection (U)

(b)(1)

NOT RELEASABLE TO FOREIGN NATIONALS

~~WARNING NOTICE: INTELLIGENCE SOURCES AND METHODS INVOLVED~~

~~S~~31. Research and Development (U)

(b)(1)

I. NAVAL CHEMICAL AND BIOLOGICAL WARFARE CAPABILITY (U)

32. Chemical and Biological Warfare Organization and Function (U)

★ a. (C-~~NOFORN~~) Navy Chemical and Biological Warfare Organization (U).

(b)(1)

b. (C-~~NOFORN~~) Policy and Doctrine (U). (b)(1)

(b)(1)

NOT RELEASABLE TO FOREIGN NATIONALS

WARNING NOTICE: ~~INTELLIGENCE~~
~~SOURCES AND~~ METHODS INVOLVED

33. Weapon Systems Effective Against Naval and Marine Corps Targets (U)

★ a. (S-~~NOFORN-WNINTEL~~) Chemical Weapons (U). (b)(1)

(b)(1)

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(b)(1)

(b) (1) Per DIA

[redacted]

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Figure 17. CBW exercise aboard Chinese ship (U).

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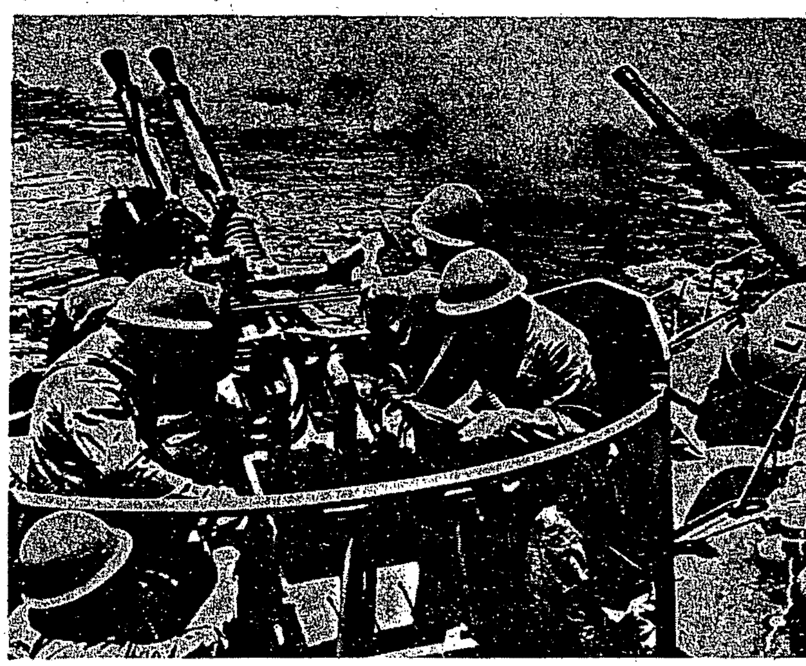

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Figure 18. (U) Drill Aboard a Destroyer Under CBW Conditions (From a Source Dated 1973)

34. Chemical and Biological Warfare Protective Systems and Equipment (U)

a. Shipboard Collective Protection Systems (U).

★ (1) (~~S-NOFORN~~) Citadels and filtered ventilation systems (U).

(b)(1)

(b)(1)

(3) <u>(U) CBW detection and alarms (U)</u>. Available information does not indicate the presence of any installed shipboard CBW detection systems or automatic alarms in the Chinese Navy.

SECTION II

VIETNAM (U)

A. INTRODUCTION AND BACKGROUND (U)

1. Introduction (U)

(b)(1)

(b)(1)

2.1 General Health Conditions (U)

(U) Vietnam's major health problems include outbreaks of several infectious diseases, 250 000 war-wounded needing medical services, an exceedingly large number of prostitutes and drug addicts, and an acute shortage of medical personnel (medical manpower is concentrated in the large cities), materiel, and facilities. The incidence of malaria (including chloroquine-resistant falciparium malaria), plague, leprosy, tuberculosis, venereal disease, intestinal helminthiasis, dengue, and dysentery (all forms) is abnormally high; skin infections are prevalent. Living conditions are poor, and sanitation facilities and food supplies are inadequate. The life expectancy at birth in 1974 was 44 years; the death rate was 15 deaths per 1000 population.

B. POLICY AND DOCTRINE (U)

3. Policy (U)

(b)(1)

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(b)(1)

4. Doctrine (U).

(b)(1)

C. MILITARY AND CIVIL ORGANIZATION, TACTICS, AND TRAINING (U)

5. Military Organization (U)

(b)(1)

(b)(1)

(~~CONFIDENTIAL~~)

(b)(1)

Neg. 553674 (~~CONFIDENTIAL~~)

★Figure 19. (U) CBW Organization, PAVN

(b)(1)

(b)(1)

6. <u>Assignments and/or Attachment of Army Units and Troops (U)</u>

(b)(1)

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Table V. (U) NVA Chemical Units

~~(CONFIDENTIAL-NOFORN)~~

(b)(1)

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Table V. (U) NVA Chemical Units (Continued)

~~(CONFIDENTIAL-NOFORN)~~

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~~(CONFIDENTIAL-NOFORN)~~

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(b)(1)

7. <u>Reserved for Future Use</u>

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(C)

Table VI. Use of Flamethrowers by NVA/VC (U)

(b)(1)

(CONFIDENTIAL-NOFORN)

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(b)(1)

Table VII. Use of CS and CW Agents by NVA/VC (U)

(b)(1)

(CONFIDENTIAL-NOFORN)

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8. (C-~~NOFORN~~) **Training Programs within the Armed Forces**

a. (~~C~~) **Chemical Troops.**

(b)(1)

b. (C-~~NOFORN~~) **Other Troops.**

(b)(1)

★Table VIII. (U) Vietnamese Army CBW Training Activities

~~(CONFIDENTIAL-NOFORN)~~

(b)(1)

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Table VIII. (U) Vietnamese Army CBW Training Activities (Continued)

(~~CONFIDENTIAL NOFORN~~)

(b)(1)

(CONFIDENTIAL NOFORN)

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★ (2) (U) During the 1981 training year, cadres of platoon and higher level chemical units received refresher training in chemical operations. The Chemical Bureau provided sufficient documents and training aids to all chemical units in the NVA to accomplish this training.[79]

9. Reserved for Future Use

D. AGENTS AND MUNITIONS (U)

C 10. General (U)

(b)(1)

C 11. Chemical and Biological Agents (U)

(b)(1)

(b)(1)

12. Chemical Delivery Systems (U)

★ a. ~~(C)~~ General Munitions (U). (b)(1)

(b)(1)

★ b. ~~(C)~~ Aerial Munitions (U). (b)(1)

(b)(1)

★ c. (S-~~NOFORN~~) Military Agreement (U). (b)(1)

(b)(1)

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e 13. Biological Delivery Systems (U)

(b)(1)

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24. (S-NO~~FORN-WNINTEL~~) Biological Warfare Agents

~~S~~ a. (S-NO~~FORN-WNINTEL~~) General.

(b)(1)

[redacted]

(b)(1)

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E. DEFENSE/PROTECTION

14. ~~(C)~~ General

(b)(1)

15. (U) Individual and Collective Protection

a. **Protective Masks.** Protective masks, which are currently the most important category of defensive equipment, increased both in number and variety during the recent conflict; however, these masks were believed to be available for only a small portion of the NVA/VC.[6] Effective protective masks appeared to be in short supply. A captured ShM facepiece, which is of a strapless type that covers the head and face, imposes a heatload that cannot be tolerated for long periods in a hot climate. The facepiece is connected by a rubber hose to a Soviet Model MO-2 or MO-4U (the latest) canister; both models are excellent. Token quantities of the Soviet communication mask, which uses the same kind of hose and canister but which is equipped with headstraps and a speech diaphragm, were captured. These Soviet mask assemblies provide excellent protection against all standard Western toxic CBW agents. A captured specimen of a mask not seen previously was tentatively identified as a Chinese product (see app II). The mask assembly consists of a molded rubber facepiece equipped with an elastic headharness, two lenses, and a filter element permanently installed in a pocket on the left cheek. The mask's effectiveness has not been determined; it may have been designed to protect against riot-control agents rather than lethal agents. The mask appeared to have been mass-produced. Protective masks made of nylon and filters consisting of sugar-cane charcoal mixed with soap and wrapped in silk, were locally produced; the filters were moistened before use. Improvised masks provided virtually no protection against CW agents.

b. **Protective Clothing.** The lightweight, two-piece protective suit, Model L-1, and one-piece suits that have a hood and boots molded on, would provide excellent overall body protection against percutaneously effective toxic agents.[6] Stocks of these suits were probably limited, however, even for distribution to chemical personnel. The suits, of rubberized material, cannot be worn for long periods in a hot climate because they quickly reduce the wearer's combat effectiveness. Soviet protective clothing supplied to the NVA include a chemically treated 92x140-cm sheet for covering the body and a bag for covering the head. These outfits are made of nylon and are used to protect the individual from poisonous CBW agents in the air or in contaminated areas. The outfit is always worn with a protective mask. Another Soviet-produced item was a three-piece rubber suit: hooded coat, combined pants and shoes, and gloves. It, too, is to be worn with the protective mask.

c. **Collective Protection.** Systems that provide protection for groups of people against CBW agents were not reported in Vietnam.[6] Captured tank crewmen stated that Soviet tanks, Models T-34 and PT-76, and the Chinese Model PT-63 did not have a CBW collective protection system, but that the crews were provided with CBW protective masks and protective clothing.

16. ~~(C)~~ **Chemical Warfare Detection Devices**

(b)(1) [redacted]

(b)(1)

[redacted]

17. ~~(C-NOFORN)~~ Decontamination Equipment

(b)(1)

[redacted]

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Table IX. CW Agent Detector Tubes Captured From NVA/VC Forces (U)

(b)(1)

(CONFIDENTIAL)

18. (C) Prophylaxis and Therapy

a. (C) Chemical Warfare.

(b)(1)

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(2) (U) Therapeutic procedures for victims of nerve gas poisoning included evacuation, decontamination of exposed areas by washing, and mouth-to-mouth resuscitation followed by injection with a cardiac or respiratory stimulant such as caffeine, lobeline, coramine, or atropine.[18 33] Treatment described for victims of phosphorus burns included application of wet dressing over the burned area, covering with phenacetin-impregnated gauze, and injection of 1 000 000 units of penicillin.

(b)(1)

b. ~~(C)~~ **Biological Warfare.**

(b)(1)

19. (U) Other Defensive Materiel

a. The following Soviet items reported in NVN lack sufficient descriptions for identification by model numbers:[6]

- A "chemical laboratory truck" equipped for use in testing for chemical and biological contaminants.
- "Antiatomic radiation suit No. 1," described as a protective cape made of thick cellophane. It may be comparable to commonly used, disposable capes carried in protective mask carriers.
- A "laundry truck," described as a 10-wheeled truck equipped with a crane hoist and a steel tank 1 meter in diameter and 1.3 meters high (possibly the Soviet decontamination boiling installation BU-2). In use, the tank is lowered to the ground, filled with water and heated; the contaminated clothing is washed in it.
- "Anemometers" equipped with air-speed and air-direction indicators, a compass, and a thermometer are provided among CBR reconnaissance equipment.

b. American pilots flying combat missions over NVN encountered dense white smoke that was intended to defeat the accuracy of bombing attacks.[14] The pilots described the smoke as ineffective; its chemical composition is unknown.

c. Considerable emphasis is placed on locally produced, improvised self-treatment kits, as well as on training and literature that provide fundamental instruction in the use of this equipment.[6] Certain components of the self-treatment kits (such as soap solutions, soap powder, ether, potassium permanganate, chlorinated lime, sodium bicarbonate, and copper sulfate) are known to be useful against chemical and biological contaminants; other components are too primitive to be evaluated. Readily available substances, such as lime and urine, are among those recommended by the NVA/VC for decontamination. Cloth and plastic sheeting are used in several types of improvised protective masks. A version of a mask captured in 1971, Model KT-69, is the first improvised mask identified by a model designation. In field tests the KT-69 gave adequate protection for 5 minutes in heavy concentrations of CS. In troop training, the improvised masks were advocated for use against herbicides, defoliants, and riot-control agents (all considered lethal according to some NVA/VC training literature). The majority of the improvised masks provide virtually no protection against CW agents, are difficult to breathe through, and seriously restrict vision; however, they tend to enhance the soldier's sense of security.

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CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES--
ASIAN COMMUNIST COUNTRIES (U)

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Title page	Title page
iii thru vi	iii thru vi
xi thru xx	xi thru xx
69 thru 76	69 thru 76
79 thru 86.4	79 thru 85 (Reverse Blank)
93 thru 98	93 thru 96.2
135 thru 136.84	135 thru 136.8
241 thru 246	241 thru 248 (and inclosure)

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CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES--ASIAN COMMUNIST COUNTRIES (U)

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ix thru xx	ix thru xx
1 thru 22	1 thru 22.2
25 and 26	25 thru 26.2
29 thru 38	29 thru 38
41 thru 46	41 thru 46
49 and 50	49 and 50
51 thru 64	51 thru 64.4
67 thru 70.2	67 thru 70
83 thru 86	83 thru 86.4
101 thru 108	101 thru 108.2
111 and 112	111 and 112
113 and 114	113 and 114
117 thru 124	117 thru 124
129 and 130	129 thru 130.1
135 thru 142.2	135 thru 142.2
142.5 thru 142.8	142.5 thru 142.8
243 thru 245 (Reverse Blank)	243 thru 246

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F. PRODUCTION AND STOCKPILES (U)

20. Production (U)

a. ~~(C)~~ General (U). (b)(1)

(b)(1)

★ b. ~~(C)~~ Offensive (U). (b)(1)

(b)(1)

★ c. ~~(C)~~ Defensive (U). (b)(1)

(b)(1)

21. Stockpile/Storage Facilities (U)

(b)(1)

G. RESEARCH AND DEVELOPMENT (U)

22. Offensive Research and Development (U)

(b)(1)

23. Defensive Research and Development (U)

a. ~~(C)~~ Chemical Warfare (U). (b)(1)

(b)(1)

b. Biological Warfare (U).

(b)(1)

(b)(1)

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[redacted] (b)(1)

H. AEROSPACE AND NAVAL CHEMICAL AND BIOLOGICAL WARFARE CAPABILITIES (U)

24. <u>Aerospace Chemical and Biological Warfare Capability (U)</u>

[redacted] (b)(1)

25. <u>Naval Chemical and Biological Warfare Operational Capability (U)</u>

a. <u>(U) CBW Organization and Function (U)</u>. No information is available on the CBR organization of the Vietnamese Navy. Because of the heavy Soviet influence in what was formerly North Vietnam, however, any CBW organization aboard naval units from that section of the country is probably similar to the Soviet model.

b. <u>~~(S)~~ Weapon Systems Effective Against Naval and Marine Corps Targets (U).</u> [redacted] (b)(1)

[redacted] (b)(1)

c. (~~C-NOFORN~~) CBR Protective Systems and Equipment (U). (b)(1)

(b)(1)

d. (U) Naval CBW Training (U). No information on CBW training in the Vietnamese Navy is available.

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Section III.

NORTH KOREA

A. INTRODUCTION AND BACKGROUND

1. ~~(C)~~ Introduction

(b)(1)

2. ~~(C)~~ Background

(b)(1)

2.1. ~~(C)~~ General Health Conditions

(U)
~~a.~~ (U) The standard of living in North Korea is low, but compares favorably with that in other Far Eastern countries, except Japan. Conditions are better for the urban dweller than for the rural inhabitant. In the better sections of the urban areas housing is of stucco and tile construction, while in the poorer sections of the cities housing is of cardboard and straw matting construction. In the rural areas, houses are generally of mud wall and thatched roof construction; they provide minimum shelter, are poorly ventilated, and provide access to insect and rodent carriers of disease, thus facilitating the spread of communicable diseases. Dietary deficiencies, problems of disease control, and poor personal hygiene are other major factors in the spread of infectious diseases. Despite vector control programs fleas, flies, lice, and mosquitoes breed in drainage ditches and canals, garbage ditches, night soil deposits, and rice paddies.

b. (U) The most prevalent diseases include pulmonary tuberculosis and other respiratory diseases, the dysenteries (all forms) and other enteric infections, Japanese-B encephalitis, malaria, various helminthiases, cholera, childhood diseases, and nutritional disorders. Principal environmental health problems include polluted water sources, improper disposal of human waste and garbage, and overcrowded living conditions. These problems contribute to the spread of infectious diseases and make their control difficult.

c. (U) For the past 6 years the birth rate has increased slightly and the overall death rate has decreased slightly; average life expectancy for males is 52 and for females 55.

(b)(1)

(b)(1)

B. POLICY AND DOCTRINE

3. (~~C~~) Policy

(b)(1)

4. (~~S~~) Doctrine

(b)(1)

C. MILITARY/CIVIL ORGANIZATION, TACTICS, AND TRAINING

5. (S-~~NOFORN~~) Military Organization

(b)(1)

S

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~~S~~

(b)(1)

B. POLICY AND DOCTRINE (U)

3. S **Policy (U)**

(b)(1)

4. ~~S~~ **Doctrine (U)**

(b)(1)

(b)(1)

C. MILITARY AND CIVIL ORGANIZATION, TACTICS, AND TRAINING (U)

5. ~~S~~ **Military Organization (U)**

(b)(1)

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(b)(1)

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Figure 22. (U) CBR Organization of NKA Chemical Battalion

★ Table XII. ~~(S)~~ (b)(1)

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★ b. (S-NOFORN) (b)(1)

(b)(1)

6. <u>Assignment and/or Attachment of Chemical Units and Troops (U)</u>

a. (S-NOFORN) <u>Corps (U)</u>. (b)(1)

(b)(1)

★ b. ~~(S)~~ <u>Division (U)</u>. Each division has an organic chemical company

(b)(1)

★ c. ~~(C)~~ <u>Regiment (U)</u>. (b)(1)

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Figure 23. (U) Organization of NKA Chemical Battalion

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(b)(1)

Neg. 555967 (~~CONFIDENTIAL~~)

Figure 24. (U) Organization of NKA Chemical Company

(~~CONFIDENTIAL~~)

(b)(1)

Neg. 553673 (~~CONFIDENTIAL~~)

Figure 25. (U) Organization of NKA Chemical Platoon

7. Strategy and Tactics (U)

a. ~~(S)~~ Offensive (U). (b)(1)

(b)(1)

b. ~~(C)~~ Defensive (U). (b)(1)

(b)(1)

(b)(1)

8. <u>Training Programs Within the Armed Forces (U)</u>

a. ~~(C)~~ <u>Chemical Troops (U)</u>.

(b)(1)

Table XIII. (U) CBW-Related Training in the NKA

(CONFIDENTIAL)

(b)(1)

(CONFIDENTIAL)

(b)(1)

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(b)(1)

b. Other Troops (U).

(b)(1)

(b)(1)

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Table XIV. CBW Standards of Proficiency for the NKA (U)[13]

(b)(1)

Table XIV. CBW Standards of Proficiency for the NKA (U)[13] (Continued)

(~~CONFIDENTIAL-NOFORN~~)

(b)(1)

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(6) (~~C-NOFORN~~) (b)(1)

(b)(1)

c. (~~C~~) Exercises (U). (b)(1)

(b)(1)

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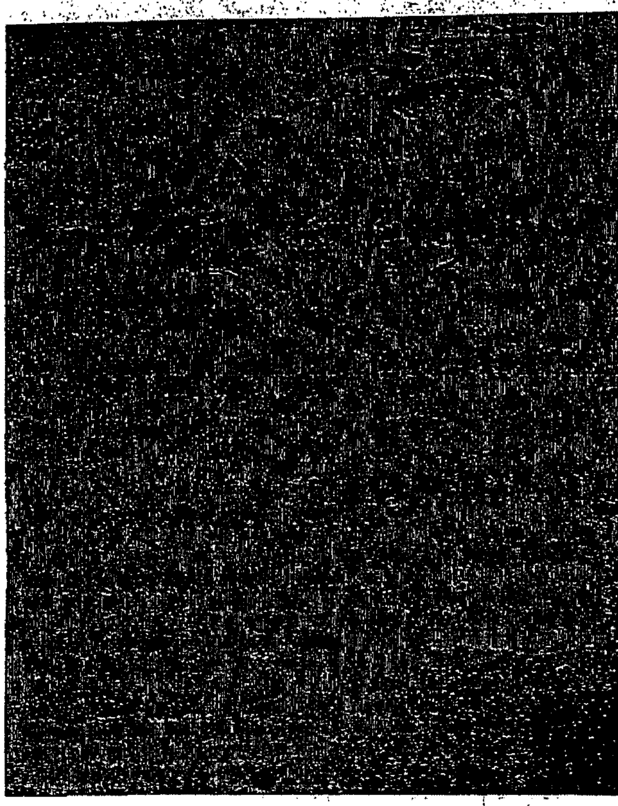

Neg. 520346 (UNCLASSIFIED)
Figure 26. (U) NKA Protective Mask Training

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(UNCLASSIFIED)

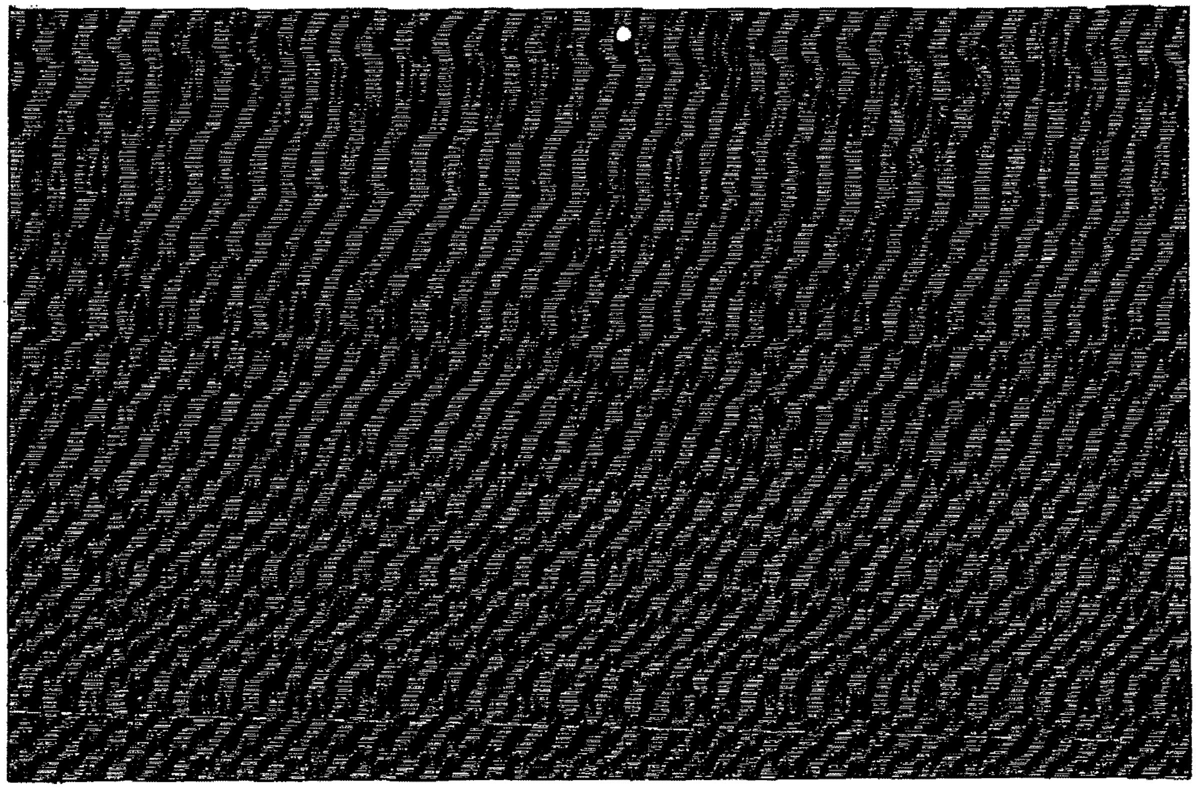

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Figure 27. (U) NKA Antiaircraft Training Under Simulated CBR Conditions

★ d. (C-NOFORN) Training Areas (U). (b)(1)

(b)(1)

9. <u>Civil Defense (U)</u>

a. (C) Organization (U). (b)(1)

(b)(1)

b. ~~(C)~~ Mission. (b)(1)

(b)(1)

c. ~~(C/NOFORN)~~ (b)(1)

(b)(1)

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d. ~~(C)~~ Shelters (U). (b)(1) [redacted]

(b)(1) [redacted]

D. AGENTS AND MUNITIONS (U)

10. Chemical and Biological Agents (U)

(b)(1) [redacted]

11. Chemical and Biological Delivery Systems (U)

★ a. ~~(C)~~ Possible Ground Weapons (U). (b)(1) [redacted]

(b)(1) [redacted]

★ b. ~~(S)~~ Possible Tactical Rocket Systems (U). (b)(1) [redacted]

(b)(1) [redacted]

c. ~~(C)~~ Flamethrowers and Flamethrower Fuel (U). (b)(1) [redacted]

(b)(1) [redacted]

(b)(1)

d. ~~(C)~~ Smoke Munitions (U). (b)(1)

(b)(1)

e. ~~(C)~~ Incendiaries (U). (b)(1)

(b)(1)

f. ~~(C)~~ Other Agent Munitions (U). (b)(1)

(b)(1)

E. DEFENSE OR PROTECTION (U)

12. General (U)

(b)(1)

(b)(1)

13. (C) Individual and Collective Protection

(b)(1)

(b)(1)

14. ~~(C)~~ Detection and Reconnaissance

(b)(1)

(b)(1)

15. Decontamination (U)

a. (U) Chemical Decontaminants (U). The chemical decontaminants used in North Korea against CBW agents are probably identical with those commonly used in Soviet decontamination devices.[3] [20] These decontaminants are identified in appendix II, along with the equipment in which they are used.

b. Decontamination Kits (U).

(b)(1)

c. (U) Manpack Decontamination Apparatus (U). The Soviet Model RDP-4V, a hand-operated backpack spraying apparatus, has a working capacity of 8.5 L and weighs 20 kg when full.[21] [22] This device is used to apply liquid decontaminants against vesicants and nerve agents. The North Koreans are manufacturing an apparatus to replace the Soviet model. Models RDP-3 and RDP-4 manpack spray devices are also available.

★ d. (C-~~NOFORN~~) Vehicle-Mounted Decontamination Equipment (U). (b)(1)

(b)(1)

C

(b)(1)

C 16. Prophylaxis and Therapy (U)

(b)(1)

F. PRODUCTION AND STOCKPILES (U)

17. Production (U)

★ a. ~~(C)~~ Offensive (U). (b)(1)

(b)(1)

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(b)(1)

(~~SECRET~~)

(b)(1)

Neg. 561425 (~~SECRET~~)
Figure 27.1. ~~(S)~~ (b)(1) (Area B)

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b. Defensive (U)

(1) (C-NOFORN) General (U). (b)(1)

(b)(1)

(2) (C) Items and equipment (U). (b)(1)

(b)(1)

18. Stockpile and Storage Facilities (U)

a. (S-NOFORN) Stockpiles (U). (b)(1)

(b)(1)

~~S~~

(b)(1)

★ b. ~~(S-NOFORN-WNINTEL)~~ (b)(1)

(b)(1)

G. RESEARCH AND DEVELOPMENT (U)

19. General (U)

a. ~~(C)~~ (b)(1)

(b)(1)

b. ~~(C-NOFORN)~~ (b)(1)

(b)(1)

20. <u>Chemical Warfare Research and Development (U)</u>

(b)(1)

b. (U) North Korean scientists are conducting research on OP insecticides.[38] Sin and Ryom were able to synthesize the precursor, $(MeO)_2P(S)SH$, in 75% to 80% yields for the preparation of the dithio insecticide Rogor. This research demonstrates a potential capability to synthesize CW nerve agents.

21. <u>Biological Warfare Research and Development (U)</u>

a. ~~(C)~~ (b)(1)

(b)(1)

b. (S-NOFORN) (b)(1)

(b)(1)

(b)(1)

c. ~~(S)~~ (b)(1)

(b)(1)

d. ~~(C)~~ (b)(1)

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(b)(1)

H. AEROSPACE CHEMICAL AND BIOLOGICAL WARFARE CAPABILITY

22. (~~C~~) Policy, Doctrine, Organization, and Training

(b)(1)

23. (~~C~~) Agents and Munitions

(b)(1)

24. (C-~~NOFORN~~) Defense/Protection

(b)(1)

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WARNING NOTICE
Sensitive Intelligence Sources and Methods Involved

I. NAVAL CHEMICAL AND BIOLOGICAL WARFARE CAPABILITY

25. ~~(C)~~ Policy, Doctrine, Organization, and Training

(b)(1)

26. (~~C-WN~~INTEL) Agents and Munitions

(b)(1)

27. ~~(S)~~ Defense/Protection

a. ~~(S)~~ (b)(1)

(b)(1)

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WARNING NOTICE
Sensitive Intelligence Sources
and Methods Involved

b. ~~(C)~~ (b)(1)

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SECTION IV

THE MONGOLIAN PEOPLES REPUBLIC (U)

1. Introduction and Background (U)

(U) The Soviet Union has provided technical assistance to the Mongolian Peoples Republic (MPR) in the development of health and sanitation programs and has helped to train medical personnel. Assistance has also been provided by the United Nations and the East European Communist Countries. The Ministry of Public Health (MPH), Ulan Bator, is modeled on that of the USSR. Although capable of planning and organizing effective health programs, the MPH has a number of deficiencies, including the lack of trained personnel, a shortage of funds, and considerable political intervention.[1] The Ministry of People's Affairs (Defense) has a medical department, but the armed forces appear to be heavily dependent upon the institutions and personnel of the MPH.[2] Mongolia lacks tl echnology as well as the R&D facilities to support an offensive CW pro or to produce significant quantities of defense-related material.

1.1. General Health Conditions (U)

(U) Mongolia has several public health problems: there is a great need for trained paramedical personnel; the domestic capability to produce high-quality drugs and medical equipment is extremely limited; acute respiratory infections are reportedly high; control of animal diseases is a problem; sanitary engineering is poor; and sewerage systems are almost nonexistent. In addition, Mongolia has an inadequate food distribution system. Technical and financial assistance is provided by the USSR. The life expectancy at birth in 1974 was 61 years. The death rate in 1974 was 10 deaths per 1000 population.

2. Policy and Doctrine (U)

(b)(1)

~~S~~

★3. [redacted] (b)(1) (C)

[redacted] (b) (1) Per NSA

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(UNCLASSIFIED)

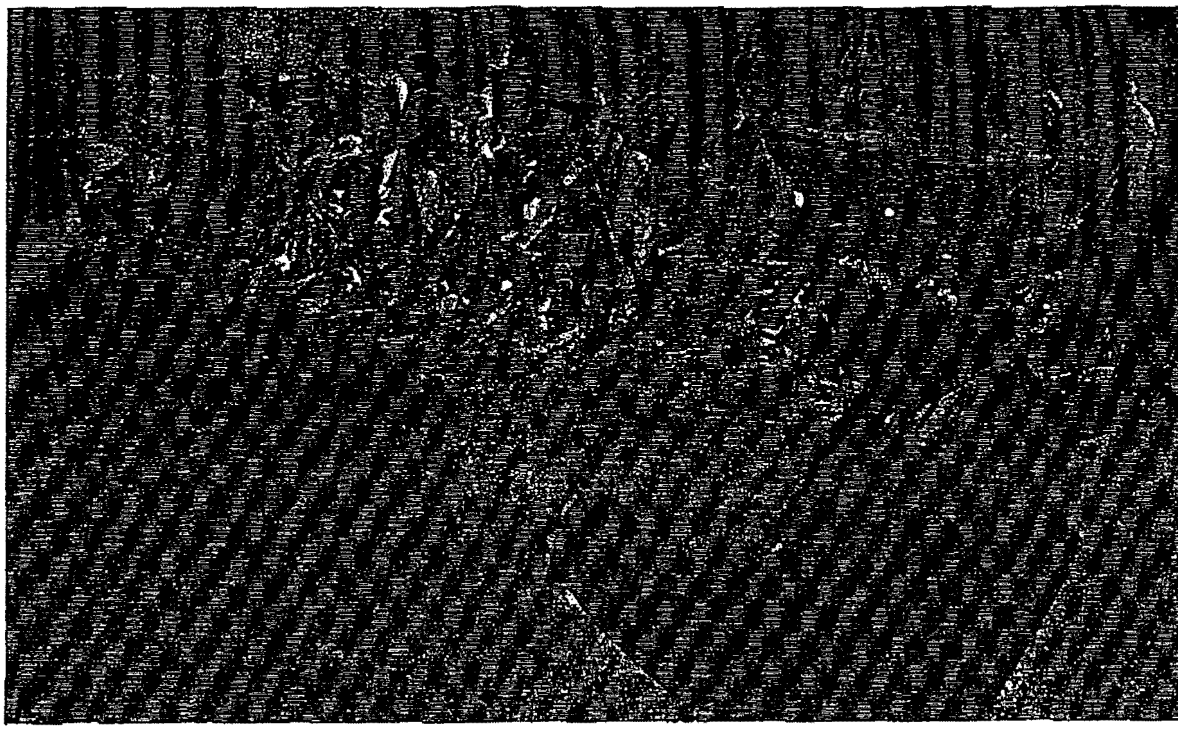

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Figure 28. (U) CBR Training in the Chemical Service, MPR

Neg. 520343 (~~FOR OFFICIAL USE ONLY~~)

Figure 29. Army training in CBR (U).

Neg. 520342 (~~FOR OFFICIAL USE ONLY~~)

Figure 30. CBR equipment instructions (U).

4. (U) **Chemical and Biological Warfare Materiel**

The MPR lacks the scientific and technical capabilities to produce and stockpile CBW offensive and defensive materiel;[3] it relies on the Soviet Union to provide the necessary materials and equipment.

5. ~~(C)~~ U **Research and Development**

a. (U) No CW R&D capability has been identified. The MPRs very limited efforts in R&D have been directed toward an improvement of public health practices and have made possible the production of some vaccines and therapeutic compounds.[5] There is no apparent interest in the development of BW agents, and R&D devoted to defense-related studies are not apparent.

b. (U) A Bacteriological Research Office was formed in 1932 by combining several small laboratories in Ulan Bator.[5] This was the first facility under the MPH to conduct microbiological research. Diseases for which vaccines have been prepared at this facility include typhus, rabies, smallpox, dysentery, typhoid fever, and brucellosis. A Soviet specialist, L. S. Rezininkova, assisted in directing research programs for the development of vaccines and medicines during the late 1950s.

c. (U) The Office for Studying and Combating Especially Dangerous Infectious Diseases, an outgrowth of the Antiepidemic Office, now has five substations under its jurisdiction.[5] It is probably the largest Mongolian organization that supports studies of measures for preventing diseases such as anthrax, glanders, plague, poliomyelitis, and tularemia. During 1966, the organization prepared and administered vaccines to an estimated 150 000 persons.

(b)(1)

(b)(1)

Neg. 553801 (CONFIDENTIAL)

Figure 31. Fermentor at the Songino Veterinary Plant, MPR (U).

6. ~~(C)~~ Trends and Forecast (10-year Projection)

(b)(1)

SECTION V

LAOS AND KAMPUCHEA (U)

---

1. Laos (U)

a. General Health Conditions (U).

(1) (U) All areas of Laos are medically understaffed and lacking in facilities. The shortage of adequately trained medical personnel seriously handicaps public health programs. Medical personnel are concentrated primarily in the principal towns and some of the more easily accessible villages. Most health services are performed by subprofessional medical personnel who are trained by the government with foreign economic and technical assistance. In the past, the Royal Lao Government depended heavily upon the Agency for International Development and other international organizations for assistance in providing medical care. The Hospital Division, Ministry of Public Health, controls government medical care facilities.

(2) (U) Laos has no capability to produce medical materiel and must depend on imports. Herbs and drugs used in traditional medicine are compounded locally.

★ b. ~~(C)~~ Policy, Doctrine, Organization, and Materiel (U). (b)(1)

(b)(1)

2. Kampuchea (U)

a. General Health Conditions (U).

(1) (U) Prior to the current regime there were not enough medical care facilities to serve the needs of the population. Most facilities were poorly equipped and understaffed, although the majority were government owned and operated. Conditions at present are unknown, since little or no information on health care facilities has been available since the fall of the Khmer Republic in 1975. There is no evidence that the shortage of medical personnel that existed prior to the current regime has been alleviated.

(2) (U) There were insufficient numbers of medical personnel and facilities prior to 1975. Facilities that were available were in poor condition. The public health services were able to provide only minimal medical care and preventive medical services to the urban population; they could not

(b)(1)

★ b. ~~(C)~~ Policy, Doctrine, Organization, and Materiel (U). (b)(1)

(b)(1)

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SECTION VI

TECHNOLOGICAL THREAT (U)

A. SUMMARY OF CURRENT THREAT (U)

~~1.~~ 5 Overview (U)

(b)(1)

~~2.~~ 6 China (U)

(b)(1)

3. C North Korea (U)

(b)(1)

B. PROJECTED THREAT (U)

4. C China (U)

(b)(1)

b. C Chemical and Biological Warfare (U).

(b)(1)

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(b)(1)

~~S~~

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SOURCES AND ~~METHODS~~ INVOLVED

(b)(1)

5. ~~(C)~~ **North Korea**

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~~WARNING NOTICE: INTELLIGENCE SOURCES AND METHODS INVOLVED~~

(b)(1) [redacted]

b. ~~(C)~~ Chemical and Biological Warfare.

(b)(1) [redacted]

(2) (U) **Nerve/agents.** Organophosphorus insecticide and pesticide R&D in North Korea is at an adequate level to provide an indigenous R&D base for investigating the synthesis of the G- and V-series nerve agents. Within the next 5 years North Korean scientists should be capable of producing thickened and unthickened nerve agents on a pilot-plant scale. It must be recognized, however, that the North Koreans are not known to have established a CW munition design/development program; therefore, the threat of disseminating nerve agents is greatly reduced since they will have to purchase munitions from a foreign source. Should they be able to procure these munitions, they would also have to insure that adequate supplies of protective equipment, nerve agent decontaminants, and antidotes were available if they expected to exploit a CW nerve agent offensive.

(b)(1) [redacted]

6. ~~(C)~~ Socialist Republic of Vietnam

(b)(1) [redacted]

(b)(1)

7. <u>The Mongolian Peoples Republic (U)</u>

(b)(1)

8. <u>Laos and Kampuchea (U)</u>

(b)(1)

APPENDIX I

FACILITIES AND FIELDS OF INTEREST (U)

(~~CONFIDENTIAL~~)

(b)(1)

CLASSIFIED ON: MULTIPLE SOURCES
REVIEW ON: 2 NOVEMBER 1999

(~~CONFIDENTIAL~~)

Organization	Location	Activity

(b)(1)

(~~CONFIDENTIAL~~)

Organization	Location	Activity

(b)(1)

(~~CONFIDENTIAL~~)

Organization	Location	Activity

(b)(1)

(CONFIDENTIAL)

Organization	Location	Activity
	(b)(1)	

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APPENDIX I.1

OTHER REPORTED CHINESE FACILITIES (U)

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CLASSIFIED BY: MULTIPLE SOURCES
REVIEW ON: 2 NOVEMBER 1999

S

Facility	Location	Production

(b)(1)

Facility	Location	Produces
	(b)(1)	

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S Facility	Location	Produces
	(b)(1)	

NOT RELEASABLE TO FOREIGN NATIONALS

S

Facility	Location	Production

(b)(1)

(S-NOFORN) Research and Production of BW Agents (U)

S

Organization	Location

(b)(1)

Organization	Location

(b)(1)

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★(S ~~NOFORN~~) Research and Production of Detection Devices (U)

Facility	Location	Interest

(b)(1)

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~~S~~ Facility	Location	Interest

(b)(1)

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APPENDIX II.

FOREIGN MATERIEL CATALOG ITEMS

(b)(1)

*FOMCAT pages included.

CLASSIFIED BY CDR, USAFSTC
EXEMPT FROM GDS OF EO 11652
EXEMPTION CATEGORY: 2
DECLASSIFY ON: DECEMBER 2004

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on

(b)(1)

NOMEN: FLAMETHROWER, LIGHT, MODEL 58 (U) ITEM 2

NATIVE DES: ? FOM-1040-5-2-1-A
PRODUCED/ADOPTED: 1966 ?/? COUNTRY: PRC

(U)THE MODEL 58 IS A COPY OF THE SOVIET MODEL LPO-50 (FOM-1040-2-2-3) WITH THE FOLLOWING MODIFICATIONS: (1)THE BIPOD IS EQUIPPED WITH A COILED SPRING, WHICH FORCES THE LEGS APART IN THE FIRING POSITION AND INTO A LATCH WHEN FOLDED. (2)A LUMINOUS CAPSULE IS FIXED TO THE REAR EDGE OF THE FRONT SIGHT. (3)THE FRONT SIGHT IS HOODED. (4)THE GUN HAS A CROSS-SLIDING SAFETY BUTTON, THE ENDS OF WHICH ARE EMBOSSED WITH CHINESE WORDS "OPEN" (ON) AND "CLOSED" (OFF, OR SAFE). (5)THE BACKPACK PAD IS MADE OF HEAVY, LEATHER-TRIMMED CANVAS TIGHTENED BY LACES. (6)A METAL STAND HAS BEEN ADDED AT THE BOTTOM OF THE TANK GROUP.

(U)TWO FITTINGS PROTRUDE FROM THE TOP OF EACH TANK. THE SMALLER FITTING IS A PRESSURE-RELIEF VALVE; THE LARGER FITTING CLOSES THE FILLING APERTURE AND IS CHAMBERED TO HOLD ELECTRICALLY FIRED PRIMER AND A PRESSURIZING CARTRIDGE THAT PROVIDES PRESSURE FOR PROPELLING THE FLAME FUEL. THREE SLOW-BURNING IGNITION CARTRIDGES ARE LOCATED AT THE GUN'S MUZZLE; AS A TANKFUL OF FUEL IS FORCED THROUGH THE GUN, ONE OF THE SLOW-BURNING CARTRIDGES IGNITES IT. A FUEL-TANK-PRESSURIZING CHARGE AND AN IGNITER ARE FIRED SIMULTANEOUSLY BY AN ELECTRICAL CURRENT. BY MEANS OF THE TRIGGER AND A SELECTOR SWITCH, EACH TANK MAY BE FIRED INDIVIDUALLY. EACH BURST OF FLAME LASTS 2 TO 2.5 SECONDS AND CONSUMES ALL THE FUEL IN ONE TANK. FOUR 1.25-VOLT DRY BATTERIES IN THE GUN'S STOCK POWER THE 5-VOLT SYSTEM. A FITTING AT THE BOTTOM OF EACH TANK CONTAINS A SPRING-LOADED VALVE THAT PERMITS THE FUEL TO LEAVE THE TANK AND PREVENTS THE ENTRY OF PRESSURE AND FUEL FROM ANOTHER TANK. TANKS ARE MADE OF HIGH-SILICON STEEL AND HAVE WELDED SEAMS; THE GUN BARREL IS MADE OF CARBON STEEL. THE TANK ASSEMBLY IS PADDED ON THE WEARER'S SIDE AND IS EQUIPPED WITH WEBBING SHOULDER STRAPS AND A WAIST STRAP.

(U)THE WEIGHTS OF THE MAJOR COMPONENTS ARE: TANK GROUP (EMPTY), 10.4 KG; GUN GROUP (WITH BATTERIES), 3.4 KG; AND HOSE, 0.7 KG. EQUIPMENT PROVIDED TO MAINTAIN THE FLAMETHROWER INCLUDES FUEL VISCOSITY METERS, REPAIR KIT (FOM-1040-5-4-2), PRESSURE TESTER (FOM-1040-5-4-3), AND TYPE OP-2 THICKENER (FOM-1365-2-2-1), GASOLINE (THE BASIC FUEL), AND TWO TYPES OF PYROTECHNIC CARTRIDGES.

(U)NORTH VIETNAMESE REFERENCES TO A MODEL K-50 (AND POSSIBLE K-5, AT-60 AND AT-64) RELATE TO THE CHINESE AND SOVIET VERSIONS OF THIS TYPE FLAMETHROWER.

NOMEN: FLAMETHROWER, LIGHT, MODEL 58 (U) ITEM 2
FOM-1040-5-2-1-A
PRODUCED/ADOPTED: 1966 ?/? COUNTRY: PRC

CURRENT STATUS: STANDARD

VEHICLE MOUNT: - N/A

FUEL: ---------- PETROLEUM W/THICKENER

CAPACITIES:
  FUEL (TOTAL) - *1
  IGNITERS-NO -- 3 (PERMIT 3 BURSTS)
PHYSICAL DATA:
  GUN LENGTH --- 96.5 CM
  HOSE LENGTH -- 81.3 CM
  TANK GROUP-
    -HEIGHT ---- 59.7 CM
    -WIDTH ----- 45 CM
    -DEPTH ----- 18 CM FRONT TO BACK
  WEIGHT-
    -FILLED ---- ?
    -EMPTY ----- 10.4 KG

PERFORMANCE:
  RANGE-
    -THICKENED FUEL ----- 70 M MAX *2
    -UNTHICKENED FUEL --- 18 M MAX *2
  DURATION OF BURST ----- 2 TO 2.5 S PER TANK
  RATE OF FIRE ---------- ?
  PRESSURE-
    -PRESSURE TANK ------ N/A
    -FUEL TANK ---------- 30 KG/SQ CM

REMARKS:
1/ MAXIMUM: 12 LITERS
   OPERATING: 10 LITERS

2/ THE WEAPON PERFORMED WELL IN TEST FIRINGS. THE RANGES AND OTHER CHARACTERISTICS OF FUELS USED IN TESTS ARE SHOWN IN FOM-1365-2-2-1. GASOLINE GELLED WITH 3% OP-2 THICKENER GAVE THE BEST RESULTS (ROD LENGTH, 32 METERS; BULK OF DEPOSIT, 45 TO 66 METERS; CENTER OF DEPOSIT, 62 METERS; AND MAXIMUM RANGE, 70 METERS). THE SOVIETS CLAIM THEIR MODEL LPO-50 HAS AN EFFECTIVE RANGE OF 41-50 METERS AND MAXIMUM RANGE OF 68 METERS.

NOMEN: FLAMETHROWER, LIGHT, MODEL 58 (U) ITEM 2

FOM-1040-5-2-1-B

PRODUCED/ADOPTED: 1966 ?/? COUNTRY: PRC

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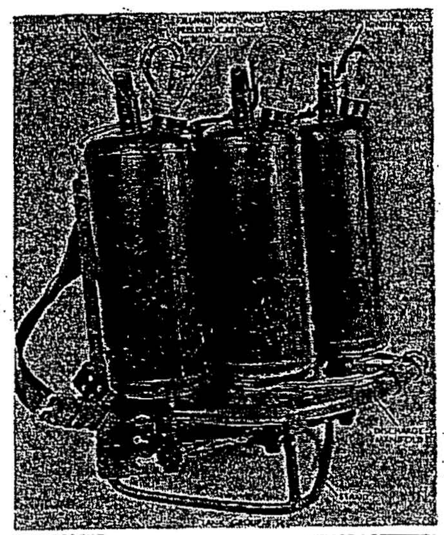

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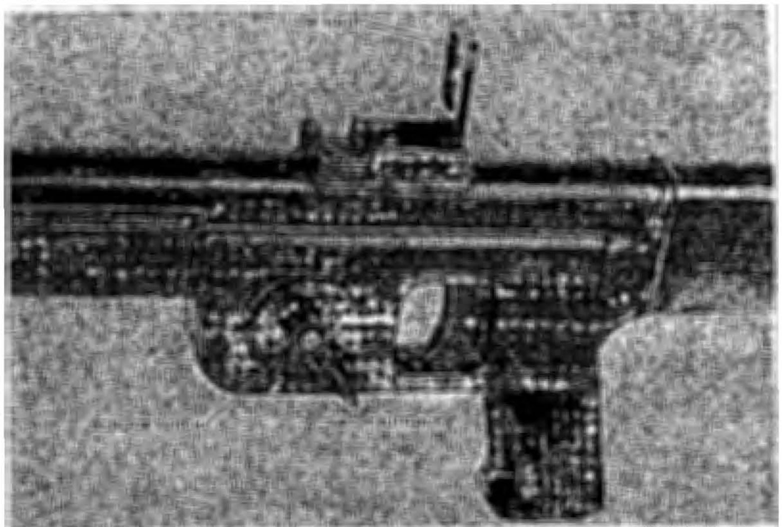
NOMEN: FLAMETHROWER, LIGHT, MODEL 58 (U) ITEM 2
FOM-1040-5-2-1-B
PRODUCED/ADOPTED: 1966 ?/? COUNTRY: PRC



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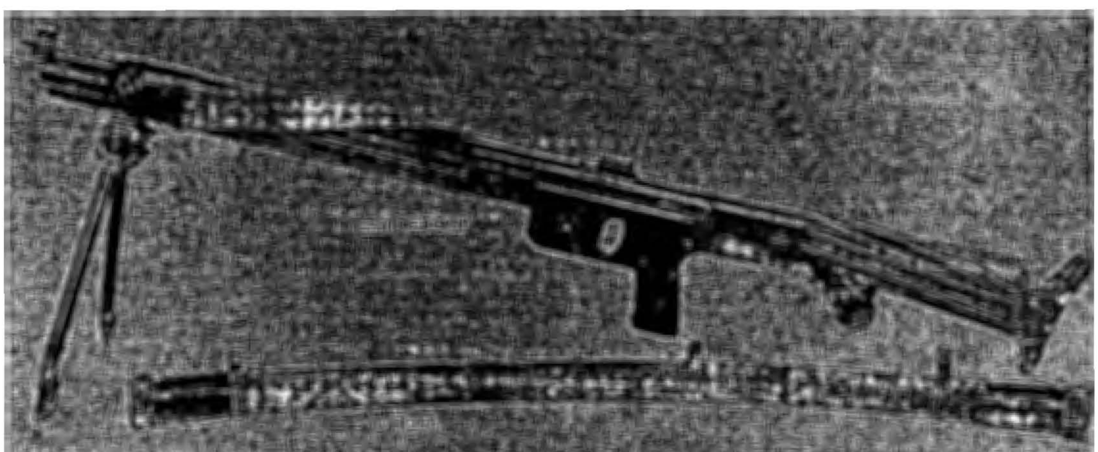


Neg. 511193 (UNCLASSIFIED)

NOMEN: FLAMETHROWER PRESSURE-TESTING KIT, MODEL XB-250 (U) ITEM 6

NATIVE DES: XB-250 FOM-4950-5-3-2-A
PRODUCED/ADOPTED: ?/1970 ? COUNTRY: PRC

(U)THE XB-250 KIT IS USED TO TEST THE PRESSURE RELIABILITY OF THE HOSE, GUN GROUP, AND FUEL TANKS OF THE PRC MODEL 58 LIGHT FLAMETHROWER AND ITS SOVIET COUNTERPART, MODEL LPO-50. THE TESTS ARE PERFORMED AT STANDARD MAINTENANCE INTERVALS TO ASSURE DEPENDABLE AND SAFE PERFORMANCE.

(U) THE KIT'S PRINCIPAL ITEM IS A SMALL HAND-OPERATED PUMP; WHEN ASSEMBLED, THE PUMP IS ATTACHED TO A FITTING ON THE FLOOR OF THE CARRIER WHICH THUS SERVES AS THE PUMP'S MOUNT. THE PUMP DRAWS A NONFLAMMABLE LIQUID FROM AN OPEN CONTAINER AND FORCES THE LIQUID, UNDER PRESSURE, INTO THE OBJECT BEING TESTED. THE KIT CONTAINS GASKETS, WASHERS, AND SPECIAL THREADED FITTINGS THAT REPLACE THE FLAMETHROWER'S STANDARD FITTINGS. THESE SPECIAL FITTINGS CLOSE THE NORMAL DISCHARGE EXITS AND PERMIT THE OBJECTS TO BECOME PRESSURIZED IN TESTS. A GAGE INDICATES THE PRESSURES DEVELOPED IN THE TESTS. A BUCKET OR A SIMILAR CONTAINER OF 3.8 OR 7.5 LITER CAPACITY CAN BE USED AS A RESERVOIR FOR THE TEST LIQUID.

(U)ALTHOUGH THE PRC SPECIFICATIONS ARE NOT KNOWN, THEY PROBABLY MATCH THE FOLLOWING SOVIET SPECIFICATIONS FOR TESTING IDENTICAL ITEMS: (1) THE SOVIET'S TEST SOLUTION IS POTASSIUM BICHROMATE IN WATER. (2) THE TESTING PRESSURES (IN KILOGRAMS PER SQUARE CENTIMETER) ARE: FUEL TANK, 80; FUEL HOSE, 60; AND FLAME GUN GROUP, 150. (3) THE TESTS ARE REQUIRED WHEN THE FLAMETHROWER IS ISSUED TO A UNIT, EVERY SIX MONTHS WHILE IT IS UNIT EQUIPMENT, AND AFTER 150 DISCHARGES.

(U)THIS KIT'S SMALL SIZE AND LIGHT WEIGHT CONTRAST WITH THE BULKY SOVIET COUNTERPART MODEL GN-200, WHICH INCLUDES A LARGER RESERVOIR AND WEIGHS 65.8 KG.

NOMEN: FLAMETHROWER PRESSURE-TESTING KIT, MODEL XB-250 (U) ITEM 6
FOM-4950-5-3-2-A

PRODUCED/ADOPTED: ?/1970 ?
COUNTRY: PRC

CURRENT STATUS: --- STANDARD

COMPONENTS: ------- SEE TEXT

PURPOSE: ---------- *1

MANUFACTURERS: ---- ?

MATERIALS: -------- METAL CARRIER WITH WEB SHOULDER STRAP

MARKINGS: --------- *2

DIMENSIONS:
LENGTH ---------- 31.2 CM
WIDTH ----------- 16.7 CM
HEIGHT ---------- 11.4 CM
WEIGHT ---------- 7.3 KG

REMARKS:
1/ PRESSURE TESTS ON COMPONENTS OF PRC AND SOVIET PORTABLE FLAMETHROWERS

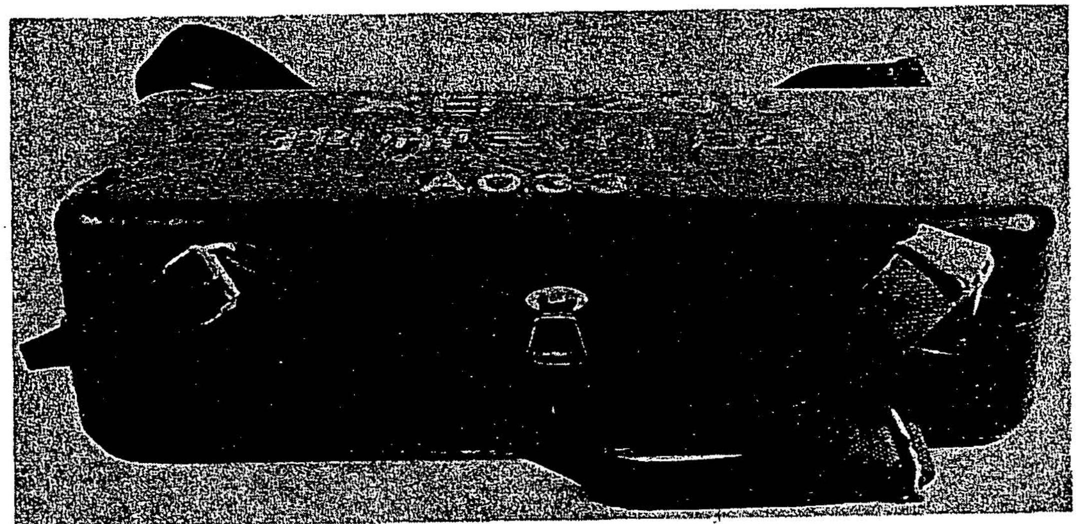
2/ SEE ILLUSTRATION (GREEN CARRIER WITH WHITE LETTERS).

NOMEN: FLAMETHROWER PRESSURE-TESTING KIT, MODEL XB-250 (U)

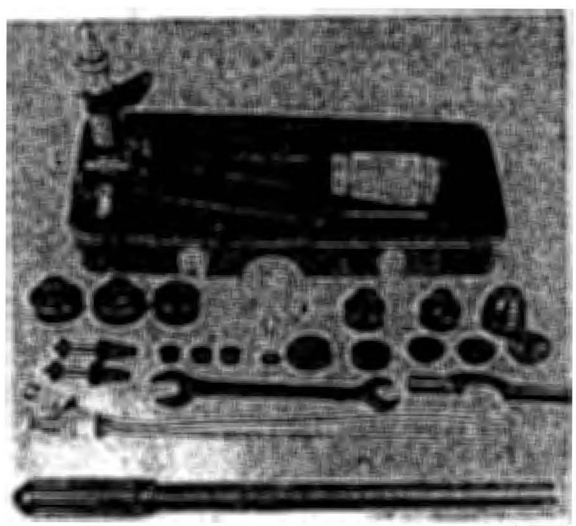
FOM-4950-5-3-2-B

PRODUCED/ADOPTED: ?/1970 ?

COUNTRY: PRC



Neg. 511585 (UNCLASSIFIED)



Neg. 511586 (UNCLASSIFIED)

NOMEN: REPAIR KIT FOR MODEL 58 LIGHT FLAMETHROWER (U) ITEM 8

NATIVE DES: ? FOM-4950-5-3-3-A
PRODUCED/ADOPTED: ?/1969 ? COUNTRY: PRC

(U)THIS KIT CONTAINS TOOLS, DEVICES FOR TESTING THE ELECTRICAL SYSTEM, AND SPARE PARTS FOR REPAIRING THE PRC MODEL 58 LIGHT FLAMETHROWER (FOM 1040-5-2-1). THE KIT IS BELIEVED TO BE EQUIPPED TO SERVICE 10 FLAMETHROWERS; IT MAY BE ISSUED ON THE BASIS OF THAT RATIO. THE KIT IS PROBABLY ALSO USED TO REPAIR THE SOVIET MODEL LPO-50 FLAMETHROWER (FOM1040-2-2-3), OF WHICH THE CHINESE VERSION IS A COPY IN MOST RESPECTS.

(U)SEPARATE KITS ARE PROVIDED FOR FLAMETHROWER MAINTENANCE AND TESTING; THEY INCLUDE (1) A PRESSURE TESTING DEVICE (FOM-4950-5-3-2) FOR DETERMINING WHETHER THE FLAMETHROWER WILL WITHSTAND NORMAL OPERATING PRESSURES, AND (2) FLAME FUEL VISCOSITY MEASURING DEVICES.

NOMEN: REPAIR KIT FOR MODEL 58 LIGHT FLAMETHROWER (U)

FOM-4950-5-3-3-A

PRODUCED/ADOPTED: ?/1969 ?

COUNTRY: PRC

CURRENT STATUS: --- STANDARD

COMPONENTS: ------- *1

PURPOSE: ---------- REPAIR MODEL 58 AND
- SOVIET LPO-50 FLAMETHROWER

MANUFACTURERS: ---- ?

MATERIALS: -------- CONTAINER-WOODEN
- BOX

MARKINGS: --------- ON 1 CONTAINER, 178-8-6-4A;
- ON ANOTHER, A-H6-1

DIMENSIONS:
LENGTH ---------- 91.4 CM
WIDTH ----------- 30.5 CM
HEIGHT ---------- 27.9 CM
WEIGHT ---------- 42.7 KG

REMARKS:

1/

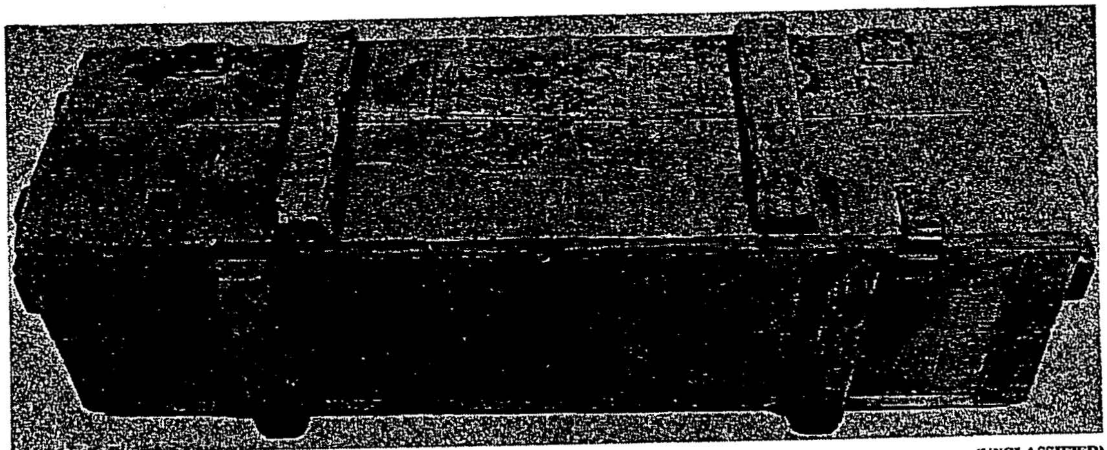
QUANTITY *2	ITEM
5	FUEL HOSES
3	FUEL FILLING PUMPS
2	SPECIAL PLIERS
5	SELECTOR SWITCHES
26	NON-RETURN VALVES
1	FUEL LEVEL INDICATOR
1	VOLT/OHMMETER
1	TEST LEADS
15	THRUST BUSHINGS
13	SMALL SCREWS
1	ELECTRICAL CONNECTOR
16	VALVE NUT CAPS
8	RUPTURE DISK PUNCH
10	ELECTRICAL WIRING HARNESS
5	BATTERY INSULATOR PADS
12	PRESSURE CARTRIDGE GRATE BARS
5	SAFETY VALVE BALL BEARINGS
15	IGNITION CARTRIDGE HOLDERS
25	NON-RETURN VALVE SPRINGS
4	ELECTRICAL CONNECTOR SCREWS
30	PLASTIC INSULATORS
20	BRASS WASHERS, 3.9 CM DIAMETER
15	BRASS WASHERS, 1 CM DIAMETER
5	ELECTRICAL SWITCHES
1	BIPOD

2/ OBSERVED IN TWO POSSIBLY INCOMPLETE KITS; THE STANDARD INVENTORY OF A COMPLETE KIT IS UNKNOWN.

Original
DST-1600S-148-76-SUP 1
ITEM 8

NOMEN: REPAIR KIT FOR MODEL 58 LIGHT FLAMETHROWER (U)
FOM-4950-5-3-3-B

PRODUCED/ADOPTED: ?/1969 ?
COUNTRY: PRC



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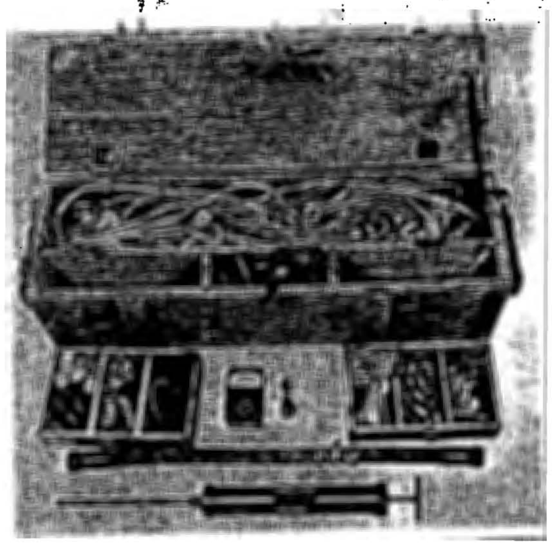


Neg. 511191 (UNCLASSIFIED)

NOMEN: GRENADE, HAND, TEAR AGENT CS, MODEL T-766B ? (U) ITEM 10

NATIVE DES: ? FOM-1330-9-1-7-A
PRODUCED/ADOPTED: ?/1966 COUNTRY: NORTH VIETNAM

(U)THE MODEL T-766B (?) HAND GRENADE IS A CYLINDRICAL CANISTER FILLED WITH THE CHEMICAL AGENT CS AND FITTED WITH A THROWING HANDLE AND A FIRING AND BURSTING ASSEMBLY. THE THIN SHEET-METAL CANISTER HAS A SOLDERED SEAM AND CRIMPED-ON ENDS. THE WOODEN HANDLE AND THE CANISTER END TO WHICH IT IS ATTACHED ARE WAX-COATED TO EXCLUDE MOISTURE. A FILLING APERTURE AT THE OPPOSITE END OF THE CANISTER IS SEALED BY A METAL DISK AND AN UNDERLYING RUBBER DISK, WHICH ARE HELD IN PLACE BY FOUR FOLD-DOWN METAL TABS. THE FIRING MECHANISM, HOUSED PARTLY IN THE HANDLE AND PARTLY IN THE CANISTER, CONSISTS OF A PULL-WIRE, A POWDER-TRAIN DELAY, A BLASTING CAP, AND A METAL CONTAINER FILLED WITH A SMALL AMOUNT OF TNT AND TWO TNT PELLETS (11.3 G). THE GRENADE EXPLODES VIOLENTLY TO DISSEMINATE THE FILLING, WHICH QUICKLY INCAPACITATES UNMASKED PERSONNEL, BUT IS NOT LETHAL. EVEN IN LOW CONCENTRATIONS, CS CAUSES LACHRYMATION AND A BURNING SENSATION IN THE EYES, NOSE, AND THROAT AND ON EXPOSED BODY SURFACES.

(U)THIS GRENADE IS BELIEVED TO BE A CONVERTED HE OFFENSIVE-TYPE GRENADE, IN WHICH THE FILLING HAS BEEN REPLACED WITH CS; ITS SHAPE IS SIMILAR TO THAT OF THE STANDARD VIET-CONG HAND GRENADE. THE QUALITY OF CONSTRUCTION INDICATES A WELL-DEVELOPED MANUFACTURING PROCESS.

NOMEN: GRENADE, HAND, TEAR AGENT CS, MODEL T-766B ? (U) ITEM 10

FOM-1330-9-1-7-A

PRODUCED/ADOPTED: ?/1966 COUNTRY: NORTH VIETNAM

CURRENT STATUS: --- IMPROVISED

CHARACTERISTICS:

TYPE ------------ TEAR AGENT
WEIGHT ---------- 355 G
LENGTH ---------- 272 MM
MAX DIAMETER ---- 69 MM
BODY MATERIAL/
  SHAPE --------- SHEET METAL
FILLER-WEIGHT --- 145 G
  -MATERIAL ----- *1
FUZE-TYPE ------- PULL FRICTION
  -DELAY TIME --- 3 S
FRAGMENT SLEEVE
  -WEIGHT ------- N/A
  -MATERIAL ----- N/A
  -DIAMETER(OUT-
    SIDE)-------- N/A
SMOKE COLOR ----- N/A
LAUNCHING METHOD
  -CARTRIDGE
    MODEL ------- N/A
CONE(MATERIAL/
  ANGLE) -------- N/A
FINS-NO --------- N/A
IDENTIFYING MARK-
  INGS ---------- *2

PERFORMANCE:
AVERAGE RANGE --- ?
EFFECTIVE FRAG
  RADIUS -------- N/A
PENETRATION ----- N/A
BURNING TIME ---- N/A

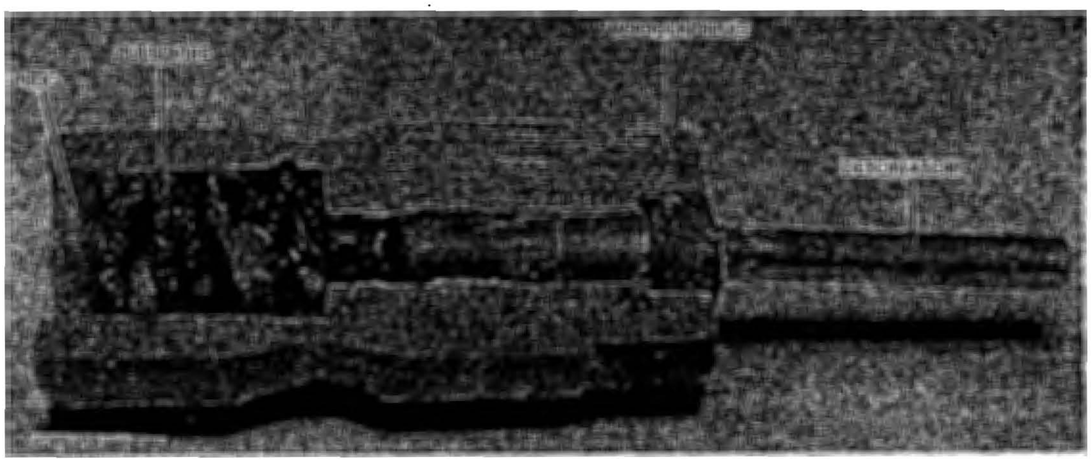
REMARKS:
1/ CS (O-CHLOROBENZYLMALCNONITRILE)
2/ THE CANISTER IS PAINTED LIGHT GREEN, WITH A NARROW WHITE STRIPE ENCIRCLING EACH END NEAR THE CRIMPING. MARKINGS ON THE CANISTER (H.1) AND ON THE HANDLE (T-766) ARE WHITE ON BLACK.

Original | DST-1600S-148-76-SUP 1

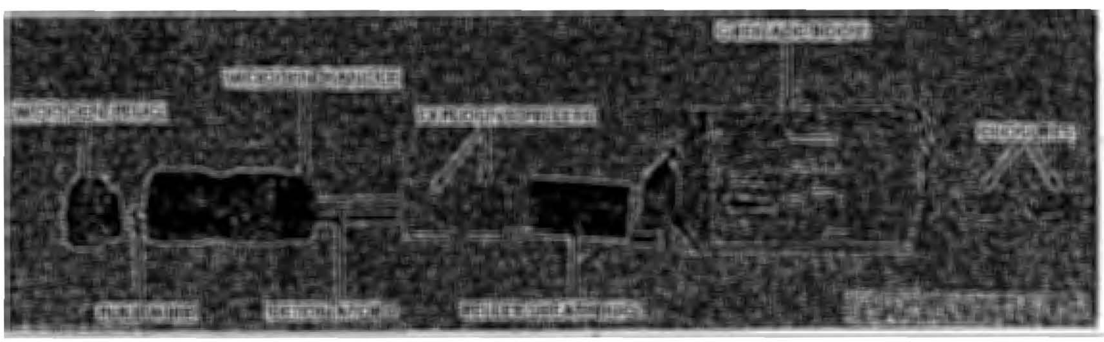
NOMEN: GRENADE, HAND, TEAR AGENT CS, MODEL T-766B ? (U) | ITEM 10

FOM-1330-9-1-7-8

PRODUCED/ADOPTED: 7/1966 | COUNTRY: NORTH VIETNAM



Neg. 511188 (UNCLASSIFIED)



Neg. 511189 (UNCLASSIFIED)

NOMEN: GRENADE, HAND, TEAR AGENT CN, MODEL ? (U) ITEM 11

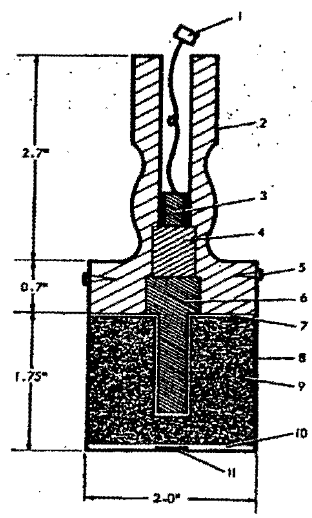
NATIVE DES: ?
PRODUCED/ADOPTED: ?/1968

FDM-1330-9-1-12-A
COUNTRY: NORTH VIETNAM

(U)THIS GRENADE ALLEGEDLY EMITS A CLOUD OF TEAR AGENT ON OVER A 23-METER RADIUS, UNDER NORMAL CONDITIONS OF WIND AND HUMIDITY. THE CN IS OBTAINED FROM U.S. DUD CHEMICAL MUNITIONS, SUCH AS THE MODEL M7A1 CN GRENADE. (THE M7A1 CONTAINS A MIXTURE OF CN, SUGAR, POTASSIUM CHLORATE, POTASSIUM BICARBONATE, AND A FINELY DIVIDED INERT SUBSTANCE--DIATOMACEOUS EARTH.)

(U)THE GRENADE'S WOODEN HANDLE, WHICH CONTAINS A PULLSTRING-ACTIVATED FRICTION IGNITER AND A PRIMER, EXTENDS INTO THE METAL CANISTER AND IS FASTENED BY FOUR NAILS FASHIONED FROM BARBED WIRE. THE CANISTER, MADE OF SHEET METAL 0.3 TO 0.7 MM THICK, HAS OVERLAPPING SEAM JOINTS AND IS EQUIPPED WITH A 7.6-MM-DIAMETER SMOKE EMISSION HOLE IN THE BOTTOM. A CARDBOARD DISK IN THE BOTTOM OF THE CANISTER COVERS THE HOLE, WHICH IS COVERED EXTERNALLY BY ADHESIVE TAPE TO EXCLUDE MOISTURE. SMOKE ESCAPES WHEN THESE CLOSURES ARE BURNED AWAY BY THE BURNING MIXTURE IN THE GRENADE. THE GRENADE IS MADE WATERPROOF BY PRETREATING THE WOOD WITH HOT PARAFFIN AND BY SEALING NAIL HOLES AND JOINTS WITH WAX.

(U)COMMUNIST FORCES IN SOUTH VIETNAM FABRICATE THIS GRENADE FROM CAPTURED U.S. CHEMICAL MUNITIONS AND OTHER MATERIALS AT HAND. THE GRENADE IS MADE IN FIELD WORKSHOPS, AND PROBABLY IN SMALL QUANTITIES. A CAPTURED ENEMY DOCUMENT, WHICH PROVIDES THE ONLY AVAILABLE DATA ON THE GRENADE, STATES THAT THE IGNITIONS SYSTEM MAY VARY SLIGHTLY (FROM THE ONE ILLUSTRATED), DEPENDING ON MATERIALS AVAILABLE.



Neg. 515281 (UNCLASSIFIED)

NOMEN: GRENADE, HAND, TEAR AGENT CN, MODEL ? (U) ITEM 11

PRODUCED/ADOPTED: ?/1968 FOM-1330-9-1-12-A

COUNTRY: NORTH VIETNAM

CURRENT STATUS: --- IMPROVISED

CHARACTERISTICS:

TYPE ------------ TEAR AGENT
WEIGHT ---------- 0.9 KG ?
LENGTH ---------- 132 MM
MAX DIAMETER ---- 50 MM
BODY MATERIAL/
SHAPE --------- *1
FILLER-WEIGHT --- ?
-MATERIAL ----- US-ARMY TEAR AGENT CN
FUZE-TYPE ------- BURNING, TIME-DELAY
-DELAY TIME --- 4-5 S
FRAGMENT SLEEVE
-WEIGHT ------- N/A
-MATERIAL ----- N/A
-DIAMETER(OUT-
SIDE)-------- N/A
SMOKE COLOR ----- N/A
LAUNCHING METHOD
-CARTRIDGE
MODEL ------- N/A
CONE(MATERIAL/
ANGLE) -------- N/A
FINS-NO --------- N/A
IDENTIFYING MARK-
INGS ---------- *2

PERFORMANCE:
AVERAGE RANGE --- APPROX 30 M
EFFECTIVE FRAG
RADIUS -------- N/A
PENETRATION ----- N/A
BURNING TIME ---- ?

REMARKS:
1/ SHEET METAL CANISTER; WOODEN HANDLE.
2/ MAY HAVE RED BAND AND LETTERS CN ON BLUE BODY

NOMEN: GRENADE, HAND, SMOKE, TYPE 2 (U) ITEM 12

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1970 ?

FOM-1330-5-1-17-A
COUNTRY: PRC

(U)THE PEOPLE'S REPUBLIC OF CHINA TYPE 2 SMOKE HAND GRENADE HAS A GRENADE BODY WHICH CONSISTS OF A LIGHT BROWN WAXED FIBERBOARD CYLINDER 216 MM LONG AND 51 MM DIAMETER. MARKING IS WITH BLACK INK IN CHINESE SYMBOLS AND ARABIC NUMERALS. THE ENDS OF THE CYLINDER ARE CLOSED WITH OUTER CARDBOARD DISKS WHICH ARE FITTED WITH COTTON TAPE GRIPS TO FACILITATE THEIR REMOVAL. REMOVAL OF THE OUTER DISKS BARES INNER DISKS WHICH CONTAIN VENT HOLES TO ALLOW SMOKE EMISSION.

(U)THE IGNITER ASSEMBLY IS LOCATED APPROXIMATELY MIDWAY ALONG A 12-MM DIAMETER THIN PAPER SLEEVE, WHICH EXTENDS ALONG THE LONGITUDINAL AXIS OF THE CARDBOARD TUBE. THE IGNITER ASSEMBLY CONSISTS OF A PRIMARY IGNITER, A SECONDARY IGNITER, AND A CLAY PLUG. THE ASSEMBLY IS HELD IN PLACE BY PLASTIC DISKS. A COPPER IGNITER WIRE EXTENDS FROM THE IGNITION ASSEMBLY TO THE BASE OF THE GRENADE AND IS HELD THERE BY A GRIP FLAP. A LOOSELY COILED 0.6-MM COPPER WIRE EXTENDS FROM THE OPPOSITE END OF THE IGNITER ASSEMBLY.

(U)THE GRENADE IS FUNCTIONED BY REMOVING THE OUTER END DISKS AND PULLING ON THE IGNITER WIRE. THE DURATION OF SMOKE EMISSION IS APPROXIMATELY 50 SECONDS. IN A TEST, THE WHITE SMOKE CLOUD GREW TO A MAXIMUM SIZE OF 6 METERS HIGH X 6 METERS WIDE X 15 METERS LONG IN A BREEZE HAVING AN ESTIMATED SPEED OF 5 MI/H.

(U)THE GRENADE IS RELATIVELY INFERIOR AS A SMOKE PRODUCER. IT IS PROBABLY VERY DANGEROUS TO MANUFACTURE. POTASSIUM CHLORATE-RESIN MIXTURES ARE VERY SUSCEPTIBLE TO IGNITION FROM IMPACT SHOCK. THE RESIN USED IN THE GRENADE CONTAINS MANY COMPOUNDS, INCREASING THE PROBABILITY THAT THE MIXTURE IS SENSITIVE. THE GRENADE HAS POOR SHELF LIFE AND SERVICE LIFE CHARACTERISTICS, PARTICULARLY IN HIGH HUMIDITY ENVIRONMENTS. THE SMOKE PRODUCING COMPOSITION CONTAINS AMMONIUM AND CHLORATE IONS IN INTIMATE CONTACT WHICH WILL NORMALLY RESULT IN DECOMPOSITION OF CHLORATE TO FORM AN INERT CHLORIDE.

NOMEN: GRENADE, HAND, SMOKE, TYPE 2 (U) ITEM 12

FOM-1330-5-1-17-A

PRODUCED/ADOPTED: ?/1970 ? COUNTRY: PRC

CURRENT STATUS: --- STANDARC

CHARACTERISTICS:

TYPE ------------ WHITE SMOKE
WEIGHT ---------- 490 G
LENGTH ---------- 216 MM
MAX DIAMETER ---- 51 MM
BODY MATERIAL/
  SHAPE --------- WAXED FIBERBOARC
FILLER-WEIGHT --- 470 G
  -MATERIAL ----- *1
FUZE-TYPE ------- FRICTION
  -DELAY TIME --- ?
FRAGMENT SLEEVE
  -WEIGHT ------- N/A
  -MATERIAL ----- N/A
  -DIAMETER(OUT-
    SIDE)-------- N/A
SMOKE COLOR ----- WHITE
LAUNCHING METHOD
  -CARTRIDGE
    MODEL ------- N/A
CONE(MATERIAL/
  ANGLE) -------- N/A
FINS-NO --------- N/A
IDENTIFYING MARK-
  INGS ---------- SEE PHOTOGRAPH

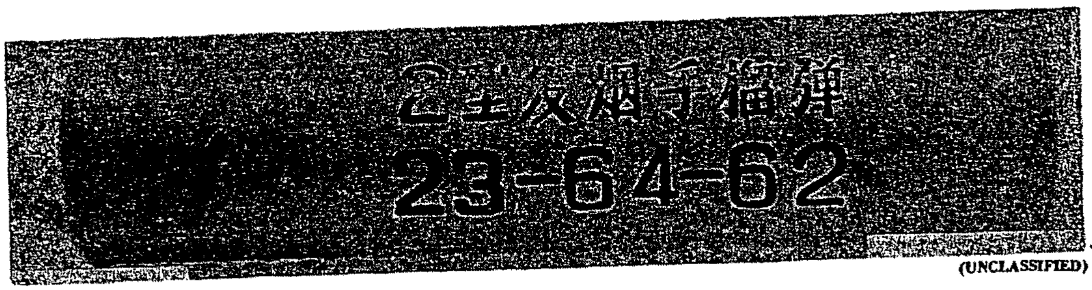
PERFORMANCE:
  AVERAGE RANGE --- ?
  EFFECTIVE FRAG
    RADIUS -------- N/A
  PENETRATION ----- N/A
  BURNING TIME ---- APPROX 50 S

REMARKS:
1/ 40% AMMONIUM CHLORIDE; 47% POTASSIUM CHLORATE + POTASSIUM CHLORIDE; 13% FUEL RESIN. THE POTASSIUM CHLORATE:POTASSIUM CHLORIDE RATIC IS ABOUT 4:1. APPARENTLY THE POTASSIUM CHLORIDE CONTENT REPRESENTS THE END PRODUCT OF CHLORATE DECOMPOSITION. THE FUEL RESIN IS AN AMORPHOUS MIXTURE PRESENT AS A POWDER. IT IS READILY SOLUBLE IN METHYLENE CHLORIDE AND ACETONE, MODERATELY SOLUBLE IN METHANOL AND ONLY PARTIALLY SOLUBLE IN HEXANE.

Original
NOMEN: GRENADE, HAND, SMOKE, TYPE Z (U)

PRODUCED/ADOPTED: ?/1970 ?

FOM-1330-5-1-17-8
COUNTRY: PRC



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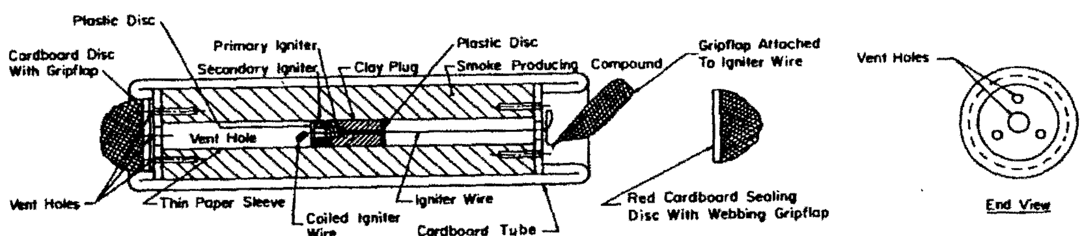
Neg. 511098



(UNCLASSIFIED)

Neg. 511295

NOMEN: GRENADE, HAND, WHITE PHOSPHORUS, MODEL T.F.L. ? (U) ITEM 13

NATIVE DES: ? FOM-1330-9-1-9-A
PRODUCED/ADOPTED: ?/BEFORE 1966 COUNTRY: NORTH VIETNAM

(U)THIS BURSTING-TYPE GRENADE DISSEMINATES WHITE PHOSPHORUS (WP), WHICH IGNITES ON EXPOSURE TO AIR TO PRODUCE SMOKE AND INCENDIARY PARTICLES. NORTH VIETNAMESE/VIETCONG FORCES USED THE GRENADE IN 1967.

(U)A SPECIMEN TAKEN FROM A CAPTURED EXPLOSIVE FACTORY WAS FILLED WITH WP AND WAS DESCRIBED AS "HOMEMADE," ALTHOUGH IT REFLECTED GOOD WORKMANSHIP AND GOOD CONSTRUCTION. THE CANISTER IS FORMED WITH CRIMPED AND SOLDERED SEAMS AND IS PAINTED GREEN. A FILLING HOLE IS PROVIDED IN THE CENTER OF THE BOTTOM END, AND A FUZE ASSEMBLY IN THE TOP END. THE END PIECES ARE BELIEVED TO BE METAL. THE FUZE, ALSO DESCRIBED AS "HOMEMADE," HAS THE EXTERNAL CONFIGURATIONS OF THE ONE ILLUSTRATED AND PROBABLY IS IDENTICAL TO IT. THE FUZE IGNITES A BURSTER CHARGE COMPRISED OF PITCH AND AN UNIDENTIFIED EXPLOSIVE, WHICH EXPLODES THE CANISTER AND DISSEMINATES THE WP FILLING.

(U)DATA ON THE GRENADE ARE BASED ON THE FIELD EXPLOITATION OF ONE SPECIMEN, AUGMENTED BY LABORATORY EXPLOITATION DATA OF AN OFFENSIVE GRENADE (FOM-1330-9-1-1) THAT HAS SIMILAR CONFIGURATIONS BUT CONTAINS HE FILLING. (NOTEWORTHY DIFFERENCES ARE THE OFFENSIVE GRENADE'S WOODEN TOP AND LACK OF AN APERTURE IN THE BOTTOM.) THE WP GRENADE APPEARS TO HAVE BEEN CONVERTED FROM ANOTHER TYPE, SUCH AS THE OFFENSIVE GRENADE, BY REMOVING THE HE CHARGE THROUGH THE BOTTOM OPENING AND TAMPING IN WP INSTEAD. IN ADDITION TO THE WP FILLING, THE CANISTER CONTAINS A BURSTER CHARGE (ESTIMATED WEIGHT, .054 KG) COMPOSED OF TNT (85 PERCENT), RDX (11 PERCENT), AND PICRIC ACID (4 PERCENT).

NOMEN: GRENADE, HAND, WHITE PHOSPHORUS, MODEL T.F.L. ? (U) ITEM 13
FOM-1330-9-1-9-A
PRODUCED/ADOPTED: ?/BEFORE 1966 COUNTRY: NORTH VIETNAM

CURRENT STATUS: --- IMPROVISED ?

CHARACTERISTICS:

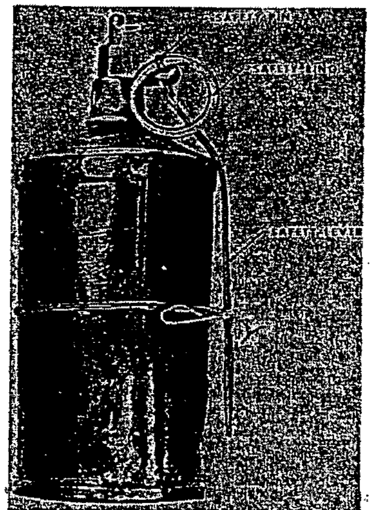
TYPE ------------ WHITE PHOSPHORUS
WEIGHT ---------- 0.73 KG (ESTIMATED)
LENGTH ---------- 140. MM
MAX DIAMETER ---- 66 MM
BODY MATERIAL/
  SHAPE --------- SHEET METAL
FILLER-WEIGHT --- 0.177 KG (ESTIMATED)
  -MATERIAL ----- WHITE PHOSPHORUS
FUZE-TYPE ------- PERCUSSION
  -DELAY TIME --- 4 S ?
FRAGMENT SLEEVE
  -WEIGHT ------- N/A
  -MATERIAL ----- N/A
  -DIAMETER(OUT-
    SIDE)-------- N/A
SMOKE COLOR ----- WHITE
LAUNCHING METHOD
  -CARTRIDGE
    MODEL ------- N/A
CONE(MATERIAL/
  ANGLE) -------- N/A
FINS-NO --------- N/A
IDENTIFYING MARK-
  INGS ---------- RED LETTERS T.F.L. ON HANDLE

PERFORMANCE:
  AVERAGE RANGE --- ?
  EFFECTIVE FRAG
    RADIUS -------- ?
  PENETRATION ----- N/A
  BURNING TIME ---- N/A

REMARKS:

Original
NOMEN: GRENADE, HAND, WHITE PHOSPHORUS, MODEL T.F.L. ? (U)
PRODUCED/ADOPTED: ?/BEFORE 1966

DST-1600S-148-76-SUP 1
ITEM 13
FOM-1330-9-1-9-B
COUNTRY: NORTH VIETNAM



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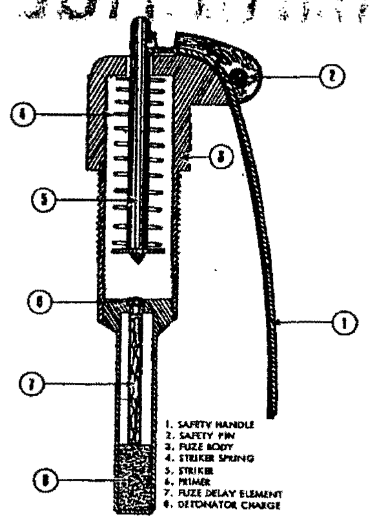


Neg. 511069 (UNCLASSIFIED)

NOMEN: GRENADE, HAND, WHITE PHOSPHORUS AND NAPALM, MODEL ? (U) ITEM 14

NATIVE DES: ?
PRODUCED/ADOPTED: ?/BEFORE 1966

FOM-1330-9-1-22-A
COUNTRY: NORTH VIETNAM

(U)THIS NORTH VIETNAMESE INCENDIARY GRENADE IS FILLED WITH A WHITE PHOSPHORUS AND NAPALM MIXTURE. THE LIGHT METAL CYLINDER IS EQUIPPED WITH A FUZE ASSEMBLY WHICH PROTRUDES FROM THE TOP END AND A LEAD PLUG WHICH IS INSERTED IN AN OPENING IN THE BOTTOM END. THE FUZE, A "SETBACK" TYPE, IS ACTIVATED BY REMOVING A SMALL NAIL OR PIN AND STRIKING THE BOTTOM CF THE GRENADE AGAINST THE GRCUND; THE FORCE CAUSES A STRIKER TO COMPRESS A RETAINING SPRING AND STRIKE A DETONATOR IN THE FUZE ASSEMBLY. THE GRENADE CAN BE THROWN BY HAND OR PROPELLED BY A HOMEMADE LAUNCHER ADAPTED TO THE FRENCH MAS-36 RIFLE. THE DEVICE WAS LAST REPORTED IN 1962.

NOMEN: GRENADE, HAND, WHITE PHOSPHORUS AND NAPALM, MODEL ? (U) ITEM 14

FOM-1330-9-1-22-A
COUNTRY: NORTH VIETNAM

PRODUCED/ADOPTED: ?/BEFORE 1966

CURRENT STATUS: --- STANDARD

CHARACTERISTICS:

TYPE ------------ INCENDIARY
WEIGHT ---------- 0.5 KG EMPTY
LENGTH ---------- 27 CM
MAX DIAMETER ---- 6 CM
BODY MATERIAL/
SHAPE --------- METAL
FILLER-WEIGHT --- ?
-MATERIAL ----- WHITE PHOSPHORUS AND NAPALM
FUZE-TYPE ------- "SETBACK" TYPE
-DELAY TIME --- 4 S
FRAGMENT SLEEVE
-WEIGHT ------- N/A
-MATERIAL ----- N/A
-DIAMETER(OUT-
SIDE)-------- N/A
SMOKE COLOR ----- ?
LAUNCHING METHOD
-CARTRIDGE
MODEL ------- N/A
CONE(MATERIAL/
ANGLE) -------- N/A
FINS-NO --------- N/A
IDENTIFYING MARK-
INGS ---------- GREEN BODY

PERFORMANCE:
AVERAGE RANGE --- ?
EFFECTIVE FRAG
RADIUS -------- N/A
PENETRATION ----- N/A
BURNING TIME ---- ?

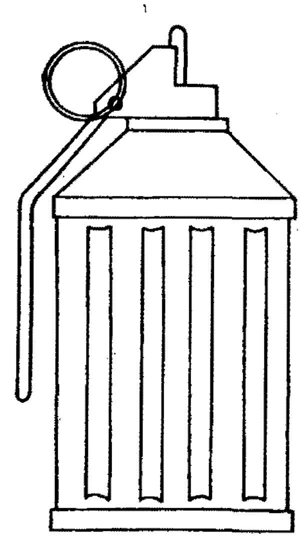
REMARKS:

NOMEN: GRENADE, HAND, WHITE PHOSPHORUS, MODEL T.F.H. (U) ITEM 15

NATIVE DES: ?
PRODUCED/ADOPTED: ?/BEFORE 1966

FOM-1330-9-1-21-A
COUNTRY: NORTH VIETNAM

(U)THE FOLLOWING INFORMATION WAS OBTAINED FROM FIELD EXAMINATION OF THIS HOMEMADE HAND GRENADE CONTAINING PLASTICIZED WHITE PHOSPHORUS (PWP). THE GRENADE FUNCTIONS LIKE THE U.S. M15 AND M34 GRENADES. THE DETONATOR BURSTS THE BODY OF THE GRENADE AND SPREADS SMALL PARTICLES OF PWP. WHEN THESE SMALL PIECES OF PHOSPHORUS COME INTO CONTACT WITH AIR, THEY BURN AT A HIGH TEMPERATURE AND GIVE OFF A DENSE WHITE SMOKE. THE EFFECTIVE CASUALTY RADIUS IS APPROXIMATELY 15 M; HOWEVER, SOME OF THESE PARTICLES MAY BE THROWN AS FAR AS 30 M. THE PHOSPHORUS WILL BURN FOR ABOUT 60 S, IGNITING ANY FLAMMABLE SUBSTANCE IT TOUCHES. IN ADDITION TO THE BURN AND SMOKE EFFECT, THERE IS A SHRAPNEL HAZARD UP TO 20 TO 25 M.



Neg. 512066 (UNCLASSIFIED)

NOMEN: GRENADE, HAND, WHITE PHOSPHORUS, MODEL T.F.H. (U) ITEM 15

FOM-1330-9-1-21-A

PRODUCED/ADOPTED: ?/BEFORE 1966

COUNTRY: NORTH VIETNAM

CURRENT STATUS: --- IMPROVISED

CHARACTERISTICS:

TYPE ------------ OFFENSIVE HAND GRENADE
WEIGHT ---------- ?
LENGTH ---------- 11 CM
MAX DIAMETER ---- 6 CM
BODY MATERIAL/
  SHAPE --------- SHEET METAL
FILLER-WEIGHT --- ?
  -MATERIAL ----- PLASTICIZED WHITE PHOSPHORUS
FUZE-TYPE ------- PERCUSSION TYPE (HOMEMADE)
  -DELAY TIME --- ?
FRAGMENT SLEEVE
  -WEIGHT ------- N/A
  -MATERIAL ----- N/A
  -DIAMETER(OUT-
    SIDE)-------- N/A
SMOKE COLOR ----- WHITE
LAUNCHING METHOD
  -CARTRIDGE
    MODEL ------- N/A
CONE(MATERIAL/
  ANGLE) -------- N/A
FINS-NO --------- N/A
IDENTIFYING MARK-
  INGS ---------- "T.F.H." ON FUZE HANDLE

PERFORMANCE:
  AVERAGE RANGE --- APPROX 15 M
  EFFECTIVE FRAG
    RADIUS -------- N/A
  PENETRATION ----- N/A
  BURNING TIME ---- 60 S

REMARKS:

NOMEN: 82-MM MORTAR CS CARTRIDGE (U)

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1968

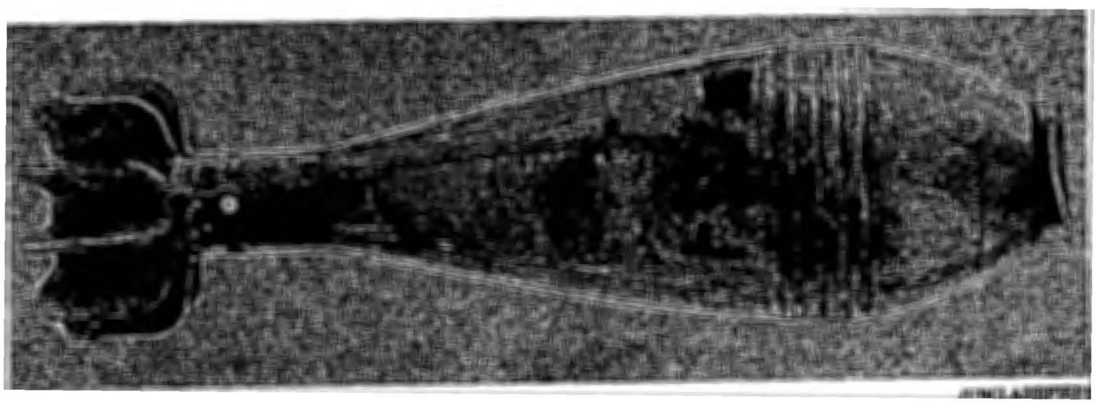
FOM-1311-9-1-82-1-A
COUNTRY: N. VIETNAM

(U)THIS NORTH VIETNAMESE MORTAR CARTRIDGE IS A MODIFICATION OF A CHINESE COMMUNIST HE ROUND. THE HE FILLER HAS BEEN REMOVED IN THE FIELD AND A CS FILLER SUBSTITUTED. THE CS WAS PROBABLY CAPTURED FROM U.S. SUPPLY SOURCES.

(U)WEIGHT OF THE ORIGINAL HE ROUNC HAS BEEN REPORTED TO BE 3.3 KG. THE VIET CONG LINE THE BOTTOM OF THE EMPTIED CARTRIDGE WITH LEAD IN AN ATTEMPT TO BRING THE WEIGHT OF THE CS ROUND (APPROXIMATELY 2.86 KG) UP TO THAT OF THE HE ROUND.

(U)THE CARTRIDGE'S INTERIOR VOLUME IS 20.13 CUBIC INCHES. ABOUT 34 PERCENT TNT IN THE FILL WOULD BE NECESSARY TC SHATTER THE ROUND. THE VIET CONG ADD ABOUT 111 GRAMS OF TNT CHIPS AND FILL THE REMAINING VOLUME WITH ABOUT 60.7 GRAMS OF CS-1.

(U)MARKINGS VARY. SOME CAPTURED ROUNDS WERE MARKED, NEAR THEIR TOPS, WITH A HALF-INCH RED BAND AND WERE HAND-LETTERED "CS-1"; THE LETTER "H" WAS INSCRIBED ON SOME OTHERS. CAPTURED INSTRUCTIONS PRESCRIBED: THAT THE ROUNDS BE LABELED "USA"; THAT THEY BE MARKED WITH A RED BAND; THAT THEY BE LETTERED "CS-1"; AND THAT THEY BE MARKED WITH TWO BLUE (OR GREEN) BANDS, "WHICH STAND FOR NERVE GAS." THE PURPOSE OF THESE MISLEADING MARKINGS WAS NOT EXPLAINED IN THE INSTRUCTIONS.



Neg. 511558

NOMEN: 82-MM MORTAR CS CARTRIDGE (U)

FOM-1311-9-1-82-1-A

COUNTRY: N. VIETNAM

PRODUCED/ADOPTED: ?/1968

CURRENT STATUS: --- IMPROVISED

NATIVE USING WEAPONS: -

COMPLETE ROUND:
- CALIBER ---------- 82-MM
- TYPE ------------ CS-FILLED
- MODEL ----------- ?
- WEIGHT ---------- APRX 2.86 KG
- LENGTH OVERALL -- 280 MM
- BODY MATERIAL --- STEEL
- FILLER
  - -WEIGHT ------- *1
  - -MATERIAL ----- CS-1 TNT
- FUZE
  - -TYPE --------- POINT DETONATING
  - -MODEL -------- M-6 ?
- IDENTIFYING-
  - MARKINGS ------ SEE TEXT

PROPELLANT:
- TYPE ------------ ?
- WEIGHT FULL-
  - CHARGE -------- 68 G
- CONFIGURATION --- ?

PERFORMANCE:
- EFF FRAG RADIUS - ?
- LETHAL AREAS ---- N/A

REMARKS:
1/ CS-1, APRX 60.7 GM; TNT, APRX 111 GM

NOMEN: PROJECTILE, 65-MM, MCRTAR, CS-FILLED, W/PWD TIME DELAY FUZE (U) ITEM 17

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1968

FOM-1311-9-2-65-1-A
COUNTRY: N. VIETNAM

(U)THE 65-MM MORTAR PROJECTILE HAS THREE MAJOR COMPONENTS: (1) A SETBACK INITIATED DELAY FUZE, (2) A PROJECTILE BODY CONTAINING CS AGENT, AND (3) A FOUR-FIN STABILIZER ASSEMBLY. ALL COMPONENTS, WITH THE EXCEPTION OF THE CS, APPEAR TO BE OF LOCAL MANUFACTURE. A WAX COATING ON ALL INTERNAL AND EXTERNAL SURFACES MAKES THE PROJECTILE WATERPROOF. THE CS AGENT PROBABLY WAS CAPTURED OR OTHERWISE OBTAINED FROM U.S. SUPPLIES.

(U)THE PROJECTILE EMPLOYS A HOMEMADE, POWDER TIME DELAY FUZE THREADED INTO THE GRENADE BODY. UPON SETBACK, THE FIRING FIN OVERCOMES THE INERTIA OF THE RETAINING SPRING AND STRIKES THE IGNITER. THE IGNITER THEN INITIATES THE 8-SECOND DELAY ELEMENT, WHICH IGNITES A SMALL POWDER CHARGE PLACED WITHIN THE CENTER OF THE PROJECTILE BODY. THE HOMEMADE BLACK POWDER CHARGE (CHARCOAL, SALTPETER, AND SULFUR) IS CONTAINED WITHIN A WAX-IMPREGNATED PAPER CONE. THE LOW-ORDER DETONATION OF THIS CHARGE CAUSES THE PROJECTILE BODY TO SEPARATE AND TO DISPERSE THE CS AGENT.

(U)THE PROJECTILE IS FABRICATED FROM 0.6-MM GALVANIZED IRON OR STEEL; ALL SEAMS ARE ROLLED AND CRIMPED. THE BODY IS IN TWO SECTIONS; EACH SECTION HAS A METAL CYLINDER WITH A CONICAL END. THE CONE OF THE UPPER SECTION IS THREADED TO RECEIVE THE FUZE. THE CYLINDRICAL PORTION OF THE UPPER SECTION OF THE PROJECTILE BODY IS INSERTED WITHIN THE CYLINDRICAL PORTION OF THE LOWER SECTION. WHEN THE RCUND DETONATES, THE PROJECTILE BODY RUPTURES OR SEPARATES INTO THE UPPER AND LOWER SECTIONS. THE FORCE OF THE BLAST ALSO RUPTURES THE PLASTIC BAGS WHICH CONTAIN THE CS AGENT, AND THE AGENT IS DISPERSED. WIND VELOCITY AND TERRAIN CHARACTERISTICS DETERMINE THE DOWNWIND AREA THAT IS AFFECTED.

(U)THE FOUR-FIN STABILIZER ASSEMBLY IS ATTACHED TO THE PROJECTILE BODY BY A SCREW, WHICH PASSES THROUGH A WASHER IN THE CONE OF THE LOWER SECTION INTO THE TOP OF THE STABILIZER ASSEMBLY. THE BOOM OF THE STABILIZER ASSEMBLY IS FABRICATED FROM A BRASS CARTRIDGE CASE OF A U.S. 20-MM MACHINEGUN RCUND. FOUR STABILIZER FINS (TWO PAIRS) MADE OF 2-MM SHEET METAL ARE RIVETED TO THE CARTRIDGE CASE AT EQUIDISTANT POINTS.

(U)THE CONFIGURATION OF THE PROJECTILE INDICATES THAT IT IS FIRED FROM A HANDMADE SPIGOT, A CUP-TYPE GRENADE LAUNCHER, OR A HANDMADE MORTAR TUBE.

NOMEN: PROJECTILE, 65-MM, MORTAR, CS-FILLED, W/PWD TIME DELAY FUZE (U) ITEM 17
FOM-1311-9-2-65-1-A

PRODUCED/ADOPTED: ?/1968
COUNTRY: N. VIETNAM

CURRENT STATUS: --- IN MILITARY USE IN VIETNAM

NATIVE USING WEAPONS: - ?

COMPLETE ROUND:
- CALIBER --------- 65 MM
- TYPE ------------ HANDMADE (CS FILLED)
- MODEL ----------- ?
- WEIGHT ---------- .626 KG
- LENGTH OVERALL -- 304.0 MM
- BODY MATERIAL --- GALVANIZED IRON OR STEEL
- FILLER
  - -WEIGHT ------- APPROX .11 KG
  - -MATERIAL ----- RIOT CONTROL AGENT CS
- FUZE
  - -TYPE --------- POWDER TIME DELAY
  - -MODEL -------- HANDMADE
- IDENTIFYING-
  MARKINGS ------ ?

PROPELLANT:
- TYPE ------------ ?
- WEIGHT FULL-
  CHARGE -------- ?
- CONFIGURATION --- ?

PERFORMANCE:
- EFF FRAG RADIUS - ?
- LETHAL AREAS ---- N/A

REMARKS:

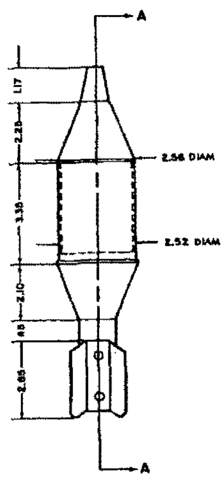
Original

NOMEN: PROJECTILE, 65-MM, MORTAR, CS-FILLED, W/PWD TIME DELAY FUZE (U)

FDM-1311-9-2-65-1-8

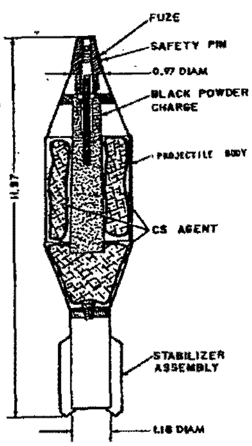
PRODUCED/ADOPTED: 7/1968

COUNTRY: N. VIETNAM



OVERALL VIEW

Neg. 515285 (UNCLASSIFIED)



SECTION A-A

SECTIONAL VIEW

Neg. 515286 (UNCLASSIFIED)

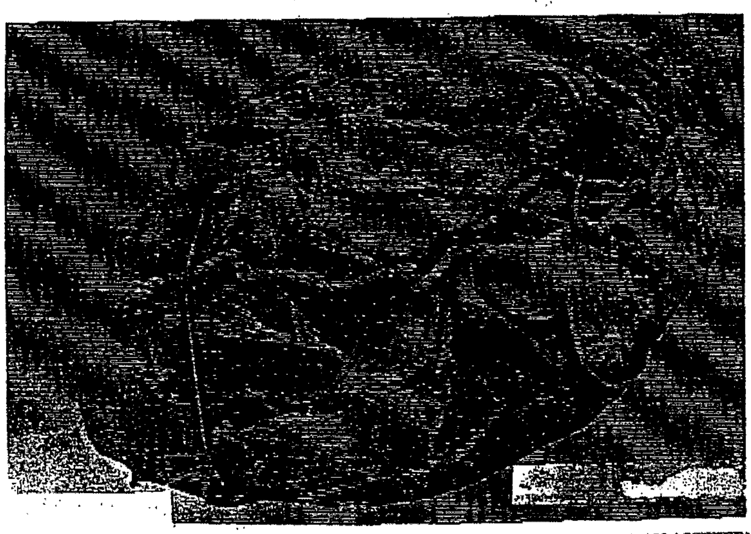
NOMEN: MINE, CHEMICAL, CS, IMPROVISED (U) ITEM 18

NATIVE DES: LAUNCH BOMB 320 ?
PRODUCED/ADOPTED: ?/?

FOM-1345-9-1-14-A
COUNTRY: NORTH VIETNAM

(U)THIS MINE IS A CRUDE CS-FILLED DEVICE THAT CAN BE EXPLODED AT EMPLACED POSITIONS OR USED AS A PROJECTILE. IN EITHER CASE, THE CS IS WRAPPED IN NYLON AND BURLAP AND TIED INTO A COMPACT BUNDLE WITH ROPE OR WIRE. AS A PROJECTILE, THE DEVICE IS LAUNCHED BY AN EXPLOSIVE CHARGE PLACED IN THE BOTTOM OF A SHAPED PIT DUG IN THE GROUND; THE EARTH IS REPLACED IN THE PIT, AND THE CS-BUNDLE IS LAID ON THE SURFACE ABOVE THE EXPLOSIVE.

(U)SPECIFICATIONS FOR LAUNCHING 20 KG OF CS REQUIRE A PIT 1 M LONG, 0.4 M WIDE, AND 0.5 M DEEP AND A PROPELLANT CHARGE OF 4 KG OF SMALL TNT BLOCKS ARRANGED IN THREE ROWS. EXPLOSIVE ELEMENTS INCLUDE TNT, PRIMER, BLASTING CAP, AND A FUZE THAT CAN BE TIMED FOR AN AIR OR GROUND BURST. THE TNT IS FIRED ELECTRICALLY BY BLASTING CAPS FROM A SAFE DISTANCE. THE USUAL RANGE, ABOUT 297 M, CAN BE INCREASED TO 379 M. INSTRUCTIONS INCLUDE DETAILED GUIDANCE ON SHAPING THE LAUNCHING PIT AND ON AIMING. AT THE SURFACE, THE PIT IS RECTANGULAR; ITS FLAT WALLS SLOPE INWARD TOWARD THE FLAT BOTTOM, WHICH IS SLANTED 40 TO 50 DEGREES (PERPENDICULAR TO THE LINE OF TRAJECTION). THE PIT IS ORIENTED WITH A LINE OF AIMING STAKES.



Neg. 512065

(UNCLASSIFIED)

NOMEN: MINE, CHEMICAL, CS, IMPROVISED (U)

FOM-1345-9-1-14-A
COUNTRY: NORTH VIETNAM

PRODUCED/ADOPTED: ?/?

CURRENT STATUS: --- IMPROVISED

COMPLETE MINE:
- TYPE ------------ CHEMICAL (CS)
- LENGTH ----------- ?
- WIDTH ------------ ?
- MAX DIAMETER ---- ?
- HEIGHT ----------- ?
- WEIGHT ----------- 20 KG ?
- ACTUATING FORCE - N/A

CASE:
- MATERIAL --------- ?
- THICKNESS -------- ?
- WEIGHT ----------- ?
- FUZE WELLS-NO --- NONE
- SERRATIONS-NO --- NONE

FILLERS:
- MAIN CHARGE
  - -TYPE ---------- TNT
  - -WEIGHT -------- ?
- BOOSTER CHARGE
  - -TYPE ---------- N/A
  - -WEIGHT -------- N/A
- PROPELLING CHARGE
  - -TYPE ---------- ?
  - -WEIGHT -------- ?
- METAL FILLER
  - -TYPE ---------- N/A
  - -WEIGHT -------- N/A

FUZE:
- MODEL ------------ ?
- TYPE ------------- ?
- SAFETY DEVICE(S) ?

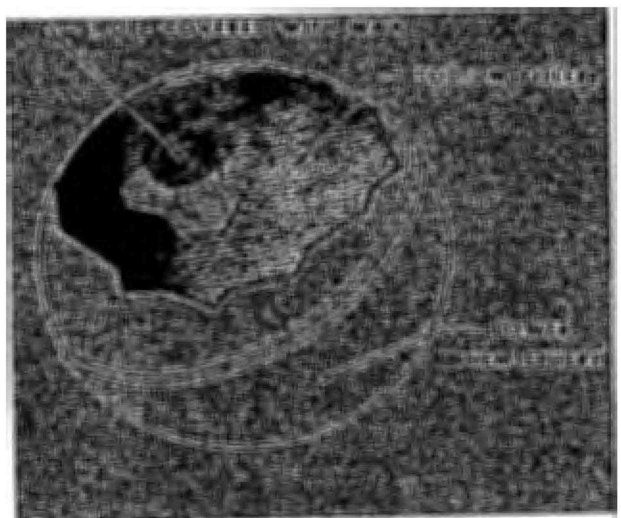
PERFORMANCE:
- EFFECTIVE FRAG RADIUS --------- N/A
- EFFECTIVE BLAST RADIUS --------- N/A
- MAX PENETRATION - N/A
- HGT REACHED AT DETONATION ---- ?

REMARKS:

NOMEN: INCENDIARY DEVICE, SODIUM, MODEL ? (U) ITEM 19

NATIVE DES: ? FOM-1345-9-1-13-A
PRODUCED/ADOPTED: ?/? COUNTRY: NORTH VIETNAM

(U)THIS INCENDIARY DEVICE IS A SABOTAGE WEAPON CONSTRUCTED OF TWO SHEET METAL HEMISPHERES OF APPROXIMATELY 8 MM DIAMETER WHICH HAVE BEEN WELDED TOGETHER. EACH HEMISPHERE HAS A HOLE COVERED WITH WAX AND PAPER TO EXCLUDE MOISTURE. THE DEVICE CONTAINS SODIUM SUSPENDED IN A TARLIKE SUBSTANCE. WHEN THE DEVICE IS EMPLACED IN WATER, THE WAX AND PAPER SEALS ARE REMOVED TO PERMIT MOISTURE TO ENTER. THE SUBSEQUENT WATER-SODIUM REACTICN PRODUCES SMOKE AND FLAME THROUGH THE TWO HOLES FOR 4 TO 5 S TO A DISTANCE OF ABOUT 1 M. THE CASE, WHICH REMAINS INTACT AFTER THE CONTENTS HAVE BURNED OUT, SMELLS OF KEROSENE AND FEELS AS IF IT WERE COVERED WITH SOAP. THE DEVICE IS ESPECIALLY EFFECTIVE IN AREAS SUBJECT TO GAS OR OIL SEEPAGE AND MAY BE PLACED IN BOAT BILGES OR CONTAINERS OF WATER TO IGNITE FLAMMABLE MATERIALS IN DEPOTS.



Neg. 512064 (UNCLASSIFIED)

NOMEN: INCENDIARY DEVICE, SCDIUM, MODEL ? (U)

FOM-1345-9-1-13-A
COUNTRY: NORTH VIETNAM

PRODUCED/ADOPTED: ?/?

CURRENT STATUS: - STANDARD

TYPE: ----------- INCENDIARY

PHYSICAL DATA:
LENGTH -------- N/A
DIAMETER------ 4 CM
WEIGHT -------- 43 G
FILLING ------- SODIUM IN TARLIKE SUBSTANCE

MARKING: ------- ?

REMARKS:

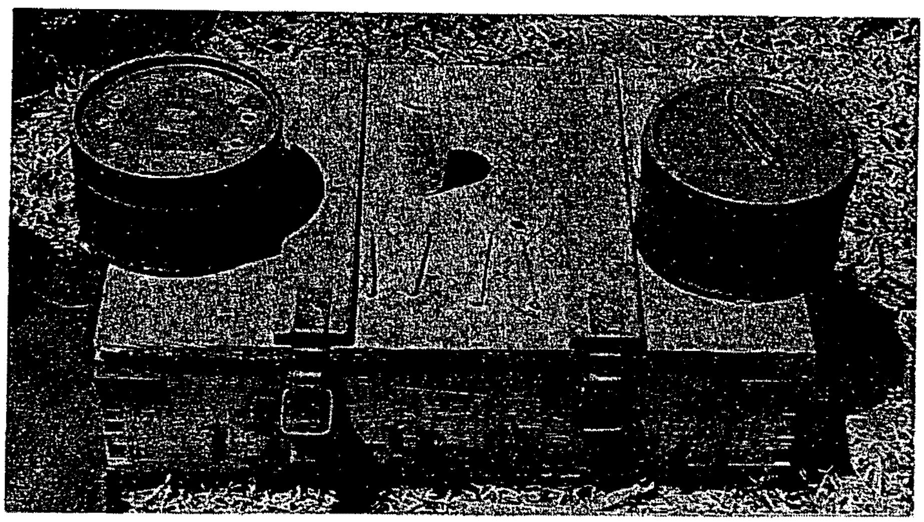
NOMEN: SMOKE POT, MODEL ?, COPY OF SOVIET DM-11 (U) ITEM 29

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1960 ?

FOM-1365-5-4-1-A
COUNTRY: PRC

(U)THIS SMOKE POT, CAPTURED FROM COMMUNIST FORCES IN SE ASIA, WAS IDENTIFIED IN THE FIELD AS A PRC VERSION OF THE SOVIET MODEL DM-11. EXTERNAL CHARACTERISTICS WERE IDENTICAL TO THE SOVIET PRODUCT, BUT MARKINGS WERE LACKING EXCEPT ON THE WOODEN PACKING CASE WHICH CONTAINED SIX POTS AND A PLASTIC VIAL OF 12 IGNITION MATCHES. THE CHEMICAL COMPOSITION OF THE SMOKE MIXTURE WAS NOT DETERMINED BUT WAS ASSUMED TO BE SIMILAR TO THE SMOKE MIXTURE IN THE SOVIET DM-11.

(U)THE SMOKE POT IS EQUIPPED WITH A REMOVABLE METAL LID; THE LID AND POT ARE HELD TOGETHER BY AN ENCIRCLING BAND OF BLACK TAPE. WHEN THE LID IS REMOVED, 10 SMOKE EMISSION HOLES AND A CENTRALLY LOCATED IGNITION HOLE ARE VISIBLE. THE HOLES ARE COVERED BY STRIPS OF SILVER COLORED TAPE UNTIL TIME OF USE. IN FIELD TESTS A POT PRODUCED SCREENING SMOKE FOR APPROXIMATELY 5 MINUTES.



Neg. 516527 (UNCLASSIFIED)

NOMEN: SMOKE POT, MODEL ?, COPY OF SOVIET DM-11 (U) ITEM 29
FOM-1365-5-4-1-A

PRODUCED/ADOPTED: ?/1960 ? COUNTRY: PRC

CURRENT STATUS: STANDARD

IGNITION METHOD ------- FRICTION MATCH

PHYSICAL DATA:
MATERIAL
-CONTAINER -------- SHEET METAL
-FILLING ---------- ?
WEIGHT
-TOTAL ------------ 2.3 KG
-FILLING ---------- 1.7 KG
DIMENSIONS
-HEIGHT ----------- 11.4 CM
-DIAMETER --------- 16.5 CM

PERFORMANCE:
DELAY TIME ---------- ?
BURNING TIME -------- APPRCX 5 MIN
SMOKE COLOR --------- BASICALLY WHITE

REMARKS:

NOMEN: MASK, PROTECTIVE, MODEL PK-1 (RESPIRATOR AND GOGGLES) (U) ITEM 33

NATIVE DES: ? FOM-4240-5-1-1-A
PRODUCED/ADOPTED: ?/1967 ? COUNTRY: PRC

(U)THE MODEL PK-1 MASK ASSEMBLY PROVIDES NO PROTECTION AGAINST TOXIC VAPORS AND POOR PROTECTION AGAINST SUCH AEROSOLIZED CW PARTICLES, SMOKE AND RIOT-CONTROL AGENTS, AND AGAINST BW AGENTS. THE ASSEMBLY CONSISTS OF A PAIR OF GOGGLES AND A SMALL RESPIRATOR THAT BARELY COVERS THE NOSE AND MOUTH. BOTH ITEMS ARE MADE OF GLOSSY GREEN RUBBER AND ARE HELD ON BY HEADSTRAPS. SPECIMENS OF THE PK-1, CAPTURED IN VIETNAM IN 1967, WERE EQUIPPED WITH A SMALL DRUM-SHAPED FILTER CANISTER, PRC MODEL 66 (FOM-4240-5-2-1), WHICH HAS EXCELLENT PROTECTIVE CHARACTERISTICS.

(U)THE MASK AND GOGGLES LEAVE MUCH OF THE FACE AND HEAD EXPOSED. WHEN WORN SEPARATELY, EACH ITEM FITS SATISFACTORILY, BUT WHEN WORN TOGETHER THEY CONFLICT OR OVERLAP AT THE BRIDGE OF THE NOSE AND PERMIT AIR LEAKAGE. THE TIME REQUIRED TO DON AND ADJUST BOTH ITEMS IS ESTIMATED TO BE UP TO 30 SECONDS. BOTH ITEMS HAVE SPONGE RUBBER GASKETS GLUED AROUND THEIR INNER PERIPHERIES; IN THE SPECIMENS OBSERVED, THE GASKETS HAD BECOME UNGLUED SO THAT THEIR SEALING EFFECTS WERE INHIBITED. THE GOGGLES ARE NOT PROVIDED WITH ANY MEANS OF PREVENTING INTERNAL FOGGING OF THE LENS. THE RESPIRATOR IS EQUIPPED WITH THREE VALVES THAT CONTROL THE DIRECTION OF AIRFLOW. THE VALVE ASSEMBLIES, WHICH ARE SIMILAR TO THOSE IN SOVIET MASKS, CONTAIN DISKS OF THIN, FLEXIBLE RUBBER. ONE VALVE, LOCATED AT THE TOP OF THE AIR INLET, ADMITS FILTERED AIR. EXHALED AIR ESCAPES THROUGH A DOUBLE OUTLET VALVE IN THE FRONT OF THE MASK. (DOUBLE VALVES ARE MORE EFFECTIVE THAN SINGLE VALVES IN PREVENTING BACK LEAKAGE.) THE OUTERMOST DISK OF THE DOUBLE VALVE IS NOT PROVIDED WITH A GUARD TO PROTECT IT AGAINST INJURY OR FOREIGN OBJECTS THAT MIGHT INHIBIT SEATING. THE SCREW THREADS OF THE AIR INLET, WHICH ARE STANDARD FOR SOVIET (AND PRC) MILITARY CANISTERS AND HOSES, PERMIT THE USE OF VARIOUS TYPES OF CANISTERS IF PROVISIONS ARE MADE TO SUPPORT THEIR WEIGHT. ALTHOUGH THE PK-1 DISPLAYS SEVERAL VULNERABILITIES, IT IS SMALL, LIGHTWEIGHT, AND RELATIVELY INEXPENSIVE. TWO-PIECE ASSEMBLIES OF THIS TYPE ARE USED IN INDUSTRY, BUT MOST COUNTRIES CONSIDER THEM UNSUITED FOR CBR USE.

NOMEN: MASK, PROTECTIVE, MODEL PK-1 (RESPIRATOR AND GOGGLES) (U) ITEM 33

FOM-4240-5-1-1-A

PRODUCED/ADOPTED: ?/1967 ? COUNTRY: PRC

CURRENT STATUS: USED IN COMBAT

FACEPIECE, TYPE: HEAD HARNESS

MATERIALS:
- FACEPIECE ---------- RUBBER
- CANISTER ---------- SEE TEXT
- HOSE -------------- N/A
- BREATHING BAG ----- N/A
- REGENERATING CART - N/A
- CARRIER ----------- COTTON CLOTH

DIMENSIONS:
- FACEPIECE --------- *1
- CANISTER ---------- SEE TEXT
- HOSE -------------- N/A
- CARRIER
  - -HEIGHT --------- 15.2 CM (ESTIMATED)
  - -WIDTH ---------- 22.9 CM (ESTIMATED)
  - -LENGTH --------- 10.1 CM (ESTIMATED)
- REGENERATING CART - N/A
- BREATHING BAG
  - -HEIGHT --------- N/A
  - -WIDTH ---------- N/A
  - -LENGTH --------- N/A
- OXYGEN CYLINDER --- N/A

WEIGHT:
- FACEPIECE --------- *2
- CANISTER ---------- SEE TEXT
- HOSE -------------- N/A
- CARRIER ----------- 227 G (ESTIMATED)
- REGENERATING CART - N/A
- BREATHING BAG ----- N/A
- OXYGEN CYLINDER --- N/A
- TOTAL ------------- 454+ G

PERFORMANCE:
- VISIBILITY ---------- PROBABLY SATISFACTORY
- COMFORT ------------- ?
- COMMUNICATION ------- ?

FACEPIECE PENETRATION ?

LEAKAGE-
- -PERIPHERAL ------- HIGH
- -OUTLET VALVE ----- SATISFACTORY

EFFECT OF COLD-
- -HOSE ------------- N/A
- -EYEPIECE --------- SUSCEPTIBLE TO FOGGING
- -FACEPIECE -------- ?
- -DEFLECTOR TUBES--- N/A

ACTIVATING UNIT:
- INITIATOR ----------- N/A
- ACTIVATING CHEM ----- N/A

OXYGEN CYLINDER:
- VOLUME -------------- N/A
- FILLING PRESS ------- N/A
- OPN PRESSURE -------- N/A
- OXYGEN CAPACITY (STP) N/A

DURATION OF OXYGEN SUPPLY: N/A

REMARKS:
1/ HEIGHT, 11.2 CM; WIDTH, 9.4 CM; DEPTH, 9.7 CM (APPROXIMATE)

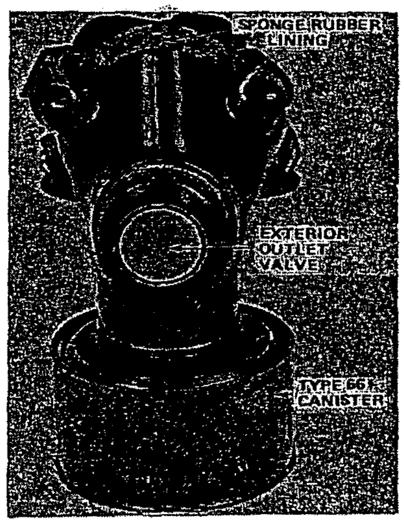
2/ RESPIRATOR, 142 GRAMS, GOGGLES, 85.1 GRAMS

NOMEN: MASK, PROTECTIVE, MODEL PK-1 (RESPIRATOR AND GOGGLES) (U)

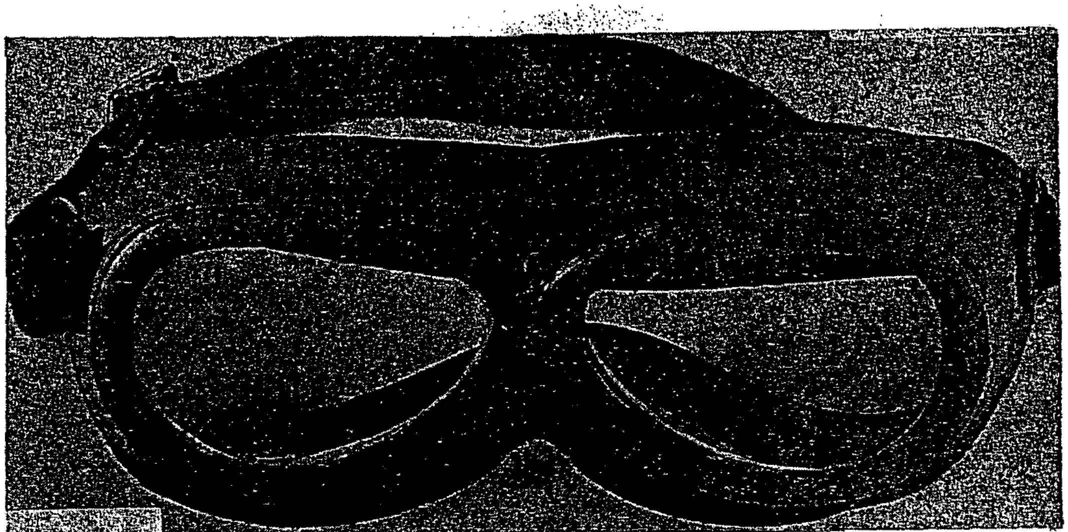
FOM-4240-5-1-1-8

PRODUCED/ADOPTED: ?/1967 ?

COUNTRY: PRC



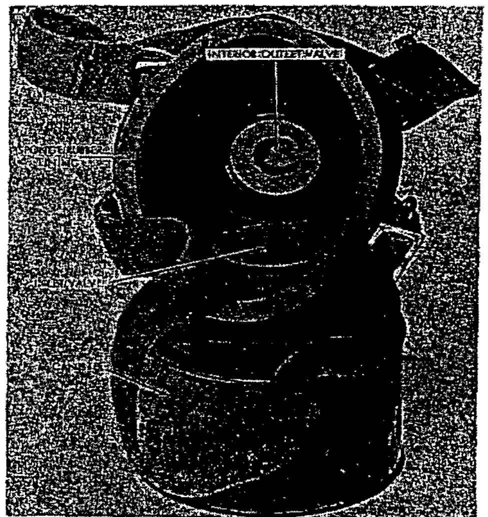
Neg. 511260 (UNCLASSIFIED)



Neg. 511274 (UNCLASSIFIED)

NOMEN: MASK, PROTECTIVE, MODEL PK-1 (RESPIRATOR AND GOGGLES) (U) — ITEM 33

PRODUCED/ADOPTED: ?/1967 ? — FDM-4240-5-1-1-8 — COUNTRY: PRC



Neg. 511297 (UNCLASSIFIED)

Neg. 511548 (UNCLASSIFIED)

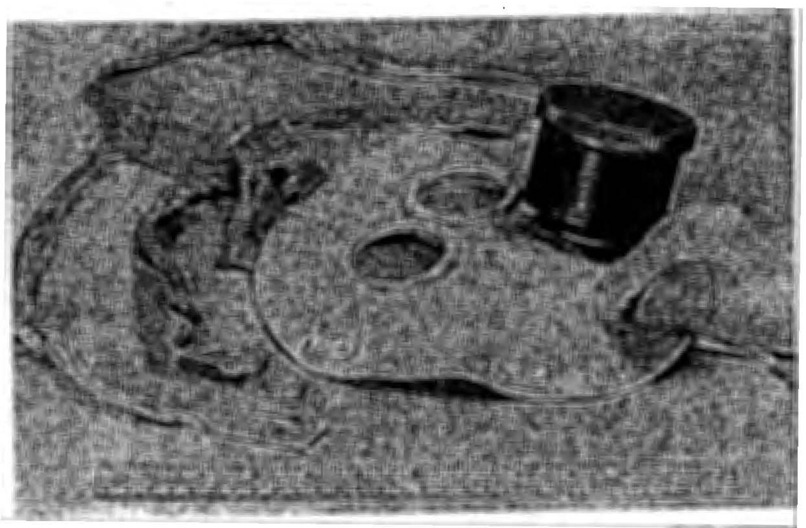
NOMEN: MASK, PROTECTIVE, INFLATABLE, WITH GREEN PLASTIC CANISTER (U) ITEM 34

NATIVE DES: ? FOM-4240-1-1-1-A
PRODUCED/ADOPTED: ?/1968 ? COUNTRY: UNIDENTIFIED

(U)THIS MASK, USED BY NORTH VIETNAMESE VIET CONG FORCES IN 1968, PROVIDES POOR PROTECTION AGAINST CW AGENTS, INCLUDING RIOT CONTROL AGENTS. THE UNIT IS A HARNESS-TYPE RUBBER FACEPIECE TO WHICH A PLASTIC CANISTER IS ATTACHED. THIS MASK REPRESENTS AN AWARENESS OF THE NEED FOR CW PROTECTION AND AN EFFORT TO PROVIDE THIS PROTECTION. ALTHOUGH THIS MASK EXHIBITS AN ADVANCE IN IMPROVISATION OVER FIELD-FABRICATED MODELS, IT OFFERS NO SIGNIFICANT INCREASE IN PROTECTION. IT MAY, HOWEVER, ENCOURAGE INCREASED CONFIDENCE IN THE WEARER.

(U)WHEN THE CANISTER WAS TESTED WITH DOP AEROSOL, 82% LEAKAGE OCCURRED. SIGNIFICANT LEAKAGE WAS DETECTED AT THE OUTLET VALVE. WHEN CYANOGEN CHLORIDE AND CHLOROPICRIN WERE USED, CANISTER BREAKDOWN OCCURRED IN LESS THAN 12 SECONDS. ALTHOUGH THE CANISTER PROVIDES LITTLE OR NO PROTECTION, THE FACEPIECE MATERIAL HAS GOOD RESISTANCE TO PERMEATION OF LIQUID CW AGENTS. THE MASK REQUIRES APPROXIMATELY 125 CU CM OF AIR AT 0.03 KG/SQ CM TO INFLATE THE FACE-SEAL CHAMBER (BY MOUTH) IN 1 MINUTE; NO MEASURABLE AIR LEAKAGE OCCURRED IN THE 4-HOUR TESTING PERIOD.

(U)THE RUBBER MASK IS GRAY, HAS CIRCULAR GLASS EYE LENSES, AND HAS A GREEN PLASTIC ORO-NASAL INSERT HOUSED IN A POCKET OF THE FACEPIECE. TWO PARTS OF THE INSERT PROJECT THROUGH THE FACEPIECE--ONE, ON THE RIGHT SIDE, IS A PROJECTION TO WHICH A FLEXIBLE, FLUTTER-TYPE, OUTLET VALVE IS SECURED (BY A RUBBER BAND); AND A PROJECTION, AT THE LEFT CHEEK, ONTO WHICH A FILTER CANISTER SCREWS. AN INFLATABLE RUBBER AIR CHAMBER IS MOLDED TO THE INNER PERIPHERY OF THE FACEPIECE TO PROVIDE AN AIRTIGHT SEAL BETWEEN THE FACE AND THE MASK. THE CHAMBER IS INFLATED THROUGH A RUBBER TUBE LOCATED AT THE CHIN POSITION; THIS TUBE IS FOLDED OVER ITSELF AND BOUND WITH A RUBBER BAND TO SECURE AGAINST LEAKAGE. A HEAD HARNESS WITH ENCLOSED METAL SPRINGS IS ATTACHED TO FIVE D RINGS--TWO AT THE TEMPLES, TWO AT THE CHEEKS, AND ONE AT THE CENTER OF THE FOREHEAD.



Neg. 511275 (UNCLASSIFIED)

NOMEN: MASK, PROTECTIVE, INFLATABLE, WITH GREEN PLASTIC CANISTER (U) ITEM 34
FOM-4240-1-1-1-A

PRODUCED/ADOPTED: ?/1968 ? COUNTRY: UNIDENTIFIED

CURRENT STATUS: MILITARY USE, VIET NAM,

FACEPIECE, TYPE: HEAD HARNESS

MATERIALS:
FACEPIECE --------- RUBBER
CANISTER ---------- PLASTIC (POLYETHYLENE)
HOSE -------------- N/A
BREATHING BAG ----- N/A
REGENERATING CART - N/A
CARRIER ----------- ?

DIMENSIONS:
FACEPIECE --------- 23.6 CM WIDE; 24.1 CM HIGH
CANISTER ---------- 7.6 CM WIDE, 6.1 CM HIGH
HOSE -------------- N/A
CARRIER
-HEIGHT --------- ?
-WIDTH ---------- ?
-LENGTH --------- ?
REGENERATING CART - N/A
BREATHING BAG
-HEIGHT --------- N/A
-WIDTH ---------- N/A
-LENGTH --------- N/A
OXYGEN CYLINDER --- N/A

WEIGHT:
FACEPIECE --------- 159 G
CANISTER ---------- 62 G
HOSE -------------- N/A
CARRIER ----------- ?
REGENERATING CART - N/A
BREATHING BAG ----- N/A
OXYGEN CYLINDER --- N/A
TOTAL ------------- 221+ G

PERFORMANCE:
VISIBILITY ---------- ?
COMFORT ------------- FAIR
COMMUNICATION ------- POOR

FACEPIECE PENETRATION *1

LEAKAGE-
-PERIPHERAL ------- ?
-OUTLET VALVE ----- SIGNIFICANT
EFFECT OF COLD-
-HOSE ------------- N/A
-EYEPIECE --------- ?

-FACEPIECE -------- FLEXIBLE AFTER 72 H AT 54 DEG C
-DEFLECTOR TUBES--- N/A

ACTIVATING UNIT:
INITIATOR ----------- N/A
ACTIVATING CHEM ----- N/A

OXYGEN CYLINDER:
VOLUME -------------- N/A
FILLING PRESS ------- N/A
OPN PRESSURE -------- N/A
OXYGEN CAPACITY (STP) N/A

DURATION OF OXYGEN SUPPLY: N/A

REMARKS:
1/ GOOD RESISTANCE TO LIQUID AGENTS:
MUSTARD (HD), 77 AND 87 MIN; SARIN (GB),
210 MIN; VX, 480 AND 1440 MIN

NOMEN: KIT, REPAIR PARTS TYPE 59, FOR SHM-1 PROTECTIVE MASK (U) ITEM 35

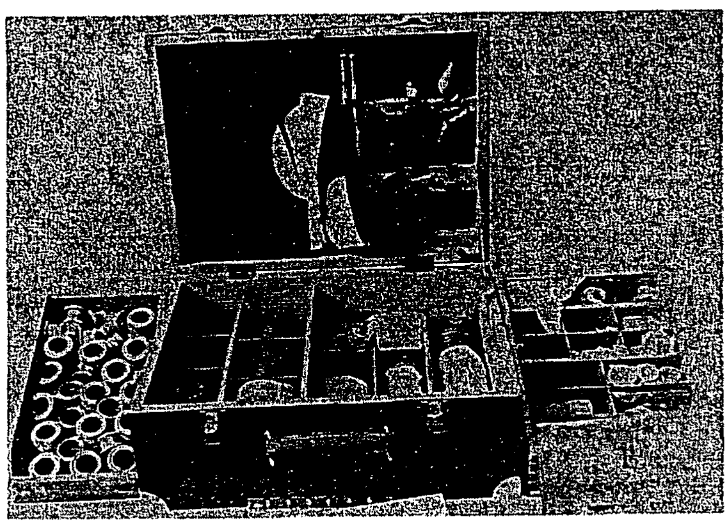
NATIVE DES: ? FOM-4950-5-3-4-1-A
PRODUCED/ADOPTED: ?/1962 ? COUNTRY: PRC

(U)THE MODEL 59 REPAIR PARTS KIT IS DESIGNED TO SUPPLY REPAIR PARTS AND SOME OF THE NECESSARY TOOLS FOR THE REPAIR OF THE SHLEM MASK (FOM-4240-2-1-1) AND THE MODIFIED SHLEM (BLACK-RUBBER) MASK. THIS KIT HAS ENOUGH SPARE PARTS, EXCEPT FACEPIECES, TO REPAIR 20 SHLEM MASKS. THE OTHER NECESSARY TOOLS ARE PROVIDED IN THE TYPE 59 MAINTENANCE AND TESTING KIT (FOM-4950-5-3-4-2).

(U)THE CARRYING CASE, CONSTRUCTED OF 1.3 CM PLYWOOD, IS PAINTED DARK GREEN, AND THE CORNERS ARE REINFORCED WITH METAL BRACES. THE LID IS ATTACHED TO THE BACK OF THE CARRYING CASE BY HEAVY METAL HINGES AND IS SECURED IN THE CLOSED POSITION BY TWO METAL TRUNK LATCHES. ALSO ATTACHED TO THE FRONT OF THE CARRYING CASE IS A STURDY LEATHER CARRYING STRAP.

(U)WHEN THE NECESSARY REPAIRS ARE COMPLETED, THE TYPE 59 TESTING KIT IS USED TO VERIFY THAT ALL LEAKS HAVE BEEN ELIMINATED.

(U)THIS KIT WAS CAPTURED IN SOUTHEAST ASIA.



Neg. 511073 (UNCLASSIFIED)

NOMEN: KIT, REPAIR PARTS TYPE 59, FOR SHM-1 PROTECTIVE MASK (U)

FOM-4950-5-3-4-1-A
COUNTRY: PRC

PRODUCED/ADOPTED: ?/1962 ?

CURRENT STATUS: --- STANDARD

COMPONENTS: ------- *1

PURPOSE: ---------- TO PROVIDE REPAIR PARTS FOR THE SHM-1 PROTECTIVE MASK

MANUFACTURERS: ---- ?

MATERIALS: -------- CONTAINER, WOODEN BOX

MARKINGS: --------- ?

DIMENSIONS:
LENGTH ---------- 45.7 CM
WIDTH ----------- 36.1 CM
HEIGHT ---------- 21.3 CM
WEIGHT ---------- ?

REMARKS:
1/ QUANTITIES AND NOMENCLATURE OF COMPONENTS

QUANTITY	NOMENCLATURE
1	NEEDLENOSE PLIERS
1	REGULAR PLIERS
1	TRIANGLE FILE
1	SCREWDRIVER
2	BRUSHES
1	PACKING LIST
3 EA	EMERY CLOTH
1 M	TARPAULIN
0.3 M	ADHESIVE TAPE
100 G	RUBBER FOR PATCHES
150 G	0.8-MM IRON WIRE
200 G	GLUE
100 G	TALC POWDER
1 EA	GAS CAN
1 EA	0.5-LITER PAINT CAN
15 M	WEBBING STRAP
55 EA	ASSORTED WASHERS
15 EA	SCREW PLUGS
15 EA	ADAPTERS
15 EA	SHORT CONNECTING TUBES
10 EA	SPRINGS
10 EA	INLET-VALVE-FRAME ADJUSTER
20 EA	EYELENS FRAMES

REMARK 1 CONTINUED

30 PIECES	EYELENS
20 BOXES	EYELENS PROTECTIVE SHIMS
25 EA	CONNECTING RINGS
25 EA	VALVE HOUSING
10 EA	SEWING NEEDLES
2 SPOOLS	THREAD
20 EA	INTERNAL OUTLET VALVES
20 EA	EXTERNAL OUTLET VALVES
20 EA	EXTERNAL OUTLET VALVE HOUSING

NOMEN: CANISTER (8.1 CM DIAMETER), MODEL ? (U) ITEM 36

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1967 ?

FOM-4240-1-2-1-A
COUNTRY: UNIDENTIFIED

(b)(1) T

(U)THE CAN-TYPE CONTAINER IS PAINTED GREEN AND HAS ONE SEAM AND BOTH ENDS SOLDERED. CHARCOAL FILLS THE UPPER PORTION, AND A PAPER (PARTICULATE) FILTER, THE LOWER PORTION. INFLUENT AIR ENTERS A CIRCULAR HOLE IN THE BOTTOM END OF THE CANISTER AND TRAVELS UPWARD SEQUENTIALLY THROUGH THE FOLLOWING ITEMS:

1. A METAL PLATE PERFORATED WITH 3.18 MM HOLES.
2. A CELLULOSE PAPER FILTER.
3. A METAL PLATE PERFORATED WITH 3.18 MM HOLES.
4. A CHARCOAL FILTER.
5. A LAYER OF COTTON (WHICH IMPEDES THE FLOW OF FINES CHARCOAL PARTICLES).
6. A LAYER OF WOVEN FABRIC.
7. A METAL PLATE PERFORATED WITH 3.18 MM HOLES.
8. THE FILTERED AIR EXITS THROUGH THE THREADED NECK.

(U)ALTHOUGH THE PLACE OF ORIGIN IS UNKNOWN, THE CANISTER REFLECTS CHARACTERISTICS OF SOVIET MODELS: THE NECK THREADS FIT STANDARD SOVIET PROTECTIVE MASKS; THE INTERNAL CONSTRUCTION IS SIMILAR TO THAT OF SOME SOVIET CANISTERS; AND THE CHARCOAL FILTER'S IMPREGNANTS, DISTRIBUTION, FORM, AND PARTICLE SIZE ARE SIMILAR TO CHARACTERISTICS FOUND IN THE CHARCOAL FILTER OF SOVIET CANISTER MODEL MO-4U (FOM 4240-2-2-6).

DST-1600S-148-76-SUP 1 | Original
NOMEN: CANISTER (8.1 CM DIAMETER), MODEL ? (U) | ITEM 36
PRODUCED/ADOPTED: ?/1967 ? | FOM-4240-1-2-1-A

[redacted] (b)(1)

APPARENT DENSITY ---- 0.62 G/ML
SPECTROGRAPHIC ANAL - *3

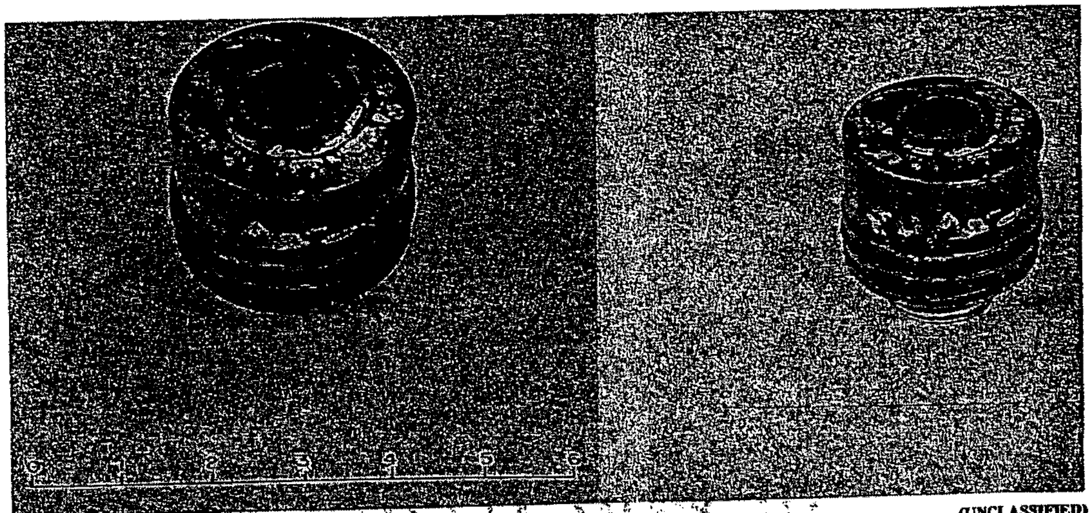
REMARKS:

[redacted] (b)(1)

[redacted] (b)(1)

Original
NOMEN: CANISTER (8.1 CM DIAMETER), MODEL ? (U)
PRODUCED/ADOPTED: ?/1967 ?

DST-1600S-148-76-SUP 1
ITEM 36
FON-4240-1-2-1-B
COUNTRY: UNIDENTIFIED



Neg. 509977 (UNCLASSIFIED)

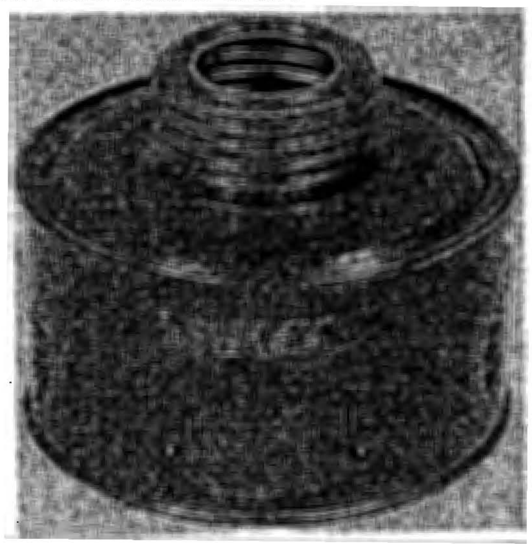
Neg. 509976 (UNCLASSIFIED)

NOMEN: CANISTER, MODEL 66 (U) ITEM 37

NATIVE DES: ? FOM-4240-5-2-1-A
PRODUCED/ADOPTED: ?/1966 COUNTRY: PRC

(U)THIS PRC CANISTER WAS USED BY NORTH VIETNAMESE FORCES IN COMBAT IN 1968. LABORATORY TESTS DISCLOSED THAT THE CANISTER WAS EFFECTIVE AGAINST ALL KNOWN TYPES OF CW STANDARD TOXIC AGENTS FOR SHORT PERIODS OF TIME AND THAT IT PROVIDED ADEQUATE PROTECTION AGAINST RIOT-CONTROL AGENT CS AND AGAINST SPORE-FORMING MICROORGANISMS CONSIDERED TO BE CANDIDATE BW AGENTS.

(U)THE SHEET-METAL CANISTER IS WELL CONSTRUCTED, IS PROVIDED WITH A SCREW CAP, AND IS PAINTED GREEN. THE CANISTER'S UPPER HALF CONTAINS CHARCOAL AND ITS LOWER HALF CONTAINS A PARTICULATE FILTER. THE CHARCOAL FILTER IS RETAINED BETWEEN TWO PERFORATED METAL PLATES: THE LOWER PLATE IS SEALED TO THE CANISTER WALL, AND THE UPPER PLATE IS PRESSED DOWNWARD AGAINST THE CHARCOAL BODY BY THREE COILED SPRINGS. THE CHARCOAL BODY COMPRISES A COARSE (LOWER) LAYER AND A FINE (UPPER) LAYER. THE PARTICULATE FILTER COMPRISES FIVE DOUBLE LAYERS OF COTTON CLOTH WITH A COTTON MAT FACE, AND PAPER AND METAL SEPARATORS. INFLUENT AIR ENTERS A HOLE IN THE BOTTOM OF THE CANISTER, TRAVELS LATERALLY THROUGH THE PARTICULATE FILTER, UPWARD THROUGH THE CHARCOAL, AND EXITS THROUGH THE THREADED NECK. THE NECK THREADS FIT THE PRC PROTECTIVE MASK MODEL PK-1 (FOM-4240-5-1-1) AND ALL KNOWN TYPES OF SOVIET MILITARY PROTECTIVE MASKS CURRENTLY IN USE.



Neg. 511253 (UNCLASSIFIED)

NOMEN: CANISTER, MODEL 66 (U) ITEM 37

FDM-4240-5-2-1-A

PRODUCED/ADOPTED: 7/1966 COUNTRY: PRC

CURRENT STATUS: STANDARD

WEIGHT ---------------- 0.25 KG

MATERIALS:
  CONTAINER ----------- SHEET METAL
  ABSORBENT ----------- CHARCOAL

DIMENSIONS:
  LENGTH -------------- N/A
  WIDTH --------------- 8.9 CM
  HEIGHT -------------- 7.1 CM

ABSORBENT:
  TYPE ---------------- *1
  WEIGHT -------------- 70.8 G
  VOLUME -------------- 17.8 KG
  HARDNESS ------------ ?
  IMPREGNANTS --------- COPPER AND CHROMIUM
  APPARENT DENSITY ---- *2
  SPECTROGRAPHIC ANAL - *3

PARTICULATE FILTER:
  TYPE ---------------- ACCORDION STACKED
  MATERIAL ------------ *4
  HEIGHT -------------- 1.9 CM
  EFFECTIVE AREA ------ ?

PERFORMANCE:
  DOP PENETRATION ----- *5
  AIR RESISTANCE ------ *5
  RESIST TO CHEM AGENTS *6

REMARKS:

1/ IMPREGNATED, EXTRUDED CHARCOAL

3/ SIGNIFICANT AMOUNTS OF SILICON, IRON, ALUMINUM, COPPER AND CHROMIUM.

5/ THE RESULTS OF PENETRATION TESTS OF THREE CANISTERS, USING DIOCTYL PHTHALATE (DOP) PARTICLES OF 0.3 MICRON SIZE AND A FLOW RATE OF 32 LITERS PER MINUTE, WITH AIR RESISTANCE AT A FLOW RATE OF 85 LITERS PER MINUTE, ARE SHOWN BELOW:

CANISTER SPECIMENS	DOP PENETRATION %	AIR RESISTANCE (MM OF WATER)
A	0.005	59
B	0.015	58
C	0.008	60

2/ UPPER LAYER, 0.572
LOWER LAYER, 0.632

4/ LAYERS OF COTTON FABRIC AND COTTON MATTE

6/ RESISTANCE TO CML AGENTS (TESTS OF 3 CANISTERS)

AGENT	AGENT CONCEN-TRATION (MG/L)	TYPE OF FLOW	FLOW RATE (L/MIN)	LIFE*** (MIN)
CK*	4.0	INTERMITTENT	50	0.45-0.68
PS**	50	CONSTANT	32	3.2 -4.1

*USED TO EVALUATE THE ABILITY OF CHARCOAL TO RESIST PENETRANTS.

**USED BECAUSE IT EXHIBITS ABSORPTION CHARACTERISTICS SIMILAR TO NERVE AGENTS BUT IS SAFE.

***THE RELATIVELY SHORT LIFE IS BELIEVED TO BE DUE TO THE THIN CHARCOAL FILTER RATHER THAN TO INEFFECTIVE IMPREGNANTS.

NOMEN: MASK, CBR PROTECTIVE, TYPE ? (U) ITEM 40

NATIVE DES: ? FDM-4240-5-1-4-A
PRODUCED/ADOPTED: ?/1972? COUNTRY: PRC

(U)THIS MASK, TENTATIVELY IDENTIFIED AS A PRC PRODUCT, CONSISTS OF A GRAY FACEPIECE WITH TWO ELLIPTICAL PLASTIC EYELENSES AND ONE FILTER ELEMENT ENCLOSED IN AN ATTACHED RUBBER POUCH AT THE LEFT CHEEK. A TRIANGULAR HEAD PAD IS ATTACHED TO THE FACEPIECE BY SIX ADJUSTABLE HARNESS STRAPS, TWO AT THE FOREHEAD, TWO AT EYE LEVEL, AND TWO AT THE CHEEK POSITION. A DOUBLE-OUTLET VALVE WITH A THIN, GREEN RUBBER DISK FOR VOICE TRANSMISSION IS POSITIONED IN A GRAY PLASTIC HOUSING AT THE SNOUT POSITION. THE OUTLET VALVE AND THE VOICE TRANSMISSION DISK SLIP ONTO A CIRCULAR PLASTIC RING. THE OUTER PORTION OF THE RING HAS SLOTTED OPENINGS WITH AN ATTACHED CIRCULAR RUBBER GASKET FUNCTIONING AS THE SECOND OUTLET VALVE. DEFLECTOR TUBES DIRECT THE PATH OF THE INFLUENT AIR OVER EACH EYELENS. THE ENTIRE ASSEMBLY HAS A SCREWED-ON PLASTIC COVER WITH NUMEROUS CIRCULAR HOLES.

(U)THE FILTER ELEMENT IS ELLIPTICAL AND SUPPORTED BY AN ALUMINUM CAGE. THE ENTIRE ELEMENT CAN BE INSERTED OR REMOVED FROM THE POUCH HOUSING THROUGH A 6-CM HOLE IN THE FLEXIBLE RUBBER; HOWEVER, THE STRUCTURE DOES NOT APPEAR TO LEND ITSELF TO CHANGING THE FILTER IN THE FIELD. A POP-ON PLASTIC DISK WITH A CIRCULAR RUBBER CHECK VALVE COVERS THE OPENING TO THE CANISTER POUCH. THE FILTER ELEMENT CORE IS COMPOSED OF IMPREGNATED CHARCOAL BONDED TO PLASTIC AND SPUN GLASS FIBERS; THE CHARCOAL IS IMPREGNATED WITH LESS THAN 0.1% COPPER AND 0.90% CHROMIUM. AT A FLOW RATE OF 32 L/MIN, THE OVERALL DOP LEAKAGE WAS 0.005%. AIR RESISTANCE, AT A FLOW RATE OF 42.5 L/MIN, WAS 24 MM OF WATER.

(U)THIS MASK HAS EXCELLENT CAPABILITY TO FILTER AEROSOL PARTICLES AND SARIN VAPORS, BUT ITS ABILITY TO ABSORB CK VAPORS IS POOR. PROTECTION AGAINST SARIN IS 69 MIN, WHILE PROTECTION AGAINST CK IS LESS THAN 1 MIN.

NOMEN: MASK, CBR PROTECTIVE, TYPE ? (U)

ITEM 40

PRODUCED/ADOPTED: ?/1972?

FOM-4240-5-1-4-A
COUNTRY: PRC

CURRENT STATUS: STANDARD

FACEPIECE, TYPE: HEAD HARNESS

MATERIALS:
- FACEPIECE --------- GRAY RUBBER
- CANISTER ---------- N/A
- HOSE -------------- N/A
- BREATHING BAG ----- N/A
- REGENERATING CART - N/A
- CARRIER ----------- ?

DIMENSIONS:
- FACEPIECE --------- 25X34 CM
- CANISTER ---------- FILTER ELEMENT IS 10X2X14 CM
- HOSE -------------- N/A
- CARRIER
  - -HEIGHT --------- ?
  - -WIDTH ---------- ?
  - -LENGTH --------- ?
- REGENERATING CART - N/A
- BREATHING BAG
  - -HEIGHT --------- N/A
  - -WIDTH ---------- N/A
  - -LENGTH --------- N/A
- OXYGEN CYLINDER --- N/A

WEIGHT:
- FACEPIECE --------- 511 G INCLUDING FILTER
- CANISTER ---------- FILTER, 123 G
- HOSE -------------- N/A
- CARRIER ----------- ?
- REGENERATING CART - N/A
- BREATHING BAG ----- N/A
- OXYGEN CYLINDER --- N/A
- TOTAL ------------- 511 G

PERFORMANCE:
- VISIBILITY ---------- 50% UNIMPEDED
- COMFORT ------------- *1
- COMMUNICATION ------- 20 M MAXIMUM WITH NORMAL VOICE COMMANDS
- FACEPIECE PENETRATION MORE THAN 4 H FOR LIQUID MUSTARD
- LEAKAGE-
  - -PERIPHERAL ------- *1
  - -OUTLET VALVE ----- ?
- EFFECT OF COLD-
  - -HOSE ------------- N/A
  - -EYEPIECE --------- FOGGING IS EXTENSIVE AT -18 DEG C
  - -FACEPIECE -------- ?
  - -DEFLECTOR TUBES--- ?

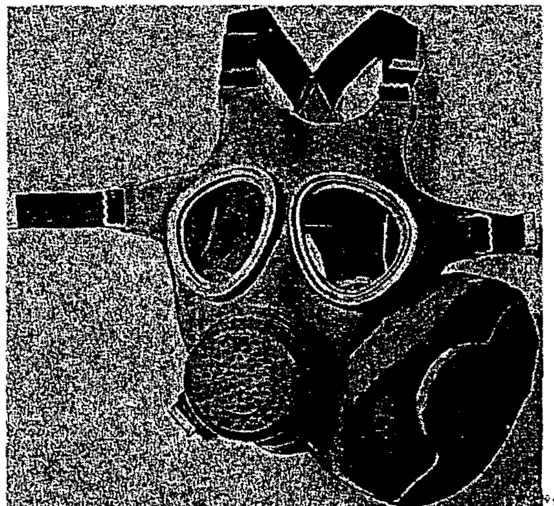
ACTIVATING UNIT:
- INITIATOR ----------- N/A
- ACTIVATING CHEM ----- N/A

OXYGEN CYLINDER:
- VOLUME -------------- N/A
- FILLING PRESS ------- N/A
- OPN PRESSURE -------- N/A
- OXYGEN CAPACITY (STP) N/A

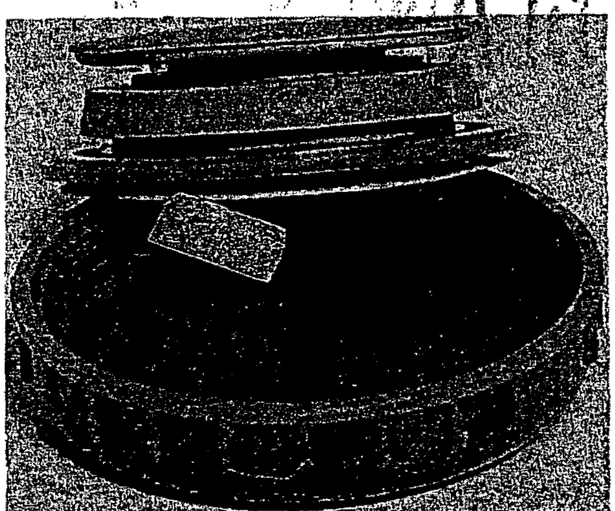
DURATION OF OXYGEN SUPPLY: N/A

REMARKS:
1/ FIT AND COMFORT ARE GOOD FOR SUBJECTS WITH SMALL TO MEDIUM FACIAL FEATURES. NO PERIPHERAL LEAKAGE DETECTED WITH THESE SUBJECTS. SUBJECTS HAVING FACIAL FEATURES LARGER THAN MEDIUM WOULD HAVE A POOR AND UNCOMFORTABLE FIT WITH POSSIBLE PERIPHERAL LEAKAGE.

NOMEN: MASK, CBR PROTECTIVE, TYPE ? (U)
ITEM 40
FOM-4240-5-1-4-8
PRODUCED/ADOPTED: ?/1972?
COUNTRY: PRC



Neg. 520122 (UNCLASSIFIED)



Neg. 520123 (UNCLASSIFIED)

NOMEN: DETECTOR KIT, MODEL 1950 ? (U)

ITEM 48

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1950 ?

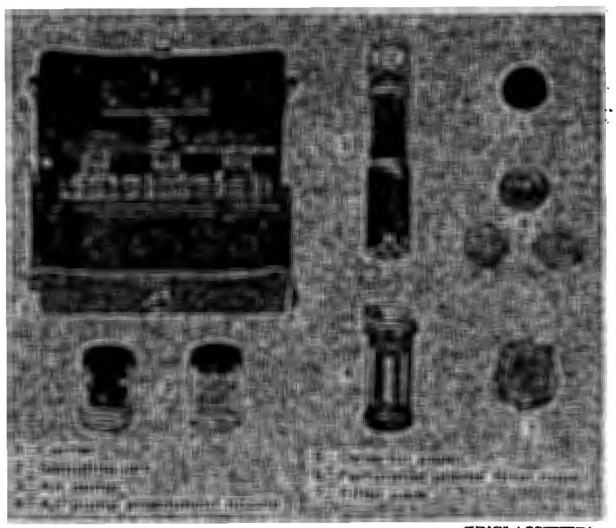
FOM-6665-5-3-1-A
COUNTRY: PRC

(U)THE PRC DETECTOR KIT, MODEL 1950?, CAN BE USED TO DETECT AND TO IDENTIFY A VARIETY OF CW AGENTS INCLUDING THE G-TYPE NERVE AGENTS; TO SAMPLE SMOKES AND UNIDENTIFIED TOXIC CHEMICALS IN THE AIR, ON TERRAIN, OR ON MATERIEL; AND TO IDENTIFY AN AGENT DETECTED BY AN AUTOMATIC DETECTOR.

(U)THE KIT CONTAINS: A HAND-OPERATED PISTON-TYPE AIRPUMP; NINE TYPES OF GLASS CW AGENT DETECTOR TUBES (10 TO A PACKET); TWO SAMPLING JARS; A PUMP ATTACHMENT NOZZLE; PERFORATED, PLASTIC FILTER CUPS; A PACKAGE OF ANTISMOKE FILTER PADS; AND A ROLL OF DETECTOR PAPER. THE KIT, CARRIED BY A SHOULDER STRAP, IS MOVED TO THE WEARER'S FRONT FOR TESTING.

(U)TO PERFORM A TEST BOTH ENDS OF THE DESIRED GLASS TUBES ARE BROKEN OFF. THE INTAKE END OF THE PUMP HAS FIVE HOLES FOR INSERTION OF THE DETECTOR TUBES FOR AGENT TESTING. THE ROTATION OF A KNURL (MARKED 1 TO 5) ABOVE A SPRING PERMITS SELECTION OF A SPECIFIC NUMBER OF INLET HOLES FOR TAKING MULTIPLE SAMPLES. THE OPPOSITE END OF THE PUMP HAS EIGHT HOLES WITH A METAL SPIKE INSIDE EACH HOLE FOR PIERCING THE AMPOULES IN THE TUBES. EACH HOLE IS COLOR MARKED FOR A SPECIFIC DETECTION TUBE. A REAGENT IN THE TUBE WILL UNDERGO A PREDICTABLE COLOR CHANGE IF A SPECIFIC CW AGENT IS PRESENT. THE TYPES OF TUBES INCLUDED IN THE KIT, THEIR COLOR-BAND CODES, AND OTHER CHARACTERISTICS ARE SHOWN IN TABLE 1.

(U)THE AIR PUMP, EXCEPT FOR SLIGHTLY DIFFERENT MEASUREMENTS, IS SIMILAR TO SOVIET MODELS DESCRIBED IN FOM-6665-2-3-8. THE KIT DIFFERS SLIGHTLY IN SIZE BUT IS GENERALLY SIMILAR TO THE SOVIET MODEL PKHR-54 (FOM-6665-2-3-1); HOWEVER, "1950", IMPRINTED ON THE LID, MAY INDICATE THAT THE PRC KIT IS A COPY OF AN EARLIER SOVIET MODEL. PACKETS OF DETECTOR TUBES IN THE KIT ARE MARKED WITH INSTRUCTIONS IN CHINESE.



Neg. 511091 (UNCLASSIFIED)

NOMEN: DETECTOR KIT, MODEL 1950 ? (U) ITEM 48

FOM-6665-5-3-1-A

PRODUCED/ADOPTED: ?/1950 ? COUNTRY: PRC

CURRENT STATUS: --- STANDARD

PERFORMANCE: ------ EXCELLENT

TYPE: ------------- PORTABLE

MAJOR COMPONENTS: - AIR PUMP, DETECTOR TUBES, SAMPLING JARS,

PHYSICAL DATA:
APPEARANCE ------ *1
DIMENSIONS
-CASE --------- *2
-DETECTOR ----- *3
-PUMP --------- LG, 241 CM; DIAM, 3.3 CM
-WEIGHT ------- 2.2 KG

REMARKS:

1/ METAL CARRIER; PAINTED OLIVE GREEN

2/ HEIGHT: 14.5 CM
LENGTH: 24.1 CM
WIDTH: 10.2 CM

3/ GLASS TUBES: LENGTH 10 CM
OUTSIDE DIAMETER 6 MM

TABLE I. TUBE TYPES

RING COLOR CODE MARKINGS	AGENT DETECTED
ONE YELLOW	MUSTARD
TWO YELLOW	NITROGEN MUSTARD
THREE YELLOW	LEWISITE
ONE WHITE	CHLOROACETOPHENONE
TWO WHITE	ADAMSITE
ONE GREEN	PHOSGENE
TWO GREEN	CYANOGEN CHLORIDE
ONE RED	SARIN, SOMAN TABUN
ONE BLACK	HYDROGEN CYANIDE

NOMEN: DETECTOR KIT, TYPE 64 (U) ITEM 49

NATIVE DES: ? FDM-6665-5-3-2-A
PRODUCED/ADOPTED: ?/1964 ? COUNTRY: PRC

(U)THE TYPE 64 DETECTOR KIT IS USED TO TEST WATER AND FOOD FOR CONTAMINATION BY TOXIC CHEMICAL AGENTS. ALTHOUGH ITS CAPABILITIES HAVE NOT BEEN VERIFIED, THE CHINESE CLAIM THE KIT CAN BE USED TO DETECT THE G-TYPE NERVE AGENTS; V-AGENTS; MUSTARD; NITROGEN MUSTARD; LEWISITE; ORGANOPHOSPHORUS INSECTICIDES; ARSENIC; MERCURY; LEAD; AND BARIUM. IN ADDITION TO THOSE, THE CHINESE CLAIM THE APPARATUS CAN DETECT "BIO-ALKALOID"; THIS TERM MAY BE THE RESULT OF A MISTRANSLATION OF CHINESE LANGUAGE INSTRUCTIONS CONTAINED IN A KIT. THE CHINESE TERM MAY MEAN "ALKALOID" SUBSTANCE, SUCH AS LYSERGIC ACID (A DERIVATIVE OF ERGOT).

(U)THE KIT HAS A SLIDING DRAWER IN THE LOWER PORTION WHICH CONTAINS: 2 FLAT GLASS BOTTLES, 1 EMPTY PLASTIC BOTTLE, 1 PIPETTE, 1 PENCIL, 1 THERMOMETER, 1 TEST TUBE CLEANING BRUSH, 1 METAL TEST TUBE HOLDER-CLAMP, 1 PAIR TWEEZERS, 1 SPATULA, AND 1 PLASTIC BOX FILLED WITH MATCHES.

(U)THE CARRIER'S HINGED LID CONTAINS A RACK WITH SPACES FOR 12 TEST TUBES, SOME CLOSED WITH GLASS STOPPERS, SOME WITH RUBBER-BULB DROPPERS. INSIDE ONE TEST TUBE IS A SMALLER SEALED GLASS TUBE WHICH CONTAINS WHAT APPEARS TO BE LITMUS PAPER.

(U)THE LOWER PART OF THE UPPER PORTION OF THE KIT IS DIVIDED INTO 5 SMALL OPEN COMPARTMENTS; 1 LARGER OPEN COMPARTMENT, AND 1 NARROW OPEN COMPARTMENT RUNNING THE LENGTH OF THE KIT, IN THE FRONT. THE LATTER CONTAINS, AT ONE END, A FOAM PLASTIC CUSHIONING MATERIAL WITH HOLES FOR 10 SEALED GLASS CHEMICAL TUBES.

(U)THE KIT ALSO CONTAINS BOTTLES CONTAINING TEST SOLUTIONS. THESE SOLUTIONS ARE IDENTIFIED BY THE TEST SOLUTION ONLY.

NOMEN: DETECTOR KIT, TYPE 64 (U) ITEM 49

FON-6665-5-3-2-A

PRODUCED/ADOPTED: ?/1964 ?

COUNTRY: PRC

CURRENT STATUS: --- STANDARD

PERFORMANCE: ------ SATISFACTORY

TYPE: ------------- PORTABLE

MAJOR COMPONENTS: - TEST TUBES, LITMUS PAPER, - THERMOMETER, MATCHES, SPATULA

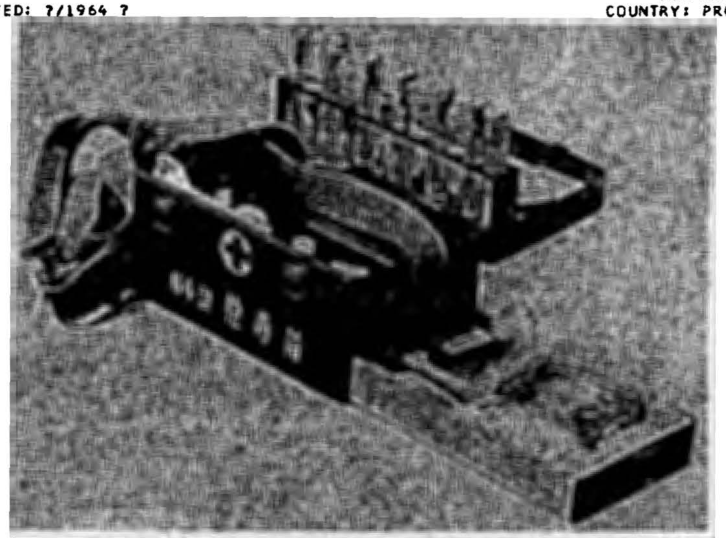
PHYSICAL DATA:
APPEARANCE ------ METAL CARRIER
DIMENSIONS
-CASE --------- 24 X 13.5 X 14 CM
-DETECTOR ----- SEE TEXT
-PUMP --------- N/A
-WEIGHT ------- ?

REMARKS:

Original
NOMEN: DETECTOR KIT, TYPE 64 (U)

PRODUCED/ADOPTED: ?/1964 ?

DST-1600S-148-76-SUP 1
ITEM 49
FOM-6665-5-3-2-B
COUNTRY: PRC



Neg. 511092 (UNCLASSIFIED)

Neg. 511093 (UNCLASSIFIED)

NOMEN: DETECTOR KIT, CHEMICAL AGENT, TYPE 65 (U) ITEM 50

NATIVE DES: ? FOM-6665-5-3-10-A
PRODUCED/ADOPTED: ?/1965? COUNTRY: PRC

(U)THE TYPE 65 CHEMICAL AGENT DETECTOR KIT CAN DETECT AND IDENTIFY SARIN, CYANIDE AND HYDROGEN CYANIDE, PHOSGENE AND DIPHOSGENE, MUSTARD, NITROGEN MUSTARD, LEWISITE, CHLOROACETOPHENONE, AND ADAMSITE AND SAMPLE SMOKES AND CHEMICALS IN THE AIR, ON TERRAIN, OR ON MATERIEL. IT IS EITHER A CHINESE IMPORTED SOVIET ITEM SIMILAR TO THE MODEL PKHR-54 OR A CHINESE COPY THEREOF. THE ONLY EVIDENT NATIVE CHARACTERIZATION IS THE USE OF CHINESE IDEOGRAMS IN THE INSTRUCTION SHEET AND LABELS ON THE CONTENTS.

(U)THE KIT CONSISTS OF A COVERED METAL CASE WITH SHOULDER STRAP CONTAINING BOTH SAMPLING AND ANALYZING COMPONENTS. CONTENTS OF THE KIT ARE LISTED IN THE INSTRUCTIONS AND SPECIFICATIONS SHEET AND INCLUDE AN AIR PUMP AND ATTACHMENT, SAMPLE JAR AND SPATULA, AMPOULE-PIERCING PIN, SMOKE FILTER PAPER, DETECTOR TUBES, PERFORATED PROTECTIVE CAPS, AND COLOR COMPARISON CHART. THE TYPE 65 KIT INCLUDES 10 EACH OF THE FOLLOWING DETECTOR TUBES: ONE BLACK BAND; ONE, TWO, AND THREE YELLOW BANDS; ONE AND TWO GREEN BANDS; ONE RED BAND; AND ONE AND TWO WHITE BANDS.

(U)DETECTOR TUBES ARE DESIGNED TO PRECLUDE THE NEED FOR PREPARATION OF ADDITIONAL REAGENTS. WHEN THE AMPOULES ARE BROKEN WITH A PIERCING PIN, THE REAGENT IS RELEASED. AIR SUSPECTED OF CONTAMINATION IS DRAWN IN THROUGH A DETECTOR TUBE WHICH CONTAINS A LAYER OF SILICA GEL, AND THE AGENT VAPOR IS ADSORBED ON THE SURFACE OF THE SILICA GEL IN THE PRESENCE OF THE CHEMICAL REAGENT WHICH REACTS WITH THE TOXIC AGENT TO PRODUCE A COLOR CHANGE. TO PREPARE A DETECTOR TUBE FOR USE, BOTH ENDS ARE SNAPPED OFF, THE TUBE IS INSERTED IN ONE OF THE FIVE AIR INLET HOLES IN THE PUMP HEAD, AND THE PUMP IS STROKED TO DRAW AIR THROUGH THE TUBE.

(U)THE METAL INTAKE MANIFOLD HOUSING OF THE AIR SAMPLING PUMP HAS EVENLY SPACED NUMBERS TO INDICATE THE NUMBER OF INLETS THAT CAN ACCOMMODATE DETECTOR TUBES; FIVE TUBES CAN BE USED SIMULTANEOUSLY. SEVEN AMPOULE-PIERCING PIN WELLS COLOR CODED WITH SMALL PAINTED STRIPES CORRESPOND TO THE COLOR-CODED, PAINTED BANDS ON THE DETECTOR TUBES. INSTRUCTIONS ON THE TUBE CASSETTES INDICATE THE NUMBER OF STROKES REQUIRED, NORMALLY 50 TO 55 PER MINUTE; HOWEVER, PUMPING FREQUENCY SHOULD BE INCREASED WHEN USING SEVERAL TUBES SIMULTANEOUSLY, WHEN SAMPLING IS CONDUCTED IN 0 TO SUB-0 TEMPERATURES, AND WHEN USING THE PUMP ATTACHEMNT. FILTER PAPER SHOULD BE USED WHEN DETECTING AGENT IN SMOKE.

(U)THE SOVIET RED-BAND-RED-DOT DETECTOR TUBE, WHICH IS NOT A COMPONENT OF THE KIT BUT WHICH MIGHT BE AVAILABLE TO THE CHINESE, WOULD GIVE THE KIT THE CAPABILITY TO DETECT G- AND V-TYPE AGENTS.

(U)SIMILAR SOVIET DEVICES (DETECTOR KIT, MODEL PKHR-54, AND AIR PUMP FOR PKHR-54 DETECTOR KIT) ARE DESCRIBED IN FOM-6665-2-3-1 AND FOM-6665-2-3-8.

NOMEN: DETECTOR KIT, CHEMICAL AGENT, TYPE 65 (U)

ITEM 50
FOM-6665-5-3-10-A
COUNTRY: PRC

PRODUCED/ADOPTED: ?/1965?

CURRENT STATUS: --- STANDARD

PERFORMANCE: ------ SATISFACTORY ?

TYPE: ------------- PORTABLE

MAJOR COMPONENTS: - DETECTOR TUBES, AIR PUMP
- FILTER COVER, SMOKE FILTERS

PHYSICAL DATA:
  APPEARANCE ------ OLIVE GREEN, METAL CASE
  DIMENSIONS
    -CASE --------- 14 X 24 X 10 CM
    -DETECTOR ----- ?
    -PUMP --------- ?
    -WEIGHT ------- ?

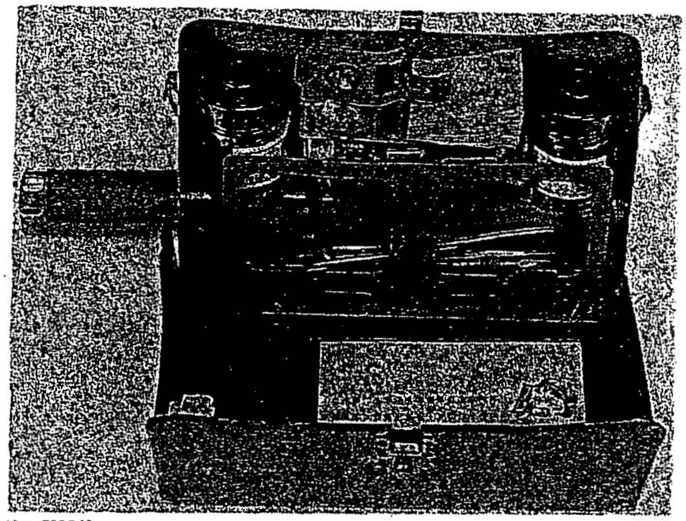
REMARKS:

Original
NOMEN: DETECTOR KIT, CHEMICAL AGENT, TYPE 65 (U)

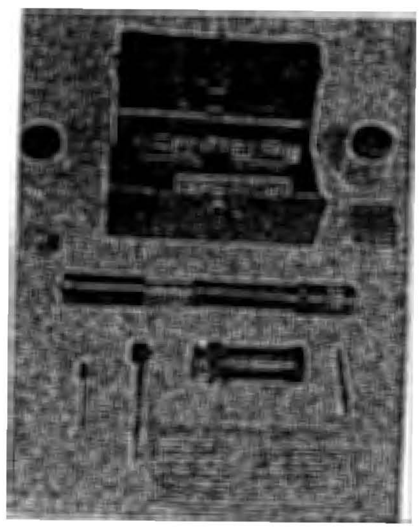
DST-1600S-148-76-SUP 1
ITEM 50
FOM-6665-5-3-10-8

PRODUCED/ADOPTED: ?/1965?

COUNTRY: PRC



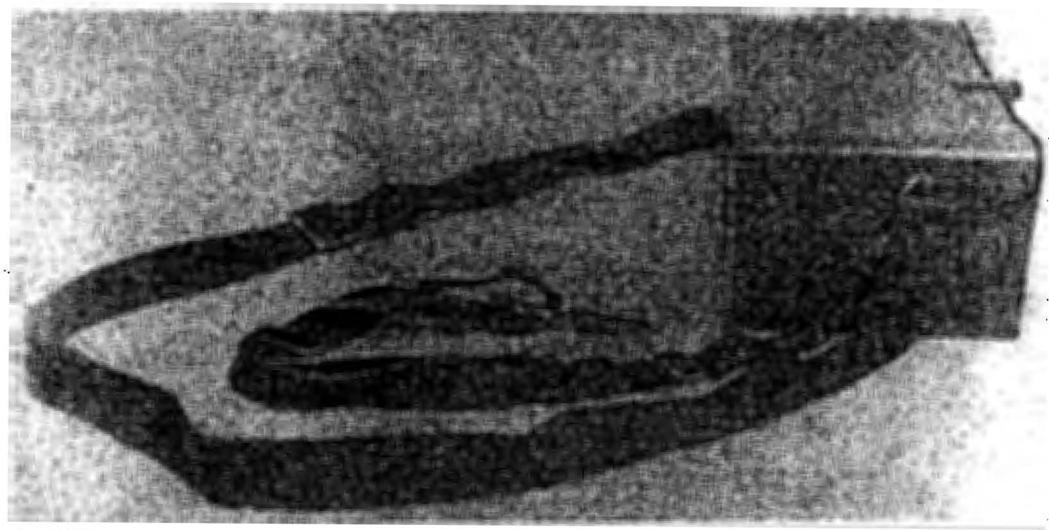
Neg. 511241 (UNCLASSIFIED)



Neg. 511240 (UNCLASSIFIED)

DST-1600S-148-76-SUP 1
NOMEN: DETECTOR KIT, CHEMICAL AGENT, TYPE 65 (U)
PRODUCED/ADOPTED: ?/1965?

Original
ITEM 50
FOM-6665-5-3-10-B
COUNTRY: PRC



Neg. 511242 (UNCLASSIFIED)

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, 7 BLACK PACKETS (U) ITEM 57

NATIVE DES: ?
PRODUCED/ADOPTED: ?/1966

FDM-4230-9-1-1-A
COUNTRY: NORTH VIETNAM

(U)THE INDIVIDUAL DECONTAMINATION KIT OF SEVEN BLACK PACKETS APPROXIMATES THE STATE-OF-THE-ART OF DECONTAMINATION APPARATUS OF ABOUT 1917. ALTHOUGH MOST OF THE DECONTAMINANT MATERIALS ARE OF HIGH QUALITY, THEY ARE ALL WELL-KNOWN SUBSTANCES WITH RATHER LIMITED EFFECTIVENESS.

(U)THIS KIT CONSISTS OF A PLASTIC BAG IN WHICH AN INSTRUCTION SHEET AND SEVEN PACKETS ARE CONTAINED. EACH PACKET HOLDS A DECONTAMINATING MATERIAL IN A SEALED SLEEVE OF PLASTIC WHICH IS SEALED, IN TURN, IN A BROWN RICE-PAPER ENVELOPE. THE BROWN RICE PAPER GRADUALLY TURNS BLACK WITH EXPOSURE AND AGE. THE INGREDIENT, AND ITS PROBABLE EFFECTIVENESS, OF EACH PACKET IS AS FOLLOWS:

(U)PACKET NO. 1 (LABELED: POWDERED LIME) CONTAINS HYDRATED LIME, EFFECTIVE MAINLY AS AN ABSORBENT MATERIAL, WHICH ABSORBS LIQUID MUSTARD (HD) AND G-AGENT AND, TO A LESSER EXTENT, V-AGENT THAT HAS BEEN DEPOSITED ON THE SKIN.

(U)PACKET NO. 2 (LABELED: LIME CHLORURE) HOLDS CALCIUM HYPOCHLORITE, WHICH IS A GOOD MATERIEL DECONTAMINANT FOR HD AND G-AGENTS, BUT HAS A LESSER EFFECT ON V-AGENTS.

(U)PACKET NO. 3 (LABELED: PERMANGANATE) CONTAINS POTASSIUM PERMANGANATE, AN ACCEPTED AID FOR AND EFFECTIVE AGAINST FUNGUS, POISON IVY, AND OTHER MATERIALS WHICH AFFECT THE SKIN SIMILARLY; IT HAS NO EFFECT AGAINST CHEMICAL WARFARE AGENTS.

(U)PACKET NO. 4 (LABELED: POWDERED SOAP) CONTAINS SOAP AND WATER, STANDARD DECONTAMINATING AIDS FOR THE PHYSICAL REMOVAL OF ALL CHEMICAL AGENTS AS WELL AS BIOLOGICAL WARFARE AGENTS.

(U)PACKET NO. 5 (LABELED: CARBONATE NATRI) IS IMPROPERLY LABELED; IT CONTAINS MAINLY SODIUM SULFATE WITH CHROMIUM IMPURITIES. SODIUM SULFATE IS NOT A PARTICULARLY EFFECTIVE DECONTAMINANT.

(U)PACKET NO. 6 (LABELED: COPPER SULFATE) CONTAINS COPPER SULFATE, A STANDARD MATERIAL THAT IS EFFECTIVE FOR CONTROL OF WHITE PHOSPHORUS BURNS.

(U)PACKET NO. 7 (LABELED: HYDROLIC COTTON) HOLDS COTTON, A STANDARD MATERIAL USED FOR REMOVAL OF CONTAMINANT FROM THE SKIN AND FOR THE APPLICATION OF DECONTAMINANTS.

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, 7 BLACK PACKETS (U) ITEM 57
FOM-4230-9-1-1-A

PRODUCED/ADOPTED: ?/1966 COUNTRY: NORTH VIETNAM

CURRENT STATUS: IN MILITARY USE

CARRYING CASE:
MATERIAL ------------ PLASTIC (BAG)
DIMENSIONS:
-LENGTH ----------- *1
-WIDTH ------------ *1
-HEIGHT ----------- *1

WEIGHT --------------- 46 G

DECONTAMINANT:
TYPE ---------------- SEE TEXT
QUANTITY ------------ *1 AND TEXT

REMARKS:

1/ COMPONENT

COMPONENT	LENGTH (CM)	WIDTH (CM)	WEIGHT (G)
OUTER BAG	18.0	11.9	0.96
INSTRUCTION SHEET	26.3	18.3	2.69
PACKET NO.1 (GROSS)	---	---	7.62
PAPER ENVELOPE	7.9	4.8	0.61
PLASTIC BAG	8.1	5.1	0.22
CONTENTS (NET)	---	---	6.79
PACKET NO.2 (GROSS)	---	---	6.61
PAPER ENVELOPE	7.9	5.1	0.88
PLASTIC BAG	7.9	5.1	0.30
CONTENTS (NET)	---	---	5.43
PACKET NO.3 (GROSS)	---	---	4.88
PAPER ENVELOPE	7.1	5.1	0.52
PLASTIC BAG	8.1	6.9	0.31
CONTENTS (NET)	---	---	4.05
PACKET NO.4 (GROSS)	---	---	4.44
PAPER ENVELOPE	7.9	5.0	0.56
PLASTIC BAG	7.9	7.4	0.33
CONTENTS (NET)	---	---	3.55

1/ CONTINUED

COMPONENT	LENGTH (CM)	WIDTH (CM)	WEIGHT (G)
PACKET NO.5 (GROSS)	---	---	7.30
PAPER ENVELOPE	7.2	5.1	0.45
PLASTIC BAG	10.7	6.2	0.44
CONTENTS (NET)	---	---	6.41
PACKET NO.6 (GROSS)	---	---	9.89
PAPER ENVELOPE	7.9	5.1	0.67
PLASTIC BAG	7.9	7.6	0.35
CONTENTS (NET)	---	---	8.87
PACKET NO.7 (GROSS)	---	---	1.57
PAPER ENVELOPE	7.6	4.8	0.54
PLASTIC BAG	8.1	6.4	0.27
CONTENTS (NET)	---	---	0.76

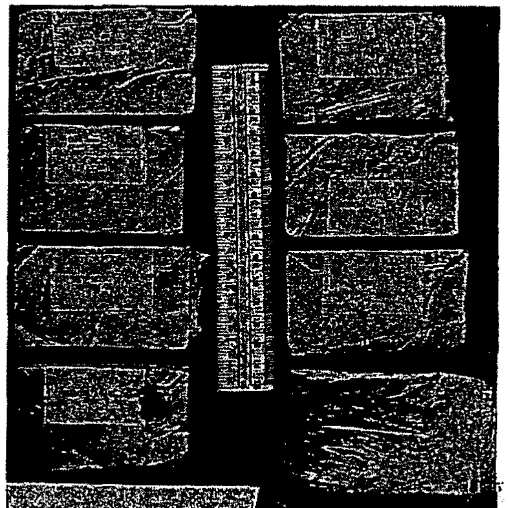
NOMEN: DECONTAMINATION KIT, INDIVIDUAL, 7 BLACK PACKETS (U)

ITEM 57

FOM-4230-9-1-1-8

PRODUCED/ADOPTED: ?/1966

COUNTRY: NORTH VIETNAM



Neg. 511095 (UNCLASSIFIED)

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, FIVE RED PACKETS (U) ITEM 58

NATIVE DES: ? FOM-4230-9-1-2-A
PRODUCED/ADOPTED: 7/1965 COUNTRY: NORTH VIETNAM

(U)THE INDIVIDUAL DECONTAMINATION KIT OF FIVE RED PACKETS GENERALLY APPROXIMATES THE STATE-OF-THE-ART OF DECONTAMINATION APPARATUS OF ABOUT 1917. THE PACKETS, PROPERLY LABELED EXCEPT THAT THE LABELED WEIGHTS ARE NOT CORRECT, CONTAIN GENERALLY PURE-QUALITY, WELL-KNOWN MATERIALS.

(U)THE KIT CONSISTS OF AN OUTER PLASTIC BAG IN WHICH AN INSTRUCTION SHEET AND FIVE RED PLASTIC PACKETS ARE CONTAINED. FOUR OF THE SEALED PACKETS CONTAIN DECONTAMINATING MATERIAL AND THE FIFTH, A COTTON PAD. THE INGREDIENT, AND ITS PROBABLE EFFECTIVENESS, OF EACH PACKET IS AS FOLLOWS:

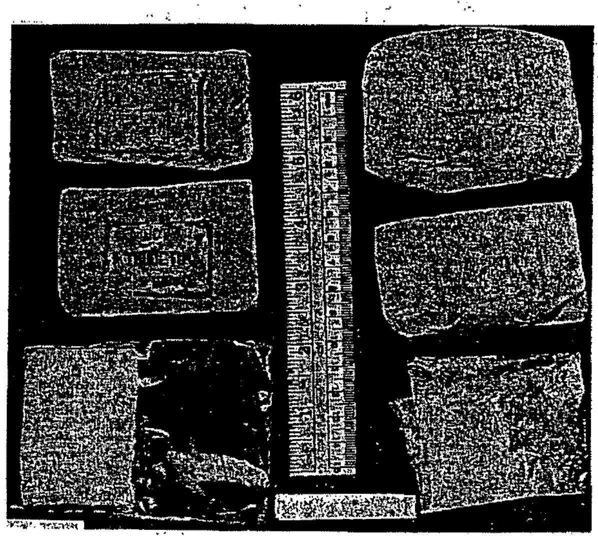
(U)PACKET NO.1 (LABELED: POWDERED LIME) CONTAINS TECHNICAL GRADE, HYDRATED LIME, EFFECTIVE MAINLY AS AN ABSORBENT MATERIAL, WHICH ABSORBS LIQUID MUSTARD (HD), G-AGENT, AND, TO A LESSER EXTENT, V-AGENT THAT HAS BEEN DEPOSITED ON THE SKIN.

(U)PACKET NO.2 (LABELED: PERMANGANATE) CONTAINS POTASSIUM PERMANGANATE, AN ACCEPTED AID FOR AND EFFECTIVE AGAINST FUNGUS, POISON IVY, AND OTHER MATERIALS THAT AFFECT THE SKIN SIMILARLY; IT HAS NO EFFECT AGAINST CHEMICAL WARFARE AGENTS.

(U)PACKET NO.3 (LABELED: ALKALINE SOAP) CONTAINS STRONG SOAP AND WATER, STANDARD DECONTAMINATING AIDS FOR THE PHYSICAL REMOVAL OF ALL CHEMICAL AS WELL AS BIOLOGICAL WARFARE AGENTS.

(U)PACKET NO.4 (LABELED: COPPER SULFATE) CONTAINS COPPER SULFATE, A STANDARD MATERIAL EFFECTIVE FOR CONTROL OF WHITE PHOSPHORUS BURNS.

(U)PACKET NO.5 (NO LABEL) CONTAINS AN ABSORBENT COTTON PAD, A STANDARD MATERIAL USED TO REMOVE CONTAMINANTS FROM THE SKIN AND TO APPLY DECONTAMINANTS.



Neg. 511078 (UNCLASSIFIED)

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, FIVE RED PACKETS (U) ITEM 58

FOM-4230-9-1-2-A

PRODUCED/ADOPTED: ?/1965 COUNTRY: NORTH VIETNAM

CURRENT STATUS: IN MILITARY USE

CARRYING CASE:
  MATERIAL ------------ PLASTIC (BAG)
DIMENSIONS:
    -LENGTH ----------- *1
    -WIDTH ------------ *1
    -HEIGHT ----------- *1

WEIGHT ---------------- 44 G

DECONTAMINANT:
  TYPE ---------------- SEE TEXT
  QUANTITY ------------ *1

REMARKS:

1/

COMPONENT	LENGTH (CM)	WIDTH (CM)	WEIGHT (G)
KIT (ENTIRE)	---	---	44.27
OUTER BAG	20.1	9.9	0.94
INSTRUCTION SHEET	24.1	13.0	1.67
PACKET NO.1 (GROSS)	---	---	11.78
PAPER ENVELOPE	7.6	5.1	0.62
PLASTIC BAG	11.8	8.0	0.47
CONTENTS (NET)	---	---	10.69
PACKET NO.2 (GROSS)	---	---	6.84
PAPER ENVELOPE	7.6	5.1	0.53
PLASTIC BAG	6.9	6.4	0.48
CONTENTS (NET)	---	---	5.83
PACKET NO.3 (GROSS)	---	---	5.62
PAPER ENVELOPE	8.4	6.9	0.74
PLASTIC BAG	11.9	8.1	0.52
CONTENTS (NET)	---	---	4.36
PACKET NO.4 (GROSS)	---	---	14.92
PAPER ENVELOPE	7.4	4.6	0.58
PLASTIC BAG	10.2	9.1	0.97
CONTENTS (NET)	---	---	13.37

1/ CONTINUED

COMPONENT	LENGTH (CM)	WIDTH (CM)	WEIGHT (G)
PACKET NO.5 (GROSS)	---	---	2.50
PLASTIC BAG	9.8	8.4	0.91
CONTENTS (NET)	7.4	6.4	1.59

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, NR. 1-65 (U)

FOM-4230-9-1-3-A

NATIVE DES: ?

PRODUCED/ADOPTED: ?/1965

COUNTRY: NORTH VIETNAM

(U)THE QUALITY OF THE INDIVIDUAL DECONTAMINATION KIT, NO. 1-65, IS PRIMITIVE BY U.S. STANDARDS. THIS KIT CONTAINS NO FIRST AID ITEMS FOR CASUALTIES CAUSED BY NERVE AGENTS. THE KIT HAS A SMALL BAR OF SOAP, USED TO WASH LIQUID CONTAMINANTS SUCH AS MUSTARD FROM THE SKIN, AND A BOTTLE OF AQUEOUS SOAP, TO BE USED FOR THE TREATMENT OF PHOSPHORUS BURNS AND WHEN NO WATER IS AVAILABLE. EACH SOAP IS A SODIUM SALT OF SATURATED FATTY ACIDS AND CONTAINS SILICON, PROBABLY IN THE FORM OF SODIUM SILICATE. TWO AMPOULES CONTAIN DIETHYL ETHER FOR RELIEF FROM CHEMICAL AGENTS THAT INDUCE SNEEZING, LACHRYMATION, OR VOMITING. A BALL OF COTTON IS SUPPLIED TO BLOT OR TO REMOVE ANY TOXIC AGENT.

(U)THE KIT ALSO HOLDS POTASSIUM PERMANGANATE, A POWERFUL OXIDIZING AGENT WHICH MAY BE USED TO PREVENT INFECTION FROM PHCSPHORUS BURNS. ALTHOUGH POTASSIUM PERMANGANATE IS USUALLY DILUTED IN A 1 TO 5 SOLUTION FOR DISINFECTION, THE DIRECTION BOOKLET IN THIS KIT SUGGESTS USING 0.5 GRAMS OF POTASSIUM PERMANGANATE TO 500 MILLILITERS OF WATER (OR A 1 TO 1000 SOLUTION). ALTHOUGH THIS CONCENTRATION IS MUCH WEAKER THAN A 1 TO 5 SOLUTION, IT MAY BE EFFECTIVE AGAINST SOME INFECTIOUS ORGANISMS.

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, NR. 1-65 (U) ITEM 59
FOM-4230-9-1-3-A

PRODUCED/ADOPTED: 7/1965 COUNTRY: NORTH VIETNAM

CURRENT STATUS: MILITARY USE IN VIETNAM

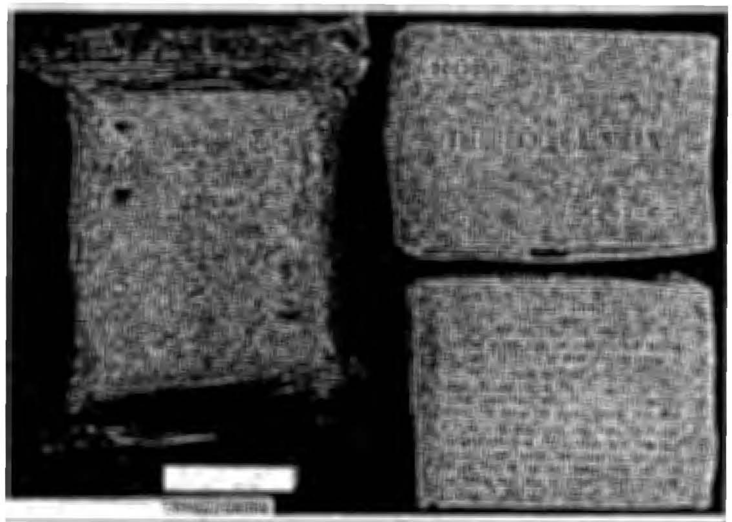
CARRYING CASE:
MATERIAL ------------ CARDBOARD
DIMENSIONS:
-LENGTH ----------- 7.1 CM
-WIDTH ------------ 6.1 CM
-HEIGHT ----------- 2.3 CM

WEIGHT ---------------- 91 G

DECONTAMINANT:
TYPE ---------------- SOAP (LIQUID AND BAR)
QUANTITY ------------ 10 ML

REMARKS:

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, NR. 1-65 (U)
ITEM 59
FOM-4230-9-1-3-B
PRODUCED/ADOPTED: ?/1965
COUNTRY: NORTH VIETNAM



Neg. 511583 (UNCLASSIFIED)

Neg. 512863

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, TYPE FANGHUHE (U) ITEM 60

NATIVE DES: ? FOM-4230-5-1-1-A
PRODUCED/ADOPTED: ?/1966 ? COUNTRY: PRC

(U)THIS PRC KIT IS USED TO DECONTAMINATE THE SKIN AND CLOTHING, TO COUNTER THE PHYSIOLOGICAL EFFECTS OF NERVE AGENTS, AND TO REDUCE PSYCHOLOGICAL TENSION. THE METAL BOX, PAINTED YELLOW WITH A RED CROSS AND CHINESE CHARACTERS MEANING SELF-AID KIT, CONTAINS INSTRUCTIONS, A NERVE AGENT SYRETTE, A VIAL OF DECONTAMINANT, A VIAL OF PILLS, AND A SURGICAL-TYPE GAUZE MASK, MODEL 64. LABORATORY TESTS HAVE BEEN RUN ON THIS KIT.

(U)THE SYRETTE COMPRISES A GLASS VIAL OF LIQUID (PRESSURIZED BY AN INERT GAS) AND A HOLLOW NEEDLE. THE SYRETTE IS COVERED BY FLEXIBLE PLASTIC, EXCEPT THAT THE FREE END OF THE NEEDLE HAS A SCORED GLASS SHEATH THAT, WHEN SNAPPED OFF, EXPOSES AN INCH OF THE NEEDLE. LIQUID IS RELEASED INTO THE NEEDLE WHEN THE VIAL IS CRUSHED BY SQUEEZING TWO BLUE RINGS PAINTED ON THE SYRETTE. A GAUZE FILTER TRAPS PARTICLES OF BROKEN GLASS. THE LIQUID, AN AQUEOUS SOLUTION (300 MILLIGRAMS OF PAM CHLORIDE AND POSSIBLY 1.2 MILLIGRAM OF ATROPINE) IS INJECTED INTO THE THIGH OR BUTTOCKS TO COUNTER THE EFFECTS OF NERVE AGENTS.

(U)THE DECONTAMINANT IS CONTAINED IN A PILLOW-SHAPED FLEXIBLE PLASTIC VIAL THAT IS CARRIED IN A GAUZE BAG TO WHICH A PIERCING NAIL IS ATTACHED. THE VIAL HOLDS A LIQUID AND A THIN-WALLED GLASS CONTAINER OF WHITE POWDER WHICH DISSOLVES WHEN THE PLASTIC IS SQUEEZED AND THE GLASS IS CRUSHED. THE PLASTIC VIAL IS PUNCTURED TO RELEASE THE SOLUTION, AND THE GAUZE BAG CAN BE USED AS AN APPLICATOR. THE LIQUID COMPRISES 65 PERCENT WATER, 30 PERCENT ETHANOL AND 5 PERCENT DETERGENT (SODIUM SALT OF AN ALKYL SULFONIC ACID); THE POWDER, CONTAINING 32 PERCENT ACTIVE CHLORINE, IS SIMILAR TO SUPERTROPICAL BLEACH (STB). THE SOLUTION WOULD BE EFFECTIVE AGAINST NERVE AGENTS AND VESICANT AGENTS.

(U)A GLASS VIAL WITH CORK STOPPER CONTAINS 12 YELLOW "ANTIPHOSPHORUS" PILLS WEIGHING 300 MILLIGRAMS EACH. THEIR PRINCIPAL INGREDIENT IS MEPROBAMATE (A TRANQUILIZER); THEY ALSO CONTAIN PYRIDOSTIGMINE BROMIDE AND CHLORPROMAZINE HYDROCHLORIDE BUT NO ANTICHOLINERGIC DRUGS NOR OXIMES SUCH AS PAM, WHICH ARE USED IN NERVE AGENT ANTIDOTES. THE TRANQUILIZER MAY REDUCE PSYCHOLOGICAL TENSION IN COMBAT.

(U)THE GAUZE MASK IS PROBABLY INEFFECTIVE AGAINST CW AGENTS.

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, TYPE FANGHUHE (U) ITEM 60
FOM-4230-5-1-1-A

PRODUCED/ADOPTED: ?/1966 ? COUNTRY: PRC

CURRENT STATUS: STANDARD

CARRYING CASE:
MATERIAL ------------ METAL
DIMENSIONS:
-LENGTH ----------- 12.7 CM
-WIDTH ------------ 8.4 CM
-HEIGHT ----------- 4.3 CM

WEIGHT --------------- 237 G

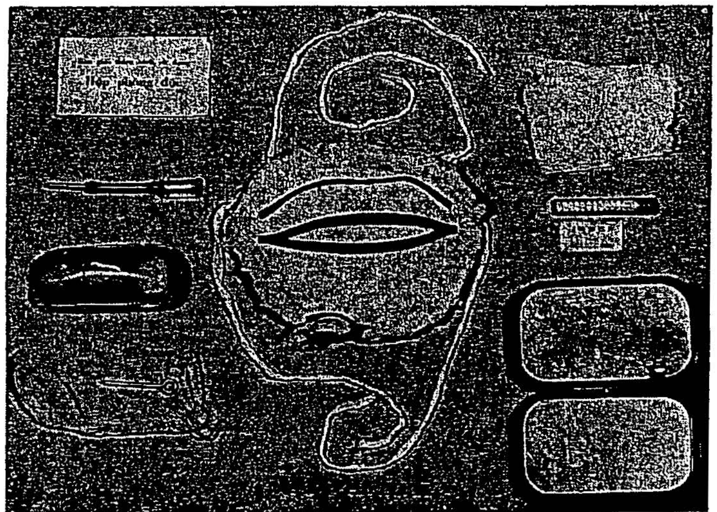
DECONTAMINANT:
TYPE --------------- *1
QUANTITY ------------ 8.6 ML

REMARKS:
1/ THE DECONTAMINATION UNIT CONTAINS A CALCIUM HYPOCHLORITE (32.3% ACTIVE CHLORINE) WITH A LIQUID MEDIUM COMPRISED OF 65% WATER, 30% ETHANOL, AND 5% DETERGENT.

NOMEN: DECONTAMINATION KIT, INDIVIDUAL, TYPE FANGHUHE (U)
ITEM 60

FOM-4230-5-1-1-B

PRODUCED/ADOPTED: ?/1966 ?
COUNTRY: PRC



Neg. 511578 (UNCLASSIFIED)

Neg. 511587 (UNCLASSIFIED)

NOMEN: DECON KIT,PERSONAL (WITH RUBBERIZED CARRIER)MODEL ? (U) ITEM 65

NATIVE DES: ? FDM-4230-5-1-3-A
PRODUCED/ADOPTED: ?/1970 ? COUNTRY: PRC

(U)THIS KIT CONTAINS MATERIALS FOR REMOVING CBR CONTAMINANTS FROM THE SKIN AND CLOTHING AND A LIQUID THAT THE CHINESE MARKINGS IDENTIFY AS AN "ANTISMOKE AGENT." THE KIT'S PRINCIPAL ITEMS--SOAP AND GAUZE--PERMIT THE REMOVAL OF CONTAMINANTS BY WASHING AND WOULD BE USEFUL FOR REMOVING ALPHA (NOT BETA OR GAMMA) RADIOACTIVE PARTICLES, BIOLOGICAL ORGANISMS, AND MOST CW AGENTS; THEY WOULD NOT BE EFFECTIVE AGAINST NERVE AGENTS. TWO GLASS AMPOULES IN THE KIT RESEMBLE SOVIET "ANTISMOKE" AMPOULES IN MOST RESPECTS (FDM 4230-2-1-7) BUT THE LIQUID CONTENT IS SLIGHTLY DIFFERENT. THE CHINESE COMPOUND, PROBABLY USED AS AN ANTISEPTIC WASH, CONSISTS OF TWO PARTS ETHYL ETHER, ONE PART ETHYL ALCOHOL, AND ONE PART CHLOROFORM (AMMONIA WATER, PRESENT IN THE SOVIET COMPOUND, IS LACKING IN THE CHINESE COMPOUND). THE EFFECTIVENESS OF THE CHINESE COMPOUND IN TREATING SMOKE INHALATION DISCOMFORT IS UNKNOWN. THE CHINESE COMPOUND HAS ANTISEPTIC QUALITIES AND COULD, WITH THE KIT'S OTHER COMPONENTS, BE USED FOR GENERAL FIRST AID PURPOSES.

(U)THE PRC-MANUFACTURED KIT CONSISTS OF THE FOLLOWING: A RECTANGULAR RUBBERIZED FABRIC CARRIER EQUIPPED WITH A BELT LOOP AND A TIE STRING CLOSURE (COLORS VARY FROM LIGHT BROWN TO DARK GREEN); TWO GAUZE PADS, WRAPPED IN A WATERPROOF RUBBERIZED PACKAGE; A PLASTIC BOTTLE OF SOAP SOLUTION; TWO PACKAGES OF SOAP POWDER, AND INSTRUCTION SHEET AND A GAUZE PAD, ALL IN A SEALED PLASTIC WRAPPER; AND TWO SMALL VIALS OF THE ALLEGED ANTISMOKE COMPOUND PACKED IN A PAPER BOX. FIFTY KITS ARE PACKED IN A WOODEN SHIPPING BOX WHICH WEIGHS 16.8 KG WHEN FILLED; THE BOX MEASURES 48.3 X 40.6 X 24.9 CM.

NOMEN: DECON KIT,PERSONAL(WITH RUBBERIZED CARRIER)MODEL ? (U) ITEM 65
FOM-4230-5-1-3-A
PRODUCED/ADOPTED: ?/1970 ? COUNTRY: PRC

CURRENT STATUS: USED BY NVN FORCES

CARRYING CASE:
MATERIAL ------------ RUBBERIZED FABRIC
DIMENSIONS:
-LENGTH ----------- 10.9 CM
-WIDTH ------------ 9.9 CM
-HEIGHT ----------- 6.4 CM

WEIGHT --------------- 198 G

DECONTAMINANT:
TYPE --------------- *1
QUANTITY ----------- *2

REMARKS:
1/ POWDERED SOAP AND 0.4% SOAP SOLUTION
2/ POWDERED SOAP, 20 ML (10 ML/PACKAGE) LIQUID SOAP, 40 ML; ANTISMOKE COMPOUND, CONTENTS OF TWO GLASS VIALS (CRUSH-TYPE AMPOULES) 3.8 CM LONG AND 0.9 CM OUTSIDE DIAMETER.

Original

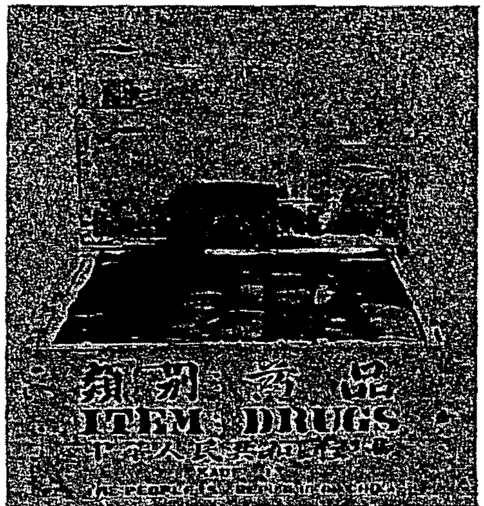
DST-1600S-148-76-SUP 1
ITEM 65

NOMEN: DECON KIT, PERSONAL (WITH RUBBERIZED CARRIER) MODEL ? (U)

FON-4230-5-1-3-8

PRODUCED/ADOPTED: ?/1970 ?

COUNTRY: PRC



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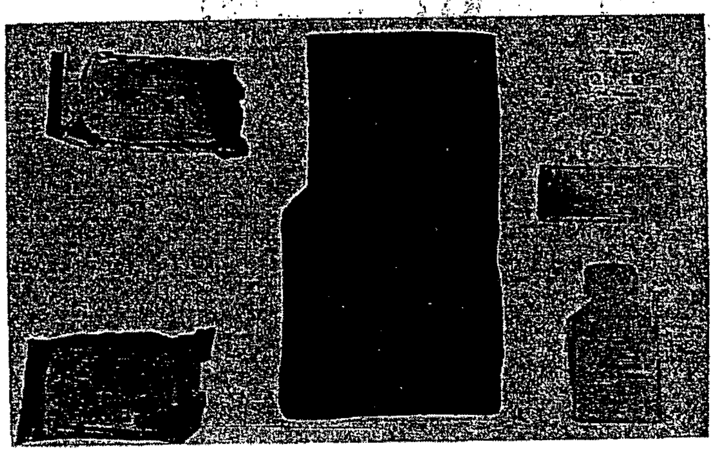


Neg. 511560 (UNCLASSIFIED)

NOMEN: DECONTAMINATION APPARATUS, MANPACK MODEL ? (U) ITEM 69

NATIVE DES: ? FON-4230-1-2-1-A
PRODUCED/ADOPTED: ?/? COUNTRY: UNIDENTIFIED

(U)THE MANPACK DECONTAMINATION APPARATUS IS USED TO DECONTAMINATE SMALL BUILDINGS, VEHICLES, CREW-SERVED AND INDIVIDUAL WEAPONS, AND TERRAIN. ALL TYPES OF LOW-VISCOSITY LIQUIDS INCLUDING DECONTAMINANTS, INSECTICIDES, HERBICIDES, AND LIGHT OILS CAN BE SPRAYED FROM THIS APPARATUS. THE APPARATUS CAN ALSO BE USED FOR VECTOR CONTROL OR FOR FIELD DISINFECTION OF AID STATIONS. THE SIZE OF THE DISCHARGE NOZZLE LIMITS THE DISCHARGE OF LIQUID TO A VERY FINE SPRAY, ALMOST A MIST. IF THE SPRAY NOZZLE IS REMOVED, IT IS POSSIBLE TO SPRAY HEAVIER DECONTAMINANTS SUCH AS BLEACH SLURRY.

(U)BASICALLY, THIS APPARATUS CONSISTS OF THE FOLLOWING: A TANK, WITH A FILLING OPENING 9.4 CM IN DIAMETER WHICH EXTENDS 2.9 CM ABOVE THE TANK; A BLACK PLASTIC SCREW CAP; SHOULDER STRAPS; A PISTON-TYPE PUMP, MOUNTED INSIDE THE TANK; AND A RUBBER DISCHARGE HOSE, CONNECTED AT THE BOTTOM OF THE TANK AND EQUIPPED WITH A NOZZLE AND A CONTROL VALVE. A LIP INSIDE THE FILLING WELL SUPPORTS A RED RUBBER CUP AND A WIRE MESH WHICH, TOGETHER, ACT AS A STRAINER WHEN AN AGENT IS POURED INTO THE TANK.

(U)THE PUMP IS MOUNTED INSIDE THE TANK ON THE LEFT SIDE, WITH THE PLUNGER ROD EXTENDING THROUGH THE TOP OF THE TANK. ON THE RIGHT SIDE OF THE TANK, LOCATED 4.4 CM FROM THE BOTTOM, IS 2.5 CM DIAMETER HOLE WITH A RED PLASTIC GROMMET. THE DISCHARGE HOSE IS INSERTED THROUGH THIS HOLE AND CONNECTED TO THE PUMP. THE PUMP MECHANISM HAS THREE CONNECTING PIECES: A HANDLE, WHICH IS INSERTED INTO A BRACKET ON THE TANK AND SECURED WITH A COTTER PIN; A HANDLE EXTENSION; AND A PLUNGER ROD.

(U)THE HOSE AND SPRAY ASSEMBLY CONSISTS OF A RUBBER HOSE 119 CM LONG, AN L-SHAPE CONNECTOR USED FROM THE HOSE TO THE PUMP, A HAND GRIP, AN ON-OFF VALVE, TWO EXTENSION TUBES, A SPRAY HEAD, AND A SPRAY NOZZLE. THE L-SHAPE CONNECTOR AND THE HAND GRIP ARE FITTED INTO THE HOSE AND SECURED BY A PIECE OF WIRE THAT IS WOUND TIGHTLY AROUND THE RUBBER HOSE. THE VALVE IS SCREWED INTO THE HAND GRIP. THE SPRAY HEAD IS ANGLED AT APPROXIMATELY 80 DEGREES.

(U)SPECIMENS OF THIS APPARATUS WERE CAPTURED IN 1969 FROM ENEMY FORCES IN SOUTH VIETNAM.

NOMEN: DECONTAMINATION APPARATUS, MANPACK MODEL ? (U) ITEM 69

FOM-4230-1-2-1-A

PRODUCED/ADOPTED: ?/?

COUNTRY: UNIDENTIFIED

CURRENT STATUS: USED BY NORTH VIETNAM ARMY

MAJOR COMPONENTS:
- TANK ---------------- METAL
- PUMP
  - -POWER DRIVEN ----- N/A
  - -HAND OPERATED ---- METAL
- HOSE ---------------- RUBBER
- STRAPS -------------- CANVAS WEBBING

PHYSICAL DATA:
- CAPACITY
  - -MAXIMUM ---------- 11.5 L
  - -WORKING ---------- 9.5 L
- WEIGHT
  - -FILLED ----------- 17 KG
  - -EMPTY ------------ 5.7 KG
- DIMENSIONS
  - -LENGTH ----------- 46 CM
  - -WIDTH ------------ 30 CM
  - -HEIGHT ----------- 16.5 CM

DECONTAMINANTS: ------ SEE TEXT

PERFORMANCE:
- COVERAGE ------------ 4.65 SQ M ?
- DISCHARGE RATE ------ APPROX 0.47 L PER MINUTE
- DISCHARGE TIME ------ 19 MINUTES ?
- OPERATING PRESSURE -- ?

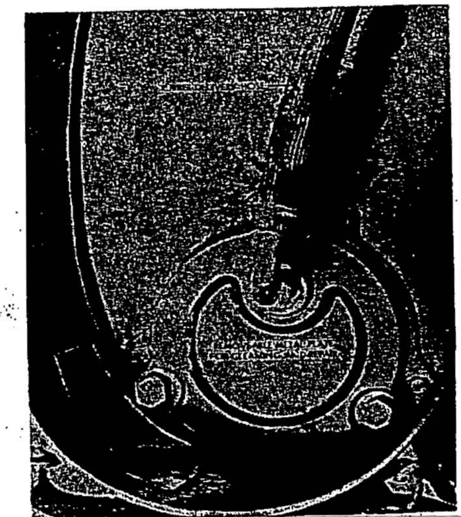
PLUMBING SYSTEM: ------ ?

GENERAL DATA:
- CARRIER
  - -TYPE ------------- PERSON
  - -CAPACITY --------- N/A
- CREW ---------------- 1
- MISC EQUIPMENT ------ ?

REMARKS:

Original
NOMEN: DECONTAMINATION APPARATUS, MANPACK MODEL ? (U)
FOM-4230-1-2-1-B
COUNTRY: UNIDENTIFIED

PRODUCED/ADOPTED: ?/?



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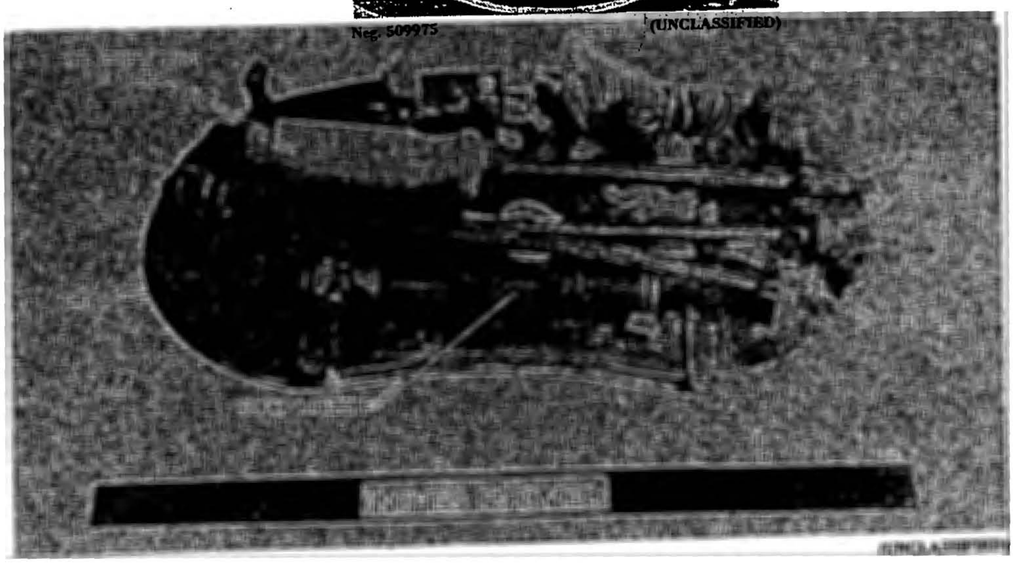


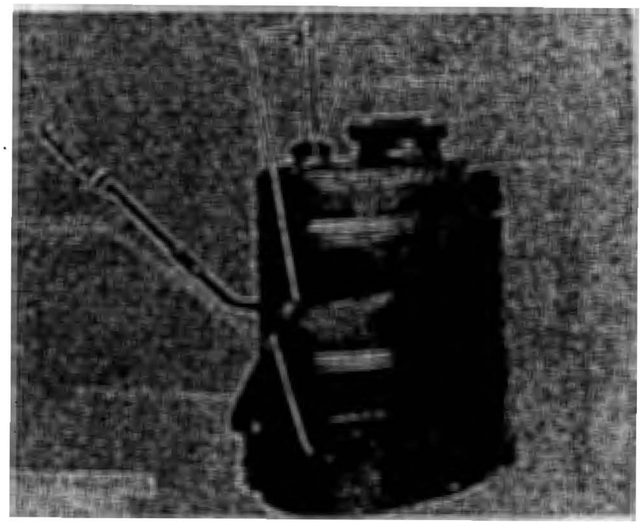
Neg. 509974

DST-1600S-148-76-SUP 1 Original

NOMEN: DECONTAMINATION APPARATUS, MANPACK MODEL ? (U) ITEM 69

FOM-4230-1-2-1-8

PRODUCED/ADOPTED: ?/? COUNTRY: UNIDENTIFIED



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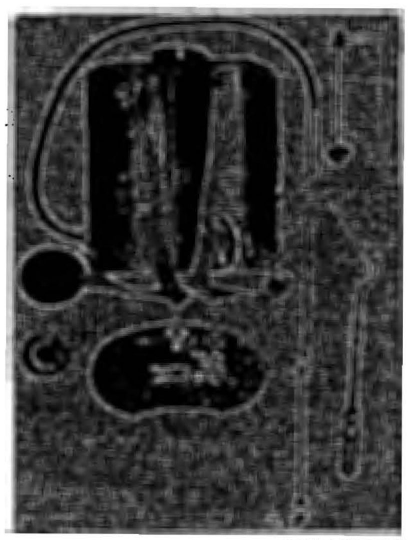

Neg. 511196 (UNCLASSIFIED)

★ APPENDIX III

STATE DEPARTMENT SPECIAL REPORT NO. 98, CHEMICAL WARFARE IN SOUTHEAST ASIA AND AFGHANISTAN

LIST OF ABBREVIATIONS

AC	hydrogen cyanide (CW agent)
BW	biological warfare
CAS	Chinese Academy of Sciences
CB	chemical and biological
CBR	chemical, biological, and radiological
CBW	chemical and biological warfare
CCP	Chinese Communist Party
CK	cyanogen chloride
CMPC	Central Military Party Committee
CN	chloracetophenone (riot-control agent)
CS	o-chlorobenzalmalononitrile (riot-control agent)
CW	chemical warfare
DAM	diacetylmonoxime (nerve-agent antidote)
DESO-4	bis(4-hydroxyiminomethyl-pyridinium 1-ethyl) sulfoxide dichloride (nerve-agent antidote)
DM	adamsite (CW agent)
DMZ	Demilitarization Zone (dividing North and South Koreas)
DRV	Democratic Republic of Vietnam
FROG	Soviet free-rocket-over-ground unguided rocket
GB	sarin (CW nerve agent)
H	sulfur mustard (CW agent)
HE	high explosive
HL	sulfur mustard/lewisite mixture (CW agent)
JBE	Japanese B encephalitis (potential BW agent)
LOPAIR	long-path infrared spectrophotometry
LSD	lysergic acid diethylamide
MND	Ministry of National Defense
MPH	Ministry of Public Health
MPAF	Ministry of People's Armed Forces
MPR	Mongolian Peoples Republic
MR	military region(s)
NKA	North Korean Army
NKN	North Korean Navy
NVA	North Vietnam Army
NVN	North Vietnam
OP	organophosphorus
2-PAM	pralidoxime (nerve-agent antidote)
PAVN	People's Army of Vietnam
PLA	People's Liberation Army
PRC	People's Republic of China
PRCN	People's Republic of China Navy
R&D	research and development
R-OH	alkyl alcohol
SCUD	Soviet tactical surface-to-surface ballistic missile
ShM	Soviet "Shlem" protective mask
SRV	Socialist Republic of Vietnam

TMB-4	N,N'-trimethylene-bis(pyridinium-4 aldoxime) dibromide (nerve-agent antidote)
Toxogonin	bis(4-hydroxyiminomethyl-pyridinium-methyl)ether dichloride (nerve-agent antidote)
U/I	Unidentified
US	United States
USSR	Union of Soviet Socialist Republics
VC	Viet Cong
WP	white phosphorus (CW agent)

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Special
Report No. 98

United States Department of State

Chemical Warfare in Southeast Asia and Afghanistan

Report to the Congress
from Secretary of State
Alexander M. Haig, Jr.,
March 22, 1982

THE SECRETARY OF STATE
WASHINGTON

TO THE CONGRESS OF THE UNITED STATES:

The years from 1914 to 1918 were among the most destructive of human life in mankind's history. Yet the sacrifice of millions brought no lasting peace. Of the elaborate structure for collective security, and the series of pacts outlawing war and controlling armaments which were negotiated in the aftermath of this First World War, little remains today. The League of Nations, the Kellogg-Briand Pact, and the Washington Naval Agreement were all swept away in the tide of aggression which culminated in a second global conflict. Almost the sole surviving monument, in the law of nations, to the twenty million dead of the First World War is the 1925 Geneva Protocol outlawing chemical and biological warfare.

Today this accord, among the oldest of arms control agreements still in force, along with another more recent such agreement banning biological and toxin weapons, is again in danger of being swept away by a new tide of aggression. Over the past seven years chemical and toxin weapons have been used, on an ever-widening scale, in genocidal campaigns against defenseless peoples. These weapons are being used for precisely the reason mankind has condemned and sought to outlaw them—because of their indiscriminate action and horrific effects. Today evidence of chemical and toxin warfare has accumulated to the point where the international community can no longer ignore the challenge.

The enclosed report on the use of chemical and toxin weapons by the Soviet Union and its Allies in Laos, Kampuchea, and Afghanistan has been prepared for submission to the Congress, to the United Nations, and to each member of the international community. The report is drawn from information made available to the United States Government since 1975. It contains the most comprehensive compilation of material on this subject available, and presents conclusions which are fully shared by all relevant agencies of the United States Government.

The international community and the world public need not rely solely on this report to form their judgment, nor only upon the United States to provide their information. Lethal chemical and toxin weapons are regrettably still in use in Laos, Kampuchea, and Afghanistan. New victims appear, new witnesses come forward, new scientific evidence is uncovered with increasing frequency. The great bulk of the information in the enclosed report could have been collected and analyzed by any interested government, international organization, or major news service. If the efforts of the United States Government to call attention to chemical warfare in Afghanistan and Southeast Asia stimulate others to discover for themselves, and join in efforts to expose the truth, this report will have served its most important purpose.

Sincerely,

Alexander M. Haig, Jr.

Chemical Warfare in Southeast Asia and Afghanistan

CONTENTS

This study presents the evidence available to the U.S. Government on chemical warfare activities in Laos, Kampuchea, and Afghanistan through January 1982 and examines the Soviet involvement in those activities. It is based on a massive amount of information, from a variety of sources, which has been carefully compiled and analyzed over the years. The paper is accompanied by annexes and tables that provide details of the medical evidence and sample analyses, a technical description of trichothecene toxins, and other supporting data.

INTRODUCTION

Nearly 7 years ago, reports of the use of lethal chemical weapons began to emerge from Laos. In 1978, similar reports started to come from Kampuchea, and in 1979 from Afghanistan. Early reports were infrequent and fragmentary, reflecting the remoteness of the scene of conflict and the isolation of those subjected to such attacks. In the summer of 1979, however, the State Department prepared a detailed compilation of interviews with refugees from Laos on this subject. That fall, a U.S. Army medical team visited Thailand to conduct further interviews. By the winter of 1979, the United States felt that it had sufficiently firm evidence of chemical warfare to raise the matter with the governments of Laos, Vietnam, and the Soviet Union. All three governments denied that a basis for concern over the use of chemical warfare agents existed.

Dissatisfied with these responses, and possessing further reports that lethal chemical agents were in use in Southeast Asia and Afghanistan, the U.S. Government in 1980 began to raise the issue publicly in the United Nations, with the Congress, and in other forums. In August of that year, the State Department provided extensive documentation containing evidence of chemical weapons attacks to the United Nations and also made this material publicly available. In December, as a result of efforts by the United States and other concerned nations, the U.N. General Assembly voted to initiate an international investigation into the use of chemical weapons. This investigation is still underway. To date, the U.N. investigating team has been denied admission to any of the three countries where these weapons are in use.

Despite the volume of information on chemical warfare in Southeast Asia which had become available by 1980, there remained one major unresolved issue—the exact nature of the chemical agents in use. Collection of physical samples was hindered by the remoteness of the then principal areas of conflict—as many as 6 weeks by foot to the nearest international border. Tests for known chemical warfare agents on those samples that were obtained proved consistently negative.

In order to identify the chemical agents in use, U.S. experts in late 1980 began to go back over all the reporting—as far back as 1975—looking for new clues. In particular, they sought to match the reported symptomatology of victims—which commonly included skin irritation, dizziness, nausea, bloody vomiting and diarrhea, and internal hemorrhaging—with possible causes. As a result of this review, the U.S. Government in mid-1981 began to test physical samples from Southeast Asia for the presence of toxins. These substances are essentially biologically produced chemical poisons. Although they have never before been used in war, this was a technical possibility, and it was noted that certain toxins could produce the sorts of symptoms observed in Southeast Asian victims of chemical warfare.

In August 1981, unnatural levels and combinations of lethal trichothecene toxins were detected in the first sample to be tested by the United States for such agents. This consisted of vegetation taken from a village in Kampuchea where an attack occurred in which people had died after exhibiting the symptoms described above. In succeeding months, further samples, taken from the sites of attacks in both Kampuchea and Laos, yielded similar results. So did samples of blood taken from victims of a chemical attack in Kampuchea.

Despite a continued flow of reports, dating back over 7 years, of chemical warfare in Southeast Asia and more recently Afghanistan, and despite the still mounting physical evidence of the use of trichothecene toxins as warfare agents, doubts as to the conclusive nature of the available evidence have persisted. These doubts have arisen for several reasons. For one, the evidence of the use of lethal chemical weapons has become available over a period of several years and from a variety of sources. Few governments, journalists, or interested members of the public have been exposed to all of this evidence, nor has it been available in any one place. A second difficulty has been the inevitable need for the U.S. Government to protect some of the relevant information, often gathered at personal risk to individuals who secured it, or obtained through the use of highly sensitive methods.

Chronology of Diplomatic/International Actions on Chemical Warfare Use

October 1978

The United States called to the attention of the Lao Charge d'Affaires in Washington the press reports alleging use of poison gas in Laos.

Assistant Secretary of State for East Asian and Pacific Affairs Holbrooke traveled to Vientiane and discussed our concerns over H'Mong human rights and other issues with Lao leaders.

Late 1978

The Department of State directed U.S. diplomatic missions in the Southeast Asia area to seek to develop information on the alleged use of poison gas against the H'Mong.

January 1979

The Department of State again informed the Lao Embassy of U.S. concerns about reports of poison gas use in Laos, coupling this with a similar demarche in Vientiane. The Lao denied the validity of the reports.

March 1979

The U.S. Representative to the 35th session of the U.N. Human Rights Commission expressed U.S. concern about the plight of the H'Mong, specifically raising the poison gas use issue.

May 1979

A State Department representative went to refugee camps in Thailand to interview H'Mong claiming to be eyewitnesses and/or victims of poison gas attacks in Laos.

A State Department representative visited Vientiane where he discussed the problem with various diplomatic missions and the senior U.N. representative in Laos. During that visit, he raised U.S. concerns about the problem directly with the Lao Foreign Ministry.

September 1979

A Department of Defense medical team was dispatched to Thailand to interview and prepare a report on H'Mong refugees having knowledge of gas attacks in Laos.

November 1979

Demarches were made to the Vietnamese in Paris and to the Soviets in Moscow expressing U.S. concerns about reports of poison gas being used against "resistance forces" in Laos. Both the Soviets and Vietnamese supported the Lao denial of the validity of the reports.

December 1979

State and Defense Department officials presented evidence of gas attacks in Laos to the House Foreign Affairs Committee.

February 1980

A bilateral demarche was made to the Soviets about U.S. concerns regarding chemical warfare use in both Laos and Kampuchea and about reports that chemical weapons were being used by the Soviets in Afghanistan. The demarche was made in Geneva in the context of the U.S./Soviet bilateral negotiations on a comprehensive prohibition of chemical weapons production, development, and stockpiling.

May 1980

An interagency team of U.S. Government political, technical, and intelligence officers was dispatched to Europe to brief the allies about the problem and to stimulate support for having an impartial international investigation conducted.

July 1980

Another bilateral demarche was made to the Soviets in the context of the U.S./Soviet bilateral chemical warfare negotiations, concerning the problem of the reported use of chemical weapons in both Southeast Asia and Afghanistan.

The Inter-Parliamentary Union adopted a resolution calling for an impartial international investigation of reports of chemical weapons use.

August 1980

The United States circulated to U.N. member states a 125-page compendium of reports and declassified intelligence information pertaining to the use of chemical weapons in Laos, Kampuchea, and Afghanistan.

The 40-nation Committee on Disarmament included language in its Annual Report to the U.N. General Assembly on the need for an impartial international investigation of the problem of chemical weapons use.

December 1980

With the full and active support of the United States, the West, and others, the U.N. General Assembly adopted a resolution (A/35/144 C) establishing a U.N. investigation, under the auspices of the U.N. Secretary General and with the assistance of qualified medical and technical experts, of reports of chemical weapons use. The vote was 78 in favor to 17 opposed, with 36 abstentions.

March 1981

In accordance with U.N. General Assembly Resolution A/35/144 C and the request of the U.N. Secretary General, the U.S. submitted detailed information pertaining to the reports of the use of chemical weapons in Southeast Asia and Afghanistan. The U.S. submission consisted of a letter summarizing the U.S. submission, the U.S. compendium of reports from August 1980, an update to that compendium covering the period through January-February 1981, the transcripts of congressional hearings held on the subject in December 1979 and in April 1980, and the texts of House and Senate resolutions condemning the use of chemical weapons.

July 1981

The United States provided further details and written responses to questions from the U.N. Group of Experts concerning the U.S. submission of March 1981.

September 1981

Secretary Haig announced, in his September 13 speech in Berlin, that the United States had obtained physical evidence of the use of lethal mycotoxins in Southeast Asia, discovered in the analysis of a leaf and stem sample obtained from the site of a chemical attack in Kampuchea.

On September 14, the United States submitted a report on the new evidence pertaining to the use of mycotoxins to the U.N. Group of Experts investigating reports of chemical weapons use.

Under Secretary of State for Political Affairs Stoessel held a press conference in Washington on September 14 and provided a detailed press backgrounder on the new evidence.

Secretary Haig raised U.S. concerns about the new evidence pertaining to the use of lethal mycotoxins in Southeast Asia and about the 1979 Sverdlovsk anthrax incident with Soviet Foreign Minister Gromyko during their bilateral consultations at the United Nations in New York.

October 1981

Following up the Haig/Gromyko discussions, detailed bilateral demarches were made to the Soviets in Washington by Acting Arms Control and Disarmament Agency Director Grey, and a followup in Moscow by the U.S. Deputy Chief of Mission, on the general subject of Soviet Biological Warfare Convention compliance and specific U.S. concerns regarding the 1979 Sverdlovsk anthrax incident and the evidence of the use of trichothecene mycotoxins in Southeast Asia. The Soviets rejected U.S. concerns once again in their formal response in November.

An interagency team of political, technical, and intelligence officers was dispatched to Europe to brief the allies about the new evidence of the use of lethal mycotoxins in Southeast Asia.

A delegation of U.S. Government political, technical, and medical experts appeared before the U.N. Group of Experts to respond to questions pertaining to the U.S. submission on September 14 of new evidence concerning the use of lethal mycotoxins in Southeast Asia.

November 1981

The U.N. Group of Experts investigating reports of chemical weapons use traveled to Thailand to visit refugee camps and interview and examine survivors and eyewitnesses of chemical attacks in Laos and Kampuchea. While there, the experts also obtained samples from alleged chemical attacks and samples of vegetation and blood from refugees exposed to chemical attacks.

Richard Burt, Director of the Bureau of Politico-Military Affairs, in testimony before the Congress, announced the results of analyses of additional samples of chemical warfare use revealing the presence of high levels of mycotoxins and the results of analyses of control samples from Southeast Asia which were found to contain *no* mycotoxins.

The United States submitted a report on its analyses of chemical warfare use samples from both Kampuchea and Laos, which were found to contain high levels of mycotoxins, to the U.N. Group of Experts investigating reports of chemical weapons use.

Demarches were made to the Vietnamese in New York and to the Lao in Vientiane regarding the evidence of the use of lethal mycotoxins in the conflicts in Kampuchea and Laos. Both the Vietnamese and the Lao rejected the evidence and denied the validity of U.S. concerns.

December 1981

The U.N. Secretary General submitted the Report of the U.N. Group of Experts investigating reports of chemical weapons use (A/36/613). The report was inconclusive and stated that the group had been unable to carry out all the actions it had *intended* (i.e., on-site visits to Afghanistan, Laos, and Kampuchea) due to the refusals to cooperate of the countries concerned, and that it had been unable to complete some of the actions it had *planned* (e.g., on-site visits to Pakistan, analysis of the samples obtained in Thailand) in the time available.

With the full and active support of the United States, the West, and others, the U.N. General Assembly adopted a resolution (A/36/96 C) extending for another year the mandate of the U.N. Secretary General's Group of Experts investigating reports of chemical weapons use. The vote on the resolution was 86 in favor to 20 opposed, with 32 abstentions.

This report represents an effort of the U.S. Government to correct the first deficiency and to ameliorate the second to the extent possible. In preparation of this report, all of the information available to the U.S. Government on chemical weapons use in Laos, Kampuchea, and Afghanistan was assembled in one place. This information was again reviewed, analyzed, cross-indexed, and organized in a coherent fashion. Based upon this comprehensive analysis, a set of conclusions were drawn, conclusions which have since been reviewed and agreed on without qualification by every relevant agency of the U.S. Government.

The evidence upon which this report is based is of several kinds, including:

- Testimony of those who saw, experienced, and suffered from chemical weapons attacks;
- Testimony of doctors, refugee workers, journalists, and others who had the opportunity to question large numbers of those with firsthand experience of chemical warfare;
- Testimony of those who engaged in chemical warfare or were in a position to observe those who did;
- Scientific evidence, based upon the analysis of physical samples taken from sites where attacks had been conducted;
- Documentary evidence from open sources; and
- Intelligence derived from "national technical means."

These sources provide compelling evidence that tens of thousands of unsophisticated and defenseless peoples have for a period of years been subjected to a campaign of chemical attacks. *Taken together, this evidence has led the U.S. Government to conclude that Lao and Vietnamese forces, operating under Soviet supervision, have, since 1975, employed lethal chemical and toxin weapons in Laos; that Vietnamese forces have, since 1978, used lethal chemical and toxin agents in Kampuchea; and that Soviet forces have used a variety of lethal chemical warfare agents, including nerve gases, in Afghanistan since the Soviet invasion of that country in 1979.*

The implications of chemical warfare in Afghanistan and Southeast Asia are painful to contemplate but dangerous to ignore. This activity threatens not only the peoples of those isolated regions but the international order upon which the security of all depends. Those who today suffer chemical warfare against their homelands are powerless to stop it. The prohibitions of international law and solemn agreement are not self-enforcing. Only an alert and outspoken world community, intent to maintain those standards of international behavior it has so painfully achieved and so tenuously established, can bring sufficient pressure to bear to halt these violations of law and treaty. It is hoped that publication of this report will be one step in this process, the end result of which will be the cessation of chemical warfare and the strengthening of the rule of law in the affairs of nations.

KEY JUDGMENTS

Laos. The U.S. Government has concluded from all the evidence that selected Lao and Vietnamese forces, under direct Soviet supervision, have employed lethal trichothecene toxins and other combinations of chemical agents against H'Mong resisting government control and their villages since at least 1976. Trichothecene toxins have been positively identified, but medical symptoms indicate that irritants, incapacitants, and nerve agents also have been employed. Thousands have been killed or severely injured. Thousands also have been driven from their homeland by the use of these agents.

Kampuchea. Vietnamese forces have used lethal trichothecene toxins on Democratic Kampuchean (DK) troops and Khmer villages since at least 1978. Medical evidence indicates that irritants, incapacitants, and nerve agents also have been used.

Afghanistan. Soviet forces in Afghanistan have used a variety of lethal and nonlethal chemical agents on *mujahidin* resistance forces and Afghan villages since the Soviet invasion in December 1979. In addition, there is some evidence that Afghan Government forces may have used Soviet-supplied chemical weapons against the *mujahidin* even before the Soviet invasion. Although it has not been possible to verify through sample analysis the specific agents used by the Soviets, a number of Afghan military defectors have named the agents brought into the country by the Soviets and have described where and when they were employed. This information has been correlated with other evidence, including the reported symptoms, leading to the conclusion that nerve agents, phosgene oxime, and various incapacitants and irritants have been used. Other agents and toxic smokes also are in the country. Some reported symptoms are consistent with those produced by lethal or sublethal doses of trichothecene toxins, but this evidence is not conclusive.

The Soviet Connection. The conclusion is inescapable that the toxins and other chemical warfare agents were developed in the Soviet Union, provided to the Lao and Vietnamese either directly or through the transfer of know-how, and weaponized with Soviet assistance in Laos, Vietnam, and Kampuchea. Soviet military forces are known to store agents in bulk and move them to the field for munitions fill as needed. This practice also is followed in Southeast Asia and Afghanistan, as evidenced by many reports which specify that Soviet technicians supervise the shipment, storage, filling, and loading onto aircraft of the chemical munitions. The dissemination techniques reported and observed evidently have been drawn from years of Soviet chemical warfare testing and experimentation. *There is no evidence to support any alternative explanation, such as the hypothesis that the Vietnamese produce and employ toxin weapons completely on their own.*

METHODOLOGY

The judgments of this study were arrived at through a rigorous analytical process.

- Every relevant piece of information on reported chemical warfare incidents was reviewed, recorded, and tabulated. Numbers of attacks and deaths were screened for possible duplication. Extensive data on the Soviet chemical and biological warfare program also were reviewed.
- All the test data on physical evidence available to the U.S. Government—including environmental samples and background controls—were reviewed.
- A scientific report on toxins, which concluded that trichothecenes probably were among the agents used in Southeast Asia, was prepared.
- The medical evidence was analyzed, drawing on all available information from Southeast Asia and Afghanistan and incorporating the findings of a Department of Defense medical team, which concluded that at least three types of agents were used in Laos.
- Extensive consultations were held with government and nongovernment scientists and medical authorities, many of whom were asked to review the evidence. Experts from other countries also were consulted.

1208

After the data were organized to permit comparative analysis, the study focused on three separate questions.

• Have lethal and other casualty-producing agents been used in Southeast Asia and Afghanistan?
• What are these agents, and how and by whom are they employed?
• Where do these agents originate, and how do they find their way to the field?

Although the evidence differs for each country, the analytical approach was the same. Testimony of eyewitnesses—date, place, and type of attack—was matched against information from defectors, journalists, international organizations, and sensitive information that often pinpointed the time and place of chemical attacks. In addition, information on military operations in the areas where chemical attacks had been reported was examined to establish whether air or artillery strikes took place or whether there was fighting in the areas where chemical agents reportedly were used. *In all three countries, instances were identified in which eyewitness accounts could be correlated directly with information from other sources on military operations in progress.*

There is no evidence of any systematic propaganda campaign by either the H'Mong in Laos or the Afghan resistance forces to promote the allegation that chemical agents have been used on their people. On the other hand, there were early indications that Pol Pot's Democratic Kampuchean resistance did engage in an organized propaganda campaign on chemical agent use. These indications made U.S. Government analysts cautious about accepting DK allegations, which increased markedly after the chemical attacks in Laos were publicized. For Kampuchea, therefore, special efforts were taken to confirm such allegations by analyzing sources of information that in no way could be considered part of a propaganda or deception campaign.

DISCUSSION OF FINDINGS

In September 1981, the U.S. Government declared publicly that toxins—poisonous chemical substances extracted from biological material—probably were the mysterious lethal agents used for many years in Laos and Kampuchea. The statement was prompted by the discovery of high levels of trichothecene toxins in a vegetation sample collected shortly after a March 1981 Vietnamese chemical attack in Kampuchea. This conclusion, however, rested on a much broader base of evidence than analysis of one sample.

By April 1980, the U.S. Government had already concluded that lethal agents almost certainly had been used against H'Mong tribespeople in Laos. There was less certainty then about the use of lethal agents in Kampuchea, mainly because of the already mentioned suspicions about the propaganda campaign of Pol Pot's Democratic Kampuchean forces, although their claims subsequently were shown to be valid. It was also concluded that chances were about even that lethal agents had been used in Afghanistan. There was little doubt by April 1980 that riot-control agents and some form of incapacitants had been used in all three countries. Since that April 1980 assessment, additional evidence has allowed a much firmer conclusion. There is now no doubt that casualties and deaths have resulted from chemical attacks in all three countries.

What Chemical Agents Are Being Used?

As soon as it was determined that chemical agents had been used, an effort was made to identify the specific agents. To do this it was necessary to collect and analyze at least one of the following: environmental samples contaminated with agents, the munitions used to deliver agents, or biological specimens from victims of an attack. A study by medical-toxicological experts of symptoms exhibited by individuals exposed to toxic agents provides a good indication of the general class of chemical agent used. Thus, the range of clinical manifestations from chemical agents, as reported by a U.S. Army investigative team in Thailand, resulted in the determination that nerve agents, irritants such as CS, and highly toxic hemorrhagic chemicals or mixture of chemicals were used in Laos.

Other medical-toxicological personnel who reviewed the evidence and conducted their own investigation reached the same conclusion. They further indicated that toxins such as the trichothecenes were a probable cause of the lethal hemorrhaging effect seen in Kampuchea and Laos. In many cases, symptoms reported by the Democratic Kampuchean forces in Kampuchea and the *mujahidin* in Afghanistan were similar to those reported by the H'Mong in Laos. Moreover, symptoms reported from Afghanistan and Kampuchea indicated that a highly potent, rapid-acting, incapacitant "knockout" chemical also was being used. *Mujahidin* victims and witnesses to chemical attacks reported other unusual symptoms, including a blackening of the skin, severe skin irritation along with multiple small blisters and severe itching, severe eye irritation, and difficulty in breathing—all of which suggests that phosgene oxime or a similar substance was used.

Collecting samples possibly contaminated with a toxic agent during or after a chemical assault is difficult under any circumstances but particularly when the assault is against ill-prepared people without masks or other protective equipment. Obtaining contaminated samples that will yield positive traces of specific chemical agents depends on many factors. These include the persistency of the chemical, the ambient temperature, rainfall, wind conditions, the medium on which the chemical was deposited, and the time, care, and packaging of the sample from collection to laboratory analysis.

Many traditional or known chemical warfare agents are nonpersistent and disappear from the environment within a few minutes to several hours after being dispersed. Such agents include the nerve agents sarin and tabun; the blood agents hydrogen cyanide and cyanogen chloride; the choking agents phosgene and diphosgene; and the irritant phosgene oxime. Other standard chemical warfare agents—such as the nerve agents VX and thickened soman and the blistering agents sulfur mustard, nitrogen mustard, and lewisite—may persist for several days to weeks depending on weather conditions.

The trichothecene toxins have good persistency but may be diluted by adverse weather conditions to below detectable concentrations. To maximize the chances of detection, sample collections need to be made as rapidly as possible after a chemical assault; as with many agents, this means minutes to hours. Under the circumstances of Southeast Asia and Afghanistan, such rapid collection has simply not been possible. Although many samples were collected, few held any realistic prospect of yielding positive results. It is fortunate that trichothecenes are sufficiently persistent and in some cases were not diluted by adverse weather conditions. Thus we were able to detect them several months after the attack.

Samples have been collected from Southeast Asia since mid-1979 and from Afghanistan since May 1980. To date, about 50 individual samples—of greatly varying types and usefulness for analytical purposes—have been collected and analyzed for the presence of known chemical warfare agents, none of which has been detected. Based on recommendations by medical and toxicological experts and findings of investigators from the U.S. Army's Chemical Systems Laboratory, several of the samples have been analyzed for the trichothecene group of mycotoxins. Four samples, two from Kampuchea and two from Laos, were found to contain high levels of trichothecene toxins. In addition, preliminary results of the analysis of blood samples drawn from victims of an attack indicate the presence of a trichothecene metabolite of T–2, namely HT–2.

A review of all reports indicates the use of many different chemical agents, means of delivery, and types of chemical attacks. The use of trichothecene toxins has been identified through symptoms and sample analysis. In some cases, however, the symptoms suggest other agents, such as nerve gas, which have not been identified through sample analysis. Significant differences as well as similarities have surfaced in the reports from the three countries. The evidence from each country, therefore, is described separately, with attention drawn to similarities where appropriate.

Laos

Reports of chemical attacks against H'Mong villages and guerrilla strongholds in Laos date from the summer of 1975 to the present (see Table 1). Most of the reports were provided by H'Mong refugees who were interviewed in Thailand and the United States. More than 200 interviews were carried out variously by U.S. Embassy officials in Thailand, a Department of Defense team of medical-toxicological experts (see Annex B), U.S. physicians, Thai officials, journalists, and representatives of international aid and relief organizations. According to the interviews, Soviet AN–2 and captured U.S. L–19 and T–28/41 aircraft usually were employed to disseminate toxic chemical agents by sprays, rockets, and bombs. In some cases, Soviet helicopters and jet aircraft were said to have been used.

The reports describe 261 separate attacks in which at least 6,504 deaths were cited as having resulted directly from exposure to chemical agents. The actual number of deaths is almost certainly much higher, since the above figure does not take account of deaths in attacks for which no specific casualty figures were reported. The greatest concentration of reported chemical agent use occurred in the area where the three provinces of Vientiane, Xiangkhoang, and Louangphrabang adjoin (see map). This triborder region accounted for 77% of the reported attacks and 83% of the chemical-associated deaths. Most of the reported attacks took place in 1978 and 1979. Since 1979, the incidence of chemical attacks appears to have been lower, but reported death rates among unprotected and untreated victims were higher. Only seven chemical attacks were reported in the fall of 1981, for example, yet 1,034 deaths were associated with those incidents.

The medical symptoms reportedly produced by the chemical agents are varied. According to knowledgeable physicians, the symptoms clearly point to at least three types of chemical agents—incapacitant/riot-control agents, a nerve agent, and an agent causing massive hemorrhaging. The last-named was positively identified as trichothecene toxins. This was announced publicly by Secretary Haig in September 1981.

In a number of the refugee reports, eyewitnesses described attacks as consisting of "red gas" or a "yellow cloud."

TABLE 1

Laos: Summary of Reported Chemical Attacks and Associated Deaths, 1975–81

Time Period	Area	Attacks[a]	Deaths[b]
Summer 1975	Vientiane	2	25 +
Fall 1976	Phou Bia	8	10
	Savannakhet	1	10
Winter 1976–77	Phou Bia	2	16
Spring 1977	Phou Bia	6	66 +
	Khammouan	2	1
Summer 1977	Phou Bia	6	95
Fall 1977	Phou Bia	1	25
Winter 1977–78	Phou Bia	10	1,328 +
	Savannakhet	6	224
Spring 1978	Phou Bia	34	969 +
Summer 1978	Phou Bia	22	664 +
Fall 1978	Phou Bia	19	572
Winter 1978–79	Phou Bia	5	15 +
Spring 1979	Phou Bia	36	257 +
Summer 1979	Phou Bia	5	239 +
Fall 1979	Phou Bia	10	56
	Xaignabouri	2	24 +
Winter 1979–80	Phou Bia	4	10 +
Spring 1980	Phou Bia	3	24
Summer 1980	Phou Bia	6	187 +
Fall 1980	Xaignabouri	1	12
	Phou Bia	7	88 +
	Savannakhet	3	1 +
Winter 1980–81	Xaignabouri	2	57
	Phou Bia	4	82
	Vientiane	1	1 +
Spring 1981	Houaphan	2	?
	Phou Bia	7	218
	Vientiane	1	—
Summer 1981	Phou Bia	1	?
Fall 1981	Phou Bia	4	500 +
	Khammouan	3	534 +
		226	6,310 +

[a] This tabulation omits 35 attack sites, accounting for 194 deaths, which could not be geographically located in the reports. The totals overall were 261 attacks and more than 6,504 deaths.
[b] A plus sign indicates that the report(s) of deaths gave a minimum figure. In some cases (shown with a question mark) deaths were reported, but no number was given. Other reports (signified with a dash) gave no information on fatalities.

Laos: Chemical Warfare Operational Areas

1211

Red gas was considered the more lethal. A former Lao Army captain stated that the "red gas" caused the H'Mong to die within 12 hours. An employee of an international organization interviewed victims of a September 15, 1979 attack in which nonlethal rounds preceded an attack by five or six "red gas" bombs that covered a 500-meter area. Persons within 30–100 meters of the circle died in 10 minutes after severe convulsions. Others had headaches, chest pains, and vomiting but did not die.

Every qualified interrogator who systematically interviewed the H'Mong refugees concluded that they had been subjected to chemical attacks. A U.S. Government medical team returned from Thailand in 1979 convinced that several unidentified chemical warfare agents had produced the symptoms described by the refugees. This evidence was expanded by testimony from a variety of sources, including that of a Lao pilot who flew chemical warfare missions before defecting in 1979. His detailed description of the Lao, Vietnamese, and Soviet program to use chemical agents to defeat the H'Mong resistance helped dispel any lingering suspicions that the refugees had fabricated or embellished the stories. The Lao pilot described the chemical rocket he had fired as having a more loosely fitting warhead than a conventional rocket. (His account appears in Annex A.)

In 1977, a H'Mong resistance leader found a U.S. 2.75-inch rocket* with a modified Soviet warhead that fits the Lao pilot's description. Other sources reported that U.S. 2.75-inch rockets were fitted with Soviet-supplied lethal chemical warheads by Soviet and Vietnamese technicians at facilities in Vientiane as well as in Xiangkhoang and Savannakhet Provinces. Munitions storage facilities suitable for storing chemical agents and weapons have been identified in each of these provinces. The aircraft types—AN-2s, L-19s, and T-28/41s—most often reported by the H'Mong refugees as being used to deliver chemical agents have been identified as based on airfields in northern Laos throughout this period. A special Lao Air Force unit is responsible for chemical rockets. The unit is commanded by a Soviet-trained Lao and has a Soviet rocket expert attached as an adviser.

* During withdrawal of U.S. forces from Vietnam, thousands of these fell into Vietnamese hands.

Obtaining additional data for Laos has been difficult because of the nature of the fighting there. There have been few major operations. The reports reflect numerous minor engagements between the opposing forces. In nearly all cases, the chemical use reported has been directed against villages, in the absence of obvious combat operations. This lends support to the Lao pilot's claim that the Vietnamese and Lao military commands were engaged in a "H'Mong extermination" campaign.

Of particular interest are the circumstances surrounding the collection of two physical samples found to contain lethal toxins. The first was collected after a March 13, 1981 attack on a village between the villages of Muong Chai and Phakhao in the Phou Bia region. In this case, a large two-engine plane reportedly sprayed a mist of a moist, yellow, sticky substance; two villagers and all village animals died. The second sample is from Ban Thonghak, another village in the Phou Bia region, collected following an April 2, 1981 attack in which a jet aircraft reportedly sprayed a yellow substance; 24 of the 450 villagers died. In the spring of 1981, seven separate chemical attacks, resulting in 218 deaths, were reported to have occurred in this region.

It is significant that these attacks took place following a period of escalation in overall resistance activities in the Phou Bia area in the winter of 1980–81. During that period, joint suppression operations by Lao People's Liberation Army and Vietnamese Army forces had achieved only limited success, perhaps spurring both forces on to greater effort. The more intense use of chemical weapons may have been part of this effort.

Evidently the fact that chemical agents were being used in Laos was not widely known among units of the Lao Army. In June 1981, a group of refugees from a village in Vientiane Province reached Thailand and described attacks against them carried out a month earlier by helicopters "dropping poison" into their water supply. Lao field units subsequently entered the village and were surprised at the sight of many villagers still suffering from symptoms of acute poisoning. According to a villager, when the Lao military personnel saw the "small yellow grains" spread around the village, they were convinced that toxic chemicals had been used on the village and requested medical assistance for those villagers still suffering from nausea and bloody diarrhea.

In a December 15, 1981 press conference in Beijing, former Lao Health Ministry Bureau Director Khamsengkeo Sengsathit—who had defected to China—confirmed that chemical weapons were being used "in the air and on the ground" in Laos, killing "thousands." He asserted that the Vietnamese alone were using such weapons, keeping the matter secret from the Lao. He also stated that 3,000 Soviet advisers were in Laos and "have taken control" of the Lao Air Force, while 40,000–50,000 Vietnamese troops had "reduced Laos to the status of a colony."

Kampuchea

Since October 1978, radio broadcasts, press releases, and official protests to the United Nations by the Democratic Kampuchea leadership have accused the Vietnamese and the Hanoi-backed People's Republic of Kampuchea regime of using Soviet-made lethal chemical agents and weapons against DK guerrilla forces and civilians. DK allegations for a time were the only source of information concerning chemical warfare attacks in Kampuchea. In November 1979, however, the guerrilla forces of the Khmer People's National Liberation Front reported that the Vietnamese had attacked them with a tear gas which, from their description, resembled the riot-control agent CS. Subsequently, Thai officials, Democratic Kampuchea informants and refugees, Vietnamese Army defectors, U.S. and Thai medical personnel, officials of international aid and relief organizations, and Canadian and West European officials also have implicated the Vietnamese in the offensive use of lethal and incapacitating chemical agents in Kampuchea.

There are reports of 124 separate attacks in Kampuchea from 1978 to the fall of 1981 in which lethal chemicals caused the deaths of 981 persons (see Table 2). The mortality figure represents a minimum because some reports state only that there were deaths and do not provide a number. The earliest reports cite attacks in Ratanakiri Province, in the northeastern corner of the country (see map). Reports from 1979 to the present show the use of lethal chemicals primarily in the provinces bordering Thailand. The greatest use of chemical agents apparently has been in Battambang Province, with 51 reported incidents; Pursat Province has experienced the next highest frequency, with 25

1212

TABLE 2

Kampuchea: Summary of Reported Chemical Attacks and Associated Deaths, 1978–81

Time Period	Area	Attacks	Deaths[a]
1978	Ratanakiri	5	?
Summer 1979	Kompong Speu	4	37
Fall 1979	Siem Reap	1	—
	Battambang	4	22 +
	Pursat	2	1 +
	Koh Kong	2	6 +
	Kampot	1	3
	Kompong Chhnang	2	118
Winter 1979–80	Battambang	12	64 +
	Pursat	5	21 +
	Koh Kong	2	4
Spring 1980	Battambang	3	20 +
	Pursat	8	24 +
	Koh Kong	5	13
Summer 1980	Siem Reap	1	82 +
	Battambang	3	23 +
	Pursat	2	7
	Koh Kong	3	—
Winter 1980–81	Battambang	8	—
	Pursat	2	3
Spring 1981	Preah Vihear	1	—
	Battambang	12	163 +
	Pursat	3	42 +
	Koh Kong	1	—
	Kampot	1	—
Summer 1981	Battambang	3	7 +
	Kompong Thom/Cham	1	—
Fall 1981	Siem Reap	16	305
	Battambang	6	16
	Pursat	3	—
	Koh Kong	1	—
	Kampot	1	—
		124	981

[a] A plus sign indicates that the report(s) of deaths gave a minimum figure. In some cases (shown with a question mark) deaths were reported, but no number was given. Other reports (signified with a dash) gave no information on fatalities.

reported incidents. These numbers are consistent with the overall high level of military activity reported in the border provinces.

A review of information from all sources provides direct and specific support for 28 of 124 reported attacks. There is, in addition, some evidence that in all reported instances some form of attack took place. This evidence includes reports of troop movements, supply transfers, operational plans, postoperation reporting, and air activity. It indicates that military activity took place at the time and place of every incident reported to involve lethal chemical agents. In some cases, it provides strong circumstantial evidence that the action involved chemical substances—for example, the movement of chemicals and personal protection equipment into the area.

There is no doubt that in late 1978 and 1979 the Vietnamese, and what later became the People's Republic of Kampuchea forces, made at least limited use of riot-control chemicals and possible incapacitating agents against both Communist and non-Communist guerrilla forces in Kampuchea. The chemicals used probably included toxic smokes, riot-control agents such as CS, and an unidentified incapacitating agent that caused vertigo and nausea and ultimately rendered victims unconscious with no other signs or symptoms.

In March 1979, during Vietnamese operations against Khmer Rouge forces in the Phnom Melai area, a Vietnamese Army private, who later defected, observed the following activities related to chemical warfare. During the fighting, all regiment (740th) troops were issued gas masks. However, the 2nd Battalion, a "border defense unit," was not issued masks. This unit was in the Phnom Melai area and was virtually surrounded by Khmer Rouge forces. At another point in the battle, the regiment's troops were ordered to don masks. The Vietnamese Army private reported that he saw two Soviets (Caucasians) fire a DH–10 (a hand-held weapon identified by the private's comrades). He was about 50 meters from the firing point. The weapon at impact, which he was able to observe from his position, gave off clouds of white, gray, and green gas/smoke. His signal unit subsequently passed a message reporting that there were 300 dead, including the unprotected Khmer Rouge and Vietnamese of the border defense forces' 2nd Battalion. The corpses reportedly had traces of white and green powder on their faces and clothes. Their faces were contorted, with eyes wide open. No blood was seen. (A H'Mong resistance leader described an incident in 1981 in which two Soviet soldiers fired a hand-held weapon that dispersed a similar lethal agent.)

Starting in February 1980, reports revealed that the Vietnamese were using 60 mm mortars, 120 mm shells, 107 mm rockets, M–79 grenade launchers filled with chemical agents, as well as munitions delivered by T–28 aircraft. According to the DK, the chemicals used were green and yellow and powderlike in appearance. In some instances the gas was described as yellow or white. The symptoms described were tightening of the chest, disorientation, vomiting, bleeding from the nose and gums, discoloration of the body, and "stiffening" of the teeth. In July 1980, the DK described artillery attacks that produced a black smoke causing itchy skin, weakness, skin lesions, and in some cases decaying skin and blisters. In December 1980, the Vietnamese were once again firing chemical artillery shells, and it was believed that poison chemicals were being brought into Thailand's border region. By March 1981, the Democratic Kampuchea forces had reported numerous attacks directed against them with lethal chemical agents and the poisoning of food and water.

U.S. analysis of contaminated vegetation samples collected within hours of a March 1981 attack showed high levels of three trichothecene toxins in a combination that would not be expected to be found in a natural outbreak in this

Kampuchea: Chemical Warfare Operational Areas

1214

environment. At the levels found on the vegetation, the three trichothecenes would produce vomiting, skin irritations and itching, and bleeding symptoms. Water samples taken from the area of the same attack also contained trichothecene toxins. Control samples from nearby areas confirmed that these toxins were not indigenous to the locale. (Details on the sample analysis appear in Annex D.)

There also is ample evidence of military activity at the place and time of the acquisition of the samples. Vietnamese Army defectors described plans for multiregimental sweep operations to be conducted along the border in northwestern Battambang Province before the end of the dry season in May. Actual fighting, however, continued to be characterized by guerrilla tactics on both sides, including, according to a Vietnamese Army defector, "staging ambushes, laying minefields, and use of deception." Indeed, Democratic Kampuchean resistance forces were ordered to avoid large-scale operations and to limit combat operations to scattered sapper attacks. Such information is consistent with other reports of Vietnamese Army forces spreading toxic chemicals in streams, along roadsides, and around villages and firing toxic gas shells against enemy positions. The Phnom Melai sector, where Phnom Mak Hoeun is located, was described as an "anthill of DK activity," and actions reported during March were "sporadic firefights" around Phnom Mak Hoeun involving the Vietnamese Army's 2nd Battalion, 2nd Border Security Regiment.

In Kampuchea, as in Laos, the period of late 1980 through spring 1981 was one of intensified Vietnamese operations to suppress the resistance and break the will of the opposing forces. In July 1981, trucks loaded with blue sacks filled with white powder were being moved by the Vietnamese into the Pailin, Battambang, and Siem Reap areas. Vietnamese soldiers told villagers that the chemicals caused blindness, hemorrhaging, and vomiting.

Additional evidence was derived from blood samples drawn from victims of Vietnamese chemical use that occurred on September 19, 1981 in the Takong area. Takong is in the same general area as Phnom Mak Hoeun—that is, the central region of Battambang Province near the Thai border. Although there is no independent confirmation of the accounts of the attack, American medical personnel visiting a DK field hospital examined the victims and obtained the blood samples. Analyses of these samples suggested the use of trichothecenes. (Blood analysis results also appear in Annex D.)

According to the DK soldiers affected, the chemicals used in the September 19 Takong attack were dispersed as a gas or powder and as a poison to water. The gas or powder was released from containers by tripwires in the area of the rear forces. This description is consistent with the other reporting for this area and time.

Thailand also has been concerned about chemical attacks against its own forces and civilian population. In March 1981, one Thai died from poisons placed by Vietnamese troops, and others became ill after suffering bleeding from the nose and mouth. In May 1981, Thai forces captured two Vietnamese as they were attempting to poison the water supply in a Kampuchean relocation camp in Thailand. The poison was analyzed by the Thai and found to contain lethal quantities of cyanide. Many reports indicate that it is common practice for Vietnamese units to poison water and food used by the DK forces.

The Soviet Connection in Southeast Asia

Much of the Soviet interest in Southeast Asia is dictated by their rivalry with China and their close alliance with the Vietnamese. Regional Communist forces have been strengthened to contain Chinese influence and deter military incursions. The area of northern Laos between Vientiane and the Chinese border—where the H'Mong hill tribes have stubbornly resisted and harassed Vietnamese forces—is strategically significant to the Vietnamese because it adjoins a hostile China. In the last few years the Vietnamese have expanded their military construction and strengthened their forces in Laos which now number 50,000.

Initially there was a tendency to interpret the Soviet role as strictly advisory. Now, however, there is considerable evidence to suggest that the Soviets are far more involved in the Lao and Vietnamese chemical warfare program than was assumed earlier. An estimated 500 Soviet military advisers provide maintenance assistance and technical support, actually running the Lao Air Force, and give advanced training to Lao personnel in conventional as well as chemical warfare.

The Soviets have had advisers and technicians working in Vietnam and Laos for many years and in Kampuchea since 1979. However, it was not until early 1979 that evidence surfaced on the Soviets' direct involvement in chemical warfare activities. For example, the Lao Army chemical section in Xiangkhoang prepared Soviet-manufactured chemical items for inspection by a Soviet military team on February 7, 1979. A seven-man team of Soviet chemical artillery experts, accompanied by Lao chemical officers, inspected chemical supplies and artillery rounds at the Xeno storage facility in Savannakhet on June 1, 1979. One report stated that the Soviets would be inspecting the same chemical explosives used to suppress the H'Mong in the Phou Bia area.

In addition to this information, H'Mong accounts have described Soviet advisers and technicians participating in the preparation of the chemical weapons for the attacks on the H'Mong villages. H'Mong eyewitnesses claim to have seen "Caucasian pilots" in aircraft, and one H'Mong report states that a downed Soviet aircraft was discovered in the jungle along with a dead Soviet pilot. In November 1981, a H'Mong resistance leader described how Soviet soldiers fighting with the Lao Army fired hand-held weapons that dispersed a lethal agent over a 300-meter area. Several Lao defectors have reported seeing Soviet advisers present when aircraft were loaded with chemical-agent rockets.

In July 1981, a Soviet shipment of wooden crates filled with canisters described by the Vietnamese as "deadly toxic chemicals" was unloaded at the port of Ho Chi Minh City. This incident further corroborates the judgment that the Soviets have been shipping chemical warfare materiel to Vietnam for some time. During the unloading, Vietnamese soldiers were caught pilfering the wooden crates containing the canisters. The soldiers dropped one of the wooden cases and intentionally broke it open; they wanted to determine if its contents were edible or valuable for pilferage. When a soldier broke the nylon seal and attempted to pry open a canister, special security personnel isolated the area and told the soldiers that the canisters contained deadly toxic substances from the U.S.S.R. The wooden crates, each weighing 100 kilograms, were loaded on military trucks and taken under special guard to the Long Binh storage depot.

This incident is only one in a series involving Soviet chemical warfare materiel dating back several years. In 1975, for example, a Soviet captain of a diving support craft engaged in salvaging a sunken ship in the Black Sea, which had been transporting Soviet military supplies to Vietnam, said that his divers came in contact with toxic chemicals, and a special Soviet salvage unit took over the operation after the divers became very ill. The salvage operations, conducted by the ASPTR-12 Salvage, Rescue, and Underwater Technical Services Group based in Odessa, were monitored by high-ranking Soviet naval officers.

The operation began with the removal of tractors and helicopters which cluttered the deck of the ship and prevented access to hold hatches. Once the surface clutter was removed, the divers attempted to enter the holds. At this point, however, operations had to be suspended temporarily because of a violent outbreak of chemical poisoning among the divers. Contact with the unidentified chemicals resulted in reddish welts 1–3 centimeters in diameter on exposed skin and was accompanied by severe headaches, nausea, and a general feeling of fatigue. The symptoms disappeared on their own after 3–5 days of rest. At this point, military authorities took over from the ASPTR-12 divers, who were temporarily withdrawn from the project. Soviet naval divers were sent down and determined that the source of poisoning was chemical seepage from an open hatch of one of the holds. The hatch was promptly sealed, and the salvage operation was once more assigned to ASPTR-12 divers who resumed work and retrieved ammunition and an assortment of other equipment. Once this was done, the military took over permanently. The ship was raised without removing the poisonous chemicals and towed to an Odessa shipyard where the chemicals were unloaded by military personnel. The ship was then broken up and scrapped. The entire operation took about 3 years to complete.

As another example of Soviet involvement, two Vietnamese corporals, from the 337th and 347th Vietnamese Army divisions, have stated that Soviet-supplied chemical weapons were stored in caves near Lang Son in February 1979. Although their Vietnamese units were issued gas masks, they were told that Soviet-supplied chemical weapons would not be used unless the Chinese initiated chemical warfare. As late as February 1981, a team of uniformed Soviet military advisers was attached to the corps headquarters. The team leader was a senior Soviet colonel. The Soviets were involved in training corps personnel in the use of Soviet-supplied weapons and equipment, including chemical artillery shells and gas masks. The Soviet team often inspected defensive positions and observed training maneuvers.

Afghanistan

Attacks with chemical weapons against the *mujahidin* guerrillas in Afghanistan were reported as early as 6 months before the Soviet invasion on December 27, 1979. The information specifies that Soviet-made aircraft were used to drop chemical bombs, with no clear identification of Soviet or Afghan pilots or of the specific agents used. On November 16, 1979, chemical bombs reportedly were dropped along with conventional air munitions on targets in Farah, Herat, and Badghisat Provinces by Soviet-supplied Afghan IL-28 bombers based at Shindand. A number of Afghan military defectors have stated that the Soviets provided the Afghan military with chemical warfare training.

TABLE 3

Afghanistan: Summary of Reported Chemical Attacks and Associated Deaths, 1979–81

Time Period	Province	Attacks[a]	Deaths[b]
Summer 1979	Badakhshan	1	2,000[c]
	Parvan	1	8
	Bamian	1	—
Fall 1979	Konarha	1	350
	Farah	1	?
	Herat	1	?
	Badghisat	1	?
Winter 1979–80	Badakhshan	5	130 +
	Takhar	1	—
	Konarha	2	10 +
	Nangarhar	1	?
	Bamian	1	?
Spring 1980	Badakhshan	1	1 +
	Konarha	2	?
	Oruzgan	1	—
	Qandahar	1	—
Summer 1980	Nangarhar	2	1
	Vardak	1	3
	Herat	2	300 +
	Kabul	2	—
Fall 1980	Konarha	1	?
	Lowgar	1	4
	Ghazni	1	100
Winter 1980–81	Lowgar	2	?
Spring 1981	Parvan	2	—
	Lowgar	3	—
	Ghazni	2	?
	Qandahar	1	—
Summer 1981	Nangarhar	2	?
	Qandahar	2	16
	Herat	1	119
		47	3,042

[a] This tabulation omits some attacks described in the text because they could not be dated or located with high confidence.

[b] A plus sign indicates that the report(s) of deaths gave a minimum figure. In some cases (shown with a question mark) deaths were reported, but no number was given. Other reports (signified with a dash) gave no information on fatalities.

[c] The quality of reporting for this period is not as good as the information that became available after the Soviet invasion. We are concerned that this unusually high figure may reflect an accumulation of deaths from several incidents and not the single attack indicated. For example, reports were received describing over 1,000 deaths in Bamian Province in June-July 1979. An Afghan military officer reported seeing the bodies of many *mujahidin* in Panjsher Valley in August 1979 after a chemical attack and stated that many had been killed. An Afghan civil engineer reported hearing that many deaths resulted from a chemical attack in the Jalalabad area, also in the summer of 1979. Because we could not obtain supporting evidence, these reports were not included. Although sufficient evidence exists to conclude that Afghan Government forces used chemical weapons, mainly bombs, from June to December 1979, no survivors or eyewitness accounts of these attacks are available to determine the type of agent and symptoms.

Afghanistan: Chemical Warfare Operational Areas

as well as supplies of lethal and incapacitating agents.

For the period from the summer of 1979 to the summer of 1981, the U.S. Government received reports of 47 separate chemical attacks with a claimed death toll of more than 3,000 (see Table 3). Of the 47 reports, 36 came from Afghan Army deserters, *mujahidin* resistance fighters, journalists, U.S. physicians, and others. For 24 of the reported attacks, there is additional independent evidence supporting allegations of chemical attacks. In seven instances, further individual reporting exists. Evidence for 20 of the reported incidents comes from information on Soviet or Afghan Army combat operations in progress in areas and at times approximating those of a reported chemical attack (see map).

The reports indicated that fixed-wing aircraft and helicopters usually were employed to disseminate chemical warfare agents by rockets, bombs, and sprays. Chemical-filled landmines were also reportedly used by the Soviets. The chemical clouds were usually gray or blue-black, yellow, or a combination of the colors.

Symptoms reported by victims and witnesses of attacks indicate that nonlethal incapacitating chemicals and lethal chemicals—including nerve agents, phosgene or phosgene oxime, possibly trichothecene toxins, and mustard—were used. Medical examinations of some of the victims include reports of paralysis, other neurological effects, blisters, bleeding, and sometimes death. While none of the agents being used in Afghanistan has been positively identified through sample analysis, there is no doubt that the agents being used are far more toxic than riot-control agents such as CN and CS or even adamsite.

Several descriptions of the physiological action of a chemical agent or of the condition of the corpses of victims were particularly unusual. In one, victims were rapidly rendered unconscious for 2–6 hours and had few aftereffects. In another, the bodies were characterized by abnormal bloating and blackened skin with a dark-reddish tinge, and the flesh appeared decayed very soon after death. In a third incident, three dead *mujahidin* guerrillas were found with hands on rifles and lying in a firing position, indicating that the attacker had used an extremely rapid-acting lethal chemical that is not detectable by normal senses and that causes no outward physiological responses before death.

Shortly after the Soviet invasion, many reports were received that both Soviet and Afghan forces were using various types of chemical agents. Ten separate chemical attacks, resulting in many deaths, were reported in the first 3 months of 1980. These reports came from northeastern Afghanistan and provide the highest percentage of reported deaths. During the mid-January to February 1980 period, helicopter attacks were reported in northeastern Afghanistan in which a grayish-blue smoke resulted in symptoms similar to those described by the H'Mong refugees from Laos (e.g., heavy tearing or watering of eyes; extensive blistering and discoloration of the skin, later resulting in large sheetlike peeling; swelling in the areas affected by the blister; and finally numbness, paralysis, and death). Medical reports from examinations in Pakistan of refugees from a large attack in the upper Konar Valley in February 1980 described red skin and blisters containing fluid described as "dirty water." Refugees estimated that about 2,000 people were affected after contact with a dirty yellow cloud.

By spring and summer of 1980, chemical attacks were reported in all areas of concentrated resistance activity. Many reports from different sources strongly support the case that irritants were used to drive the insurgents into the open to expose them to attack with conventional weapons and incapacitants to render them tractable for disarming and capture. On several occasions in April 1980, for example, Soviet helicopter pilots dropped "gas bombs" on insurgents, evidently to drive them from caves.

A Dutch journalist, Bernd de Bruin, published an eyewitness account of two chemical attacks occurring in the Jalalabad area on June 15 and June 21, 1980 (*Niewsnet,* August 2, 1980). He filmed an MI-24 helicopter dropping canisters that produced a dirty yellow cloud. A victim with blackened skin, discolored by extensive subcutaneous hemorrhaging, was photographed in the village 5 hours after the attack. The journalist evidently was exposed because he developed blisters on his hands and a swollen and itchy face. He also was exposed in the second attack, and it took about 10 days for him to recover from skin lesions, nausea, diarrhea, and stomach cramps.

An Afghan insurgent provided an eyewitness account of a July 6, 1980 attack on a village 10 kilometers east of Darae Jelga in Vardak Province. He reported that a Soviet MI-24 helicopter gunship dropped a bomb that, upon explosion, released a lethal chemical. A separate report confirmed that Soviet bombing attacks on villages in Vardak as well as Lowgar and Parvan Provinces were taking place during this period. In August 1980, information surfaced on a Soviet attack with chemical bombs on the village of Sya Wusan, 30 kilometers southeast of Herat, leaving 300 dead. It was during this time that the Soviet chemical battalion at Shindand set up an operational decontamination station.

Reports of chemical weapons use in 1981 essentially parallel 1980 reporting with respect to frequency and location of attack. Soviet helicopter units participated in chemical attacks from April 20 to April 29, 1981, in areas east and west of Kabul and in the Konar Valley, according to eyewitness accounts. These attacks were intended to drive personnel from sanctuaries, such as caves, in order to engage them with conventional fire. The munitions were described as Soviet 250-kilogram RBK cluster bombs. The Soviets have such a munition, which can be filled with chemical agents. Other reports described similar operations by helicopters north of Qandahar on April 24 and April 26, 1981.

A former Afghan MI-8 helicopter pilot said Soviet forces had used chemical weapons in Badakhshan, Qonduz, and Konarha. Chemicals in canisters that contained toxic gas, tear gas, and antirespiratory gas, which has an incapacitating effect by causing choking and difficulty in breathing, were manually pushed from the cargo compartment of helicopters. The pilot said that there also was a specific gas that is absorbed by the body and leaves the skin so soft that a finger can be punched through it. In one case, there was a wind shift, and Soviet and Afghan forces were seriously affected. Other sources also have described an incident where Soviet and Afghan forces were victims of their own gas attack.

The following sequence occurred in a small valley in Qandahar Province in early June 1981. According to an Afghan exile, Soviet combat groups engaged rebel forces in that valley during a 2-week period. The situation worsened for the Soviets, and an airstrike was conducted. The exile stated that a Soviet helicopter delivered a single rocket, releasing a chemical that killed 16 insurgents. Nearly all reports state that chemicals were delivered by aircraft or helicopters; a few reports describe chemical artillery rounds.

Before a sweep operation in the Konar Valley in September 1981, resistance leaders were told by an Afghan officer that the Soviets had four agents available but would use only the incapacitant which they could defend against with wet rags over the face. During the operation, Soviet helicopters conducted gas attacks in 25 different areas, using cylinders about 1.5 meters long and 60 centimeters in diameter that exploded 4–5 meters above the ground, releasing the incapacitating gas. Some victims lost consciousness, were paralyzed, and recovered, but others died, and unprotected areas of their skin turned dark green to blue-green.

An Afghan tribal leader recently described a Soviet chemical attack against a large resistance force in October 1981 near Maruf, about 100 kilometers east of Qandahar. Soviet helicopters dropped green cylindrical canisters (18 inches long, 3–4 inches in diameter) which, upon hitting the ground, emitted a greenish-yellow gas. According to the report, victims felt faint and dizzy; later their skin began to itch, and many lost consciousness. About 300 persons were affected by the gas and many died. Soviet ground forces captured many of the survivors. Other information on Soviet and *mujahidin* activities in the Qandahar area during this period confirms that this incident did in fact take place.

In February 1982, a member of the resistance, with considerable knowledge of Soviet weapons, told a U.S. official that the Soviets were using irritants, a hallucinogenic gas, and what he said was an apparent nerve gas. He described the "nerve agent" as an off-white powdery substance dispersed from helicopters generally during artillery or bombing attacks. Victims realize they have been exposed to chemical attack only when they become faint and dizzy. Subsequently, they begin to vomit and bleed from the eyes, nose, and mouth. Death occurs within a short time. The corpses are extremely relaxed, with no evidence of rigor mortis. Flesh and skin frequently peel off if an effort is made to move the bodies.

According to this account, survivors suffer aftereffects for about 6 months, including chest congestion and pain, dizziness, and mental agitation. The powder-like substance is more effective at lower altitudes where there is less wind to dilute the poison, and *mujahidin* groups have experienced fatality rates as high as 70%. Many survivors of chemical attacks in Laos and Afghanistan have exhibited the same long-term health problems described in this account.

Chemical defense battalions—standard in all Soviet divisions—are deployed with the three Soviet motorized rifle divisions operating in Afghanistan at Qonduz, Shindand, and Kabul. Soviet operational personnel decontamination stations were observed at several locations, and chemical decontamination field units were deployed during a sweep operation of the Konar Valley in eastern Afghanistan and near Shindand in the west in 1980. The operational deployment of decontamination units for personnel and equipment suggests that chemical battalions have supported offensive chemical use. In addition, Soviet personnel have been observed wearing chemical protective equipment. The Soviets have specifically tailored their forces in Afghanistan, in part because of logistical constraints; 5,000 troops and "nonessential" combat equipment were withdrawn, but the chemical battalions remain.

A Soviet military chemical specialist, captured by the *mujahidin*, gave his name as Yuriy Povarnitsyn from Sverdlovsk. During an interview, he said that his mission was to examine villages after a chemical attack to determine whether they were safe to enter or required decontamination. An Afghan pathologist who later defected described accompanying Soviet chemical warfare personnel into contaminated areas to collect soil, vegetation, and water samples after Soviet chemical attacks. According to firsthand experience of former Soviet chemical personnel, the Soviets do not require decontamination equipment in an area where chemical bombs are stored or loaded onto aircraft. Thus, deployment of this equipment in Afghanistan must be assumed to be associated with the active employment of casualty-producing chemical agents.

Afghan military defectors have provided information on ammunition and grenades containing phosgene, diphosgene, sarin, and soman and have described where and when some of them have been used. They also have revealed locations where these agents were stockpiled. The agents used, plus the time and location of the attacks, correspond with the refugee reports and recorded military operations.

The Soviet Union has stocked a variety of toxic chemical agents and munitions to meet wartime contingencies. Weapons systems capable of delivering chemical munitions available to Soviet forces in Afghanistan include artillery, multiple rocket launchers, and tactical aircraft.

Motivation for Using Chemical Weapons

In the course of this analysis, the question has been posed: Is there a military-strategic or tactical rationale for the systematic use of chemical weapons by conventional forces in Laos, Kampuchea, and Afghanistan? The military problems faced in these countries—viewed from the perspective of the Soviets and their allies—make the use of chemical weapons a militarily effective way of breaking the will and resistance of stubborn anti-government forces operating from relatively inaccessible, protected sanctuaries.

The Soviets have made a large investment in insuring that Vietnam and its clients succeed in extending their control over Indochina. For Vietnam, the H'Mong resistance in Laos is a major irritant to be removed as quickly and cheaply as possible. The use of chemical agents has played a major role in driving the H'Mong from their mountain strongholds, relieving Vietnamese and Lao ground forces of the need for costly combat in difficult terrain. Much of the H'Mong population that lived in the Phou Bia mountain region has been driven into Thailand, killed, or resettled.

In the mountainous areas of Afghanistan, where rebels are holed up in caves or other inaccessible areas, conventional artillery, high-explosive bombs, and napalm are not particularly effective. Many reports indicate that unidentified chemical agents have been used on such targets. Caves and rugged terrain in Laos and thick jungles in Kampuchea also have frustrated attempts to locate and destroy the resistance forces. Chemical clouds can penetrate the heavy forests and jungle canopy and seep into the mountain caves. Persistent agents linger in the area and cause casualties days and sometimes weeks after the attack. Unprotected forces and civilians have little or no defense against lethal agents like toxins, nerve gas, or blister agents.

Trichothecene toxins, which are known to have been used in Southeast Asia, have the added advantage of being an effective terror weapon that causes bizarre and horrifying symptoms. Severe bleeding, in addition to blisters and vomiting, has instilled fear in the resistance villages. Not only have the villagers and their animals been killed in a gruesome manner, but the vegetation and water also have been contaminated. Survivors are reluctant to return to their inhospitable homes and instead make the long and dangerous trek to camps in Thailand.

There is no clearcut explanation of why trichothecene toxins have been used in addition to irritants, incapacitants, and other traditional chemical warfare agents. Speculation suggests that they are probably cheaper to make and are readily available from Soviet stocks; they are probably safer and more stable to store, transport, and handle in a Southeast Asian environment, and they may require less protective equipment when being prepared for munitions. They are difficult to trace as the causative agent after an attack—as demonstrated by the length of time it took for the United States to detect them. Few laboratories in the world have the analytical capability to identify precisely the type and amount of trichothecene toxin in a sample of vegetation, soil, or water.

The Soviets may well have calculated that they and their allies could successfully deny or counter charges that chemical weapons had been used, recognizing that it would be especially difficult to compile incontrovertible evidence from inaccessible areas of Southeast Asia and Afghanistan. With respect to Kampuchea, they may also have calculated that, in view of the lack of international support for Pol Pot's resistance, chemical weapons could be used on his troops without significant international outcry.

In addition, the Soviet military very likely considers these remote areas as providing unique opportunities for the operational testing and evaluation of chemical weapons under various tactical conditions. Years of aerial and artillery chemical dispersion have undoubtedly provided the Soviets with valuable testing data. Southeast Asia has offered the Soviets an opportunity to test old agents that had been stockpiled for many years as well as more recently developed agents or combinations of agents. This conclusion is supported by information from foreign military officers who have attended the Soviet Military Academy of Chemical Defense in Moscow. According to their Soviet instructor, three types of chemical agents may be used during the "initial stages" of local wars: "harassing agents (CS, CN, DM), incapacitants such as psychochemicals (BZ) or intertoxins [sic—possibly enterotoxins], and herbicides." During the "decisive phase, lethal agents can be employed under certain circumstances." In a local war, "chemical weapons can be used to spoil enemy efforts to initiate operations, even if the enemy has not used them first." The foreign officers' accounts, including detailed descriptions of the Soviet chemical warfare program, support the conclusion that the Soviets consider chemical weapons an effective and acceptable means of warfare in local conflicts.

Insight into the Soviet bloc military perspective on the use of toxins is provided in the following passage from a 1977 East German military manual entitled *Textbook of Military Chemistry.*

> Toxins are designated as toxic agents which are produced by biological organisms such as micro-organisms, plants, and animals, and cannot themselves reproduce.
>
> By the middle of 1960 the toxins selected for military purposes were included among the biologic warfare agents. In principle, this was understood to mean only the bacterial toxins. Today it is possible to produce various toxins synthetically. Toxins with 10–12 amino acids can currently be synthesized in the laboratory. Toxins are not living substances and in this sense are chemicals. They thus differ fundamentally from the biological organisms so that they can be included among chemical warfare agents. As a result

1219

of their peculiarities they are designated simply as "toxin warfare agents." They would be used in combat according to the same principles and with the same methods used for chemical warfare agents. When they are used in combat the atmosphere can be contaminated over relatively large areas—we can expect expansion depths of up to 6 kilometers before the toxin concentration drops below lethal concentration 50 . . . the toxin warfare agents can be aerosolized. They can be used primarily in micro-bombs which are launched from the air or in warheads of tactical rockets. Toxin warfare agents concentrates can be applied with aircraft spray equipment and similar dispersion systems.

The Soviet designation for several pathogenic *Fusarium* products is "IIF (*iskusstvennyy infektsionny fon*), which stands for "artificial infection background." IIF devices are used in the Soviet Union deliberately to contaminate soil in experimental agricultural test areas with spores of disease-producing fungi. We are not certain if the IIF compounds include trichothecenes. Nor are we certain as to the intent of this agricultural research program. It is possible that these programs are designed to colonize soil with pathogenic organisms either to determine which crop varieties are most resistant to disease or, alternatively, to test eradication and control methods in infected soils. Elsewhere in the Soviet agricultural research program, however, it is known that there is widespread use of certain trichothecenes, including sprays from light aircraft. A capability exists within the Soviet Union for multi-ton production of light aircraft spray-delivered microbial products such as those described above.

Evidence accumulated since World War II clearly shows that the Soviets have been extensively involved in preparations for large-scale offensive and defensive chemical warfare. Chemical warfare agents and delivery systems developed by the Soviets have been identified, along with production and storage areas within the U.S.S.R. and continuing research, development, and testing activities at the major Soviet chemical proving grounds. Soviet military forces are extensively equipped and trained for operations in a chemically contaminated environment. None of the evidence indicates any abatement in this program. The Soviets have shown a strong interest in improving or enhancing their standard agents for greater reliability and effect. Their large chemical and biological research and development effort has led them to investigate other kinds of chemical warfare agents, particularly the toxins.

None of the four countries considered in this report—Vietnam, Laos, Kampuchea, and Afghanistan—has any known large-scale facility or organization for the manufacture of chemical and biological materials. Nor are they known to have produced even small quantities of chemical warfare agents or munitions. The technical problems of producing large quantities of weapons-grade toxins, however, are not so great as to preclude any of the four countries from learning to manufacture, purify, and weaponize these materials. It is highly unlikely, however, that they could master these functions without acquiring outside technical know-how.

ANNEX A

A Lao Pilot's Account

One of the most complete descriptions of chemical warfare activities in the 1976–78 period came from a Lao pilot who was directly involved in chemical warfare. The pilot, a former Lao People's Liberation Army (LPLA) officer who defected in 1979, reported that he flew captured L–19 and T–41 aircraft equipped to dispense toxic chemical agents on H'Mong villagers in the Phou Bia area of northern Laos. He said that the LPLA, in cooperation with the Vietnamese Army, had conducted chemical warfare operations in Laos since April or early May 1976. At that time, two Lao H–34 helicopters were flown between Long Tieng and the Phonsavan airfield, both in Xiangkhoang Province, on a series of flights to transport rockets to Phonsavan for storage.

Between June and August 1976, the LPLA launched attacks in the area of Bouamlong—in Xiangkhoang Province—a stronghold for remnants of the forces of former H'Mong Gen. Vang Pao. The LPLA used L–19 aircraft for rocket attacks in that area aimed at eliminating the H'Mong resisting government control. Lao crews responsible for loading rockets on the attack aircraft noted that they were not allowed to use the rockets that had been moved from Long Tieng to Phonsavan, even though Phonsavan was much closer to the Bouamlong target area than Long Tieng, where Lao aircraft had to rearm. The pilot said that, during nearly 3 months of flying missions against the Bouamlong area, he flew his L–19 aircraft to Long Tieng to be armed with rockets.

In late 1976, the pilot's L–19 aircraft was rearmed with rockets stored at Phonsavan. Initially, H–34 helicopters were used to transport the rockets from Phonsavan to a depot near the Ban Xon airfield (Vientiane Province), where the rockets were fitted onto racks of the L–19 aircraft for missions in the Phou Bia area; later, the rockets from Phonsavan were transported to Ban Xon by trucks. All U.S.-manufactured rockets were stored with the tip and canister kept apart; the two parts had to be joined before being fitted to the racks on the aircraft. The pilot observed, however, that all the rockets transported from Phonsavan to Ban Xon were already assembled.

As part of his routine flight activities, the pilot would check his aircraft and, in doing so, examine the tip portion of new smoke rockets that had been transported from Phonsavan. He said that most appeared "loose" in the portion where the tip and canister joined, whereas the tip and canister of the ordinary explosive-type rockets at Long Tieng were noticeably more tightly connected.

In late 1976, during preparation for airstrikes on Kasy (Louangphrabang Province) and in new areas of Phou Bia, the pilot said he began carrying two or three Vietnamese Army staff officers, sometimes accompanied by a Lao staff officer, in T–41 aircraft for reconnaissance over the target areas. When these airstrikes were launched, the defector pilot initially flew his L–19 aircraft on missions with another pilot and a Lao staff officer. After 2 or 3 weeks, however, Vietnamese staff officers, who spoke excellent Lao, began alternating with the Lao officers. Before each mission, the Vietnamese or Lao staff officer would go over target areas outlined on situation maps—which then were taken along—and would point out the targets to be attacked. The defector pilot noted that at no time did the Vietnamese staff officer communicate with Lao officers on the ground, as did the Lao staff officers. A new Vietnamese officer was assigned for each airstrike mission in the H'Mong areas.

The pilot related that before flying L–19 airstrike missions with a full load of rockets he was often warned by a Lao commander to fly at above-normal altitudes when firing rockets—to preclude hazard to the occupants of the aircraft. For this reason the pilot surmised that the "smoke" rockets fired at the H'Mong were unusual. He was able to observe that the "smoke" rockets detonated in the air and that some produced white smoke, with a mixture of blue, while others produced red smoke, with a mixture of yellow. The ordinary explosive-type rockets detonated on impact. The

1220

commander or his designated representative told the pilot before every mission that the operations—called Extinct Destruction Operations—were intended to "wipe out the reactionary H'Mong people."

Before a mission involving "smoke rockets," the commander warned the pilots to keep the operation secret. The Lao defector said that, during the nearly 2 years in which he flew rocket missions, he learned from the Lao staff officers accompanying him that there were two types of rockets. The first, mostly "smoke" rockets, were to be fired at targets far away from Lao and Vietnamese troops to avoid exposing them to the poison smoke. The second was of the ordinary explosive type, considered a "close support" rocket that could be fired near Lao troop positions. Initially, the L–19 aircraft carried eight rockets—five "close support" and three "smoke" rockets. Later, only four rockets, mainly of the "smoke" type, were carried.

After each mission in which chemical warfare rockets were used, the pilot was returned to a "rest house" at Phonsavan, where a Lao Army doctor and nurse would examine him. He said that after his missions, especially in 1978, he was particularly well treated by the examining doctor and watched very closely by the nurse. Those L–19 aircraft pilots assigned to missions utilizing chemical warfare rockets had special privileges, including additional flight pay and free meals at the Phonsavan cafeteria. In October 1978, the Lao Army stopped using L–19 aircraft on combat missions and began using Soviet MiG–21s for chemical attacks on the Phou Bia areas.

Several H'Mong reports corroborate the testimony of the Lao pilot. A village chief, for example, described attacks covering all 7 days of the week of June 5, 1976 in the Bouamlong area. He described L–19 aircraft firing rockets that produced red and green smoke: Ten villagers were killed by gas and 30 by shrapnel. Most of the H'Mong reports documented by a U.S. Foreign Service officer in June 1979 and a Department of Defense medical team in October 1979 were consistent with the pilot's testimony. H'Mong observers familiar with military aircraft reported L–19s in use until late 1978. After that time, reports described jets or "MiGs" and some accurately described Soviet AN–2s.

A review of information back to 1975 shows L–19 and T–28 aircraft were operating from airfields in northern Laos—including the one at Phonsavan, where AN–2s were seen in 1978. Failure to observe chemical decontamination equipment at the airfields does not rule out the presence or handling of chemical munitions. The Soviets supervise the chemical warfare activities in Laos; it is assumed that chemical munitions are handled in about the same manner as in the U.S.S.R. According to former Soviet chemical warfare personnel, no protective clothing or special decontamination equipment is required for loading chemical bombs onto aircraft and helicopters at chemical munitions test ranges.

The Lao pilot's description of the rockets used on the L–19 was corroborated by other sources. A H'Mong refugee, a former commander of a 500-man resistance force, reported that in 1977 he found a rocket canister and a separated warhead that he believed were the kinds used by the Vietnamese and Lao. The canister had authentic U.S. markings identifying it as a U.S.-manufactured 2.75-inch rocket and, reportedly, three lines of Russian writing which he could not translate. Another H'Mong resistance force officer, reportedly trained as a liaison officer and ordnance expert before the Communist takeover of Laos, stated that he, too, believed that the rocket canister was of U.S. manufacture and that the Soviet technicians in Laos had modified the upper stage to contain a poisonous (i.e., lethal) chemical.

The diameter of the warhead was reported to be 12.5 centimeters (5 inches), probably a measurement taken on a modified warhead, because the United States does not have a 5-inch warhead for the 2.75-inch "rocket motor." During the Vietnam conflict, about 35 million U.S.-manufactured, conventional 2.75-inch rockets were sent to the war zone, and many tens of thousands of these fell into North Vietnamese hands when the South Vietnamese forces collapsed. The Vietnamese may be using some of these rockets with existing loads, but modified warheads for the 2.75-inch rocket motor could easily be fabricated in Vietnam and filled with a lethal or nonlethal agent in Laos, especially with Soviet assistance. According to U.S. experts, fabrication of a warhead 5 inches in diameter, necked down to fit the 2.75-inch rocket, could be accomplished by trained technicians in a small, well-equipped machine shop and laboratory.

ANNEX B

Findings of U.S. Government Investigative Teams: Use of Chemical Agents Against the H'Mong in Laos

State Department Team

In May 1979, State Department officials visited Thailand to interview H'Mong refugees and investigate allegations of the use of chemical agents against H'Mong tribesmen in Laos (see Table B–1). From the signs/symptoms described and observed, it is suggested that at least two and possibly three different chemical agents may have been used, such as:

- A nerve agent (five or six individuals reported symptoms that could be attributed to a nerve agent);
- An irritant or riot-control agent (one-third of the interviews); and
- More than half of the interviews indicated such a variety of signs and symptoms that it is difficult to attribute them to a single known agent.

It is possible that in some cases two or more agents were combined.

- Reported signs and symptoms suggesting a nerve agent include sweating, tearing, excessive salivation, difficulty in breathing, shortness of breath, nausea and vomiting, dizziness, weakness, convulsions, and death occurring shortly after exposure.
- Reported signs and symptoms suggesting a riot-control or irritant agent include marked irritation or burning of the eyes, with tearing and pain; irritation and burning of the nose and throat; coughing; burning and tightness in the chest; headache; and nausea and vomiting in a few cases.
- Reported signs and symptoms not related to any known single agent include a mixture of the above as well as profuse bleeding from mucous membranes of the nose, lungs, and gastrointestinal tract, with rapid death of the affected individuals in some instances.

Estimates from the H'Mong interviewed indicate that approximately 700–1,000 persons may have died as a result of the use of chemical agents and that many times this number became ill. It was reported that on many occasions entire villages were devastated by these agents, leaving no survivors.

In the episodes described, most of the animals exposed to the chemical agents were killed. Generally, all chickens, dogs, and pigs died and, to a lesser extent, the cattle and buffalo. On several occasions it was reported that where these agents settled on tree and plant leaves, many small holes appeared in the leaves within 2 or 3 days. Rarely did agent exposure result in the defoliation or death of the plants.

Department of Defense Team

From September 28 to October 12, 1979, a team from the U.S. Army Surgeon General's Office was in Thailand to conduct a similar series of interviews.* The team visited the following H'Mong refugee camps of northern Thailand: the detention center at Nong Kai, the large H'Mong camp at Ban Vinai, and two smaller camps at Nam Yao and Mae Charim. As the great majority of refugees as well as the H'Mong leadership are at Ban Vinai, most interviews were obtained there.

The team was prepared to obtain blood and skin samples (for cholinesterase activity and study of pathological changes, respectively) from those exposed to chemical agents. For such samples to yield meaningful results they must be taken within 6–8 weeks of exposure. Since the last reported exposure was in May 1979, no blood or skin samples were collected.

Interviews were conducted through interpreters; one was an employee of the U.S. Consulate at Udorn, and the remainder were hired from among the refugees. The interpreters screened those refugees who volunteered to talk to the team and selected only those who had been eyewitnesses to or had themselves been exposed to an agent attack. Team members interviewed 40 men, 2 women, and a 12-year-old girl. Each interview took 1–2 hours. To insure conformity, a prepared questionnaire was used as a guide.

The chemical attacks reportedly occurred between June 1976 and May 1979 (Table B–1). The absence of reports of attacks after May 1979 may be because

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TABLE B–1

Reports of Probable Chemical Agent Attacks in Laos

Department of State Interviews Conducted in Summer 1979

Date	Location	Method of Attack by Plane	Material Used (Smoke/Gas)
Oct. 1977	Phu Hay, S. of Phou Bia	Rockets	Yellow-gray
1978	Pa Sieng, S. of Phou Bia	Bomb	Yellow
Feb. 1978	Ban Nam Luk, S. of Phou Bia	Spray (?)	Yellow/white
Feb. 1978	20 kms SE. of Phou Bia	Spray (?)	Yellow
Feb. 1978	Ban Ko Mai	Bomb	Yellow
Mar. 1978	Pha Houei	Sacks, burst in air	Brown
Mar. 1978	Ban Na Pong	(?)	Yellow
Apr. 1978	Ban Phamsi	(?)	White, green, blood-colored
May-Apr. 1978	Ban Nong Po	Cloud	Yellow-brown like rain
June 1978	Ban Nam Teng	Rocket (?)	Yellow
June 1978–May 1979	Ban Don area	Spray	Yellow
Mid-1978	1–3 kms NE. of Phou Bia	Rocket, air burst	Red
Oct. 1978	Nam Kham	Rockets, air burst	Yellow
Oct. 1978	6 kms N. of Phou Khao	Rockets, air burst	Red
Oct. 1978	3–4 kms N. of Phou Bia	Rockets, air burst	Yellow-gray
Nov. 1978	Phou Xang Noi	Spray	Yellow, blue
Nov. 1978	near Phou Bia	Bomb, air burst	Yellow
Nov. 1978	NE. of Pha Khao	Rocket, air burst	Yellow
Apr. 1979	Ban Nouia Pong	Spray	Yellow
May 1979	Nam Po	Spray	Yellow
May 1979	Pha Mai	Spray, air burst	Yellow

Department of Defense Interviews Conducted in Fall 1979

Date	Location	Method of Attack by Plane	Material Used (Smoke/Gas)
June 1976	Pou Mat Sao	Rockets	Red, green
Jan. 1977–Oct. 1978	Pha Khao	Rockets	Yellow, red, green
Mar. 1977	Nam Theuna	Rockets	Red, yellow
Apr. 1977	Houi Kam Lang	Rockets	Yellow
May 1977	Pha Khae	Rockets	Red
May 1977	Nam Moh	Rockets	Yellow
May 1977	Pha Ngune	Spray/rockets	Yellow
1977–1978 (3 attacks)	Phu Seu	Rockets	Red, green, yellow
Jan. 1978	Houi Xang	Rockets	Red, green
Feb. 1978	Sane Mak Ku	Rockets	Yellow
Feb. 1978	Tham Se Sam Leim	Rockets	Yellow, black
Feb. 1978	Kio Ma Nang	Rockets	Yellow
Mar. 1978	Mouong Ao	Rockets	White
Mar. 1978	Khieu Manang	Rockets	Green
Apr. 1978	Tha Se	Rockets	White
June 1978	Pha Phay	Rockets	Yellow
June 1978	Phou Seng	Rockets	Red, white, black
July 1978	Phou Bia	Rockets	Red
July 1978	Ban Nam Mo	Spray	Yellow
July 1978	Phou Lap	Rockets	Yellow
Aug. 1978	Pha Houai	Rockets	Red, green
Aug. 1978	Ban Thin On	Rockets	Green, red
Aug. 1978	Bouamlong	Rockets	Red, green, yellow
Sept. 1978	Pha Koug	Rockets	Yellow
Sept. 1978	Ban Nam Tia	Spray/rockets	Yellow, green, red
Sept. 1978	Pha Na Khum	Rockets	Red
Oct. 1978	Phou Bia	Rockets	
Oct. 1978	Ban Done	Spray	Yellow
Oct. 1978	Phou Bia	Rockets	White, green, red
Nov. 1978	Phou Bia	Rockets	White, red
Feb. 1979	Pha Mat	Spray	Yellow
Feb. 1979	Tong Moei	Rockets	Yellow, red
Mar. 1979	Pha Mai	Spray	Yellow
Mar.–May 1979 (6 attacks)	Pha Mai	Spray	Yellow
Apr.–May 1979 (4 attacks)	Pha Mai	Spray	Gray-white
May 1979	Phou Bia	Spray	Yellow
May 1979	Moung Phong	Rockets	Red

few refugees crossed the Mekong River after that time—as a result of heavy rains and flooding from June to September 1979. Most of the early reports were of the use of rockets releasing the agent; beginning in the fall of 1978, the majority of the attacks were carried out by aircraft spraying a yellowish substance which "fell like rain." The attack sites, concentrated around the H'Mong stronghold in the mountainous Phou Bia area, also are listed in Table B-1.

The team was given a plastic vial containing pieces of bark, stained by a yellow substance, which several H'Mong refugees claimed was residue from an aircraft spray attack in April 1979. Preliminary chemical analysis of the sample indicates that no standard chemical agent (i.e., an agent listed in TH 8-285, U.S. Army, May 1974) was present.

Conclusions

The conclusions of these teams, based upon interviews obtained from H'Mong refugees, are as follows:

- Chemical agents have been used against the H'Mong.
- The reported effects of these agents suggest the use of a nerve agent, a riot-control agent, and an unidentified combination or compound.

ANNEX C

Medical Evidence

Southeast Asia

Since 1975, many different sources—refugees, relief workers and medical personnel, including specially qualified physicians—consistently have detailed unusual signs and symptoms of victims of "yellow rain." Specifically, victims in Southeast Asia subjected to a direct attack of the yellow powder, mist, smoke, or dust would be seen to begin retching and vomiting within minutes. These effects and those described below were not pronounced in individuals even 100 meters from the attack zone, indicating a relatively dense chemical/carrier combination that was effective in low wind conditions.

Following the victim's exposure to yellow rain, the initial induced vomiting—unlike that caused by a traditional riot-control nausea agent—was protracted over hours to days. It was often accompanied by dizziness, rapid heartbeat and apparently low blood pressure, chest pain, loss of far-field vision, and a feeling of intense heat and burning on the skin, although not described as being most acute in the groin and axillae. Thus, the acute signs and symptoms match some effects of traditional vomiting and blister agents but clearly not all.

Within the first hours after the attack, many victims also reported intense red eyes, bleeding gums, convulsions or more often trembling, and vomiting of blood, with or without production of copious amounts of saliva—lasting many hours to days, apparently depending on the exposure level. Thick mucous, pinpoint pupils, respiratory collapse, prolonged spasticity, and involuntary urination or defecation were never reported after a yellow rain attack; the absence of these symptoms helped to rule out organophosphate nerve agents in the minds of chemical warfare experts. Many medical and environmental samples also ruled out these and other traditional agents such as DM, DS, and others.

Many observers of "yellow rain" effects reported formation within several hours of small (1 centimeter) homogeneous, hard, fluid-filled blisters over only exposed areas of skin, frequently including the victim's hands, arms, entire throat, and face—wherever skin was uncovered. In most cases the vomit, after 2-8 hours, contained blood and, in many cases, large amounts of it. About half of those receiving the most concentrated doses of yellow material—those who had been directly under the spray—were observed within several hours to cease vomiting temporarily. This interval was often followed in 5-15 minutes by a period of great pain when the victim would hold his abdomen and emit a gush of blood from mouth and nose. These individuals usually died within minutes afterward.

Close questioning by physicians of witnesses to these final moments leaves no doubt that the effects resulted from severe gastrointestinal bleeding, significant pulmonary bleeding, temporary compression of accumulated blood in the stomach, and, finally, projectile vomiting of as many as several hundred milliliters of blood. These findings were consistent with animal and human autopsies.

Many victims of the yellow material received less than the full brunt of a spray, entered the attack zone several hours to 2 days later, or consumed food or water contaminated by the material. These individuals—often within the next 24 hours—developed signs and symptoms similar to those more directly affected but often without pronounced skin effects if they had not contacted the powder residue directly. In addition to attacks of intense vomiting five or six times a day, they also had diarrhea, with bloody stools passed up to eight times a day. Bleeding under the fingernails and around the skin of the eyes and severe bruising of the skin also were commonly reported. Opiates helped the fluid loss in adults, but in children or young persons unable to tolerate the treatments of raw opium and water, death occurred after 10 days to 2 weeks in about half the cases. On the basis of reported signs and symptoms, the cause of delayed death almost certainly was dehydration.

In many cases, chemical attacks are reported to produce symptoms other than those described here. However, there has always been a direct association of the above symptoms with reports of yellow rain attacks—that is, when yellow material is used these symptoms appear; other agents may give rise to other symptoms. Although it is possible to exhibit one or even several of these symptoms associated with traditional chemical warfare agents, no expert has been able to fit the sequence, severity, and consistency with any of them. In many cases, victims and observers were examined, histories taken, and interviews conducted by several health professionals weeks apart. Remarkable consistency has been observed.

From the beginning of the yellow rain episodes in 1975, autopsies occasionally have been reported anecdotally. Some have been done inexpertly, some by nonphysicians, and some were performed on animals rather than on human victims. However, the consistency of the early reported "putrefaction" or "rottenness" of the digestive tract within 12-48 hours after death led many forensic medical experts to suspect that one effect of the poison—whatever it was— was to cause necrosis (cell death) of rapidly dividing mucosa (mucous membranes), especially in the stomach and upper small intestine. Other autopsy findings included hyperemia (engorgement with blood) of digestive mucosal linings and remarkably intense congestion and swelling in the lungs, liver, spleen, and sometimes the kidneys. These and other findings often led experts in toxicology and pathology, on the basis of clinical and pathological data alone, to suggest mycotoxin or even trichothecene intoxication.

Trichothecene effects have been reported in the forensic, oncological, and toxicological literature for several years. Unpublished findings often have been discussed in symposiums. In several dozen cases, toxic effects in humans and

1223

animals have been carefully recorded, and they match those of yellow rain with good precision (see Table C–1). *There are no additional signs or effects of known trichothecene intoxication not frequently reported by victims, nor are there any reported yellow rain symptoms that cannot be explained by the effects of the four specific trichothecene toxins found in the samples.*

There are no significant medical differences in the reporting from Laos and Kampuchea. Although the timing and delivery systems have sometimes varied, the effects of the chemical agent, clinically and pathologically, are identical. In some cases, a series of blood samples from Kampuchean victims also showed a trend toward leukopenia (reduction in the number of white blood cells) and the presence of a trichothecene metabolite (HT–2) consistent with trichothecene intoxication (see Annex D). Dose-response effects that were observed and routes of administration were both consistent with effects of trichothecenes.

An early hypothesis (1978–79) was that a significant number of deaths, especially in Laos, could be explained by the heavy use of riot-control agents such as CS, CN, DM, and agents which cause itching and/or blistering. This hypothesis was rejected quickly on two grounds. First, trace contaminant analysis failed to show the presence of any of these compounds in samples; several samples did, however, contain a trichothecene precursor. Second, contrary to commonly held views, the epidemiology of diseases endemic to the central highlands of Laos and the public health situation of the H'Mong do not support the view of malnourished, disease-ridden, and weak persons who would succumb easily to riot-control agents. Also, many studies have shown the opposite: a relatively low incidence of pulmonary disease, lower than what could otherwise account for certain effects; better nutritional states than could otherwise account for death in 10 days to 2 weeks from water loss (dehydration) and calorie depletion; and a death rate of nearly zero from causes other than infection, old age, and trauma.

TABLE C–1

Comparison of Reported "Yellow Rain" Effects With Known Trichothecene Effects

Yellow Rain Reports*	Effects of Trichothecenes
1. Nausea, vomiting—severe, immediate	1. Nausea, vomiting—severe, immediate
2. "Falling down, world turning"	2. Dizziness
3. "Burning of skin"—small blisters	3. Generalized erythema with a burning sensation of skin
4. "Shaking all over, flopping like fish out of water"	4. Ataxia (failure of muscular coordination), occasional tremors and convulsions
5. "Bleeding eyes"	5. Congestion of the sclera (white outer coat of eyeball) and blood in tears
6. "Pounding" chest, rapid heartbeat, weakness	6. Hypotension (abnormally low blood pressure) with secondary rise in heart rate
7. Severe pain in center of chest	7. Angina (substernal chest pain)
8. Sleepiness, "not able to talk"	8. Somnolence, central nervous system symptoms
9. Bleeding gums and profuse salivation	9. Stomatitis (inflammation of oral mucous membranes) and ptyalism (excessive salivation)
10. "Can't breathe"	10. Shortness of breath
11. "Skin and body hot with cold"	11. Fever and chills
12. Diarrhea with blood	12. Diarrhea with blood
13. Loss of appetite, inability to eat	13. Anorexia
14. Bleeding into skin and fingernails	14. Thrombocytopenia (decrease in number of platelets, white blood cells involved in clotting of blood) and purpura (skin discoloration caused by hemorrhage into tissues)
15. Drop in white blood cell count	15. Leukopenia and anemia
16. "Rotten esophagus, stomach, intestines; soft spleen and liver"	16. Rapid necrosis of linings of gastrointestinal tract; lymphoid necrosis in spleen and liver
17. Swelling of all organs	17. Congestion of all organs

* Effects are immediate at levels near to or above a rough estimate of 500–1,000 mg total body burden for an adult. Although inhalation data are pending, the levels are consistent with reported lethal and sublethal doses. Trichothecenes in combination, when directly ingested or inhaled, or in purified form, are more toxic in lower concentrations, and the order of signs and symptoms and timing varies.

Afghanistan

Some deaths associated with bleeding have been described in the accounts from Afghanistan. In one set of cases, a physician examined persons who had been exposed to sublethal doses of a yellow smoke/black smoke combination attack and one man near death after a series of attacks. Hemoptysis (nasal bleeding)—but not hematemesis (bleeding from the gastrointestinal tract)—was reported in about half of these cases.

Several features of at least one of the chemical agents—an incapacitant—used in Afghanistan defy explanation at this time. One possibility is that the agent(s) are highly selective for the central nervous system rather than the autonomic nervous system. As yet, no good candidate agent has been identified which will selectively inhibit the central nervous system so as to cause unconciousness for several hours. Another finding has been the presence of a dermal anaesthesia, affecting only exposed areas of skin.

Postattack Medical Survey

There is evidence that after some attacks in Laos and Afghanistan, Lao Communist or Soviet forces entered the attack zones to conduct surveys. Several reports indicate that survivors from a toxin attack on a Lao village were taken several kilometers from the village and injected with a small volume of a clear solution said by their captors to be a "new" medicine to assess the gas. The injections, given intramuscularly in the upper arm, reportedly did nothing to

1224

alleviate the weakness, nausea, vomiting, or diarrhea suffered by the survivors. One victim reported the drug caused an immediate sensation of warmth throughout his body. Only the use of opium later eased the discomfort. It is probable that this procedure was a test either of a new antidote or of a drug developed to reduce incapacitation from the nausea and vomiting.

Similarly, in a few cases in Afghanistan, Soviet troops reportedly disembarked from helicopters or armored personnel carriers at the edge of an attack site. Three or four, dressed in full anticontamination gear, walked among the dead, examined the corpses and, opening them with a crude incision, examined the organs in the abdominal and thoracic cavities. In one case, a solution was poured into the incision. When the corpses were later recovered by the *mujahidin,* the body cavity contents had been destroyed beyond recognition. These and a few additional reports support the hypothesis that the perpetrators of some of the attacks were interested in studying aftereffects, lethality, or some other quasi-experimental aspect of the use of a new chemical weapon. Recent indications from Afghanistan indicate that one purpose of the field surveys and body examinations is to determine levels of toxic materials still present in the attack zone before Soviet troops occupy it.

ANNEX D

Analysis and Review of Trichothecene Toxins

Sample Analyses for Trichothecenes

The Trichothecene Hypothesis. Since 1975, the U.S. Government has received remarkably consistent reports detailing chemical attacks in Southeast Asia. Some of these reports described the use of lethal agents which produced symptoms that could not be correlated with those produced by known or traditionally recognized chemical warfare agents or combinations of them (see Table D–1). It is readily apparent that the symptoms most frequently described in Laos and Kampuchea correspond most closely with those produced by a group of mycotoxins—the trichothecenes. A review of the scientific literature revealed not only that these compounds had physical and chemical properties indicating potential as chemical agents but also that they were the subject of intensive investigation by Soviet scientists at institutes previously linked with chemical and biological warfare research. In the fall of 1980, the trichothecenes were added to the list of agents suspected to have been used in Southeast Asia and Afghanistan. Other candidates under consideration included phosgene oxime, arsines, cyanogen chloride, nerve agents, riot-control agents, and combinations of these agents.

Many samples from chemical attacks in Laos and Kampuchea were examined at the U.S. Army's Chemical Systems Laboratory (CSL) for the presence of traditional chemical warfare agents and were reported to be negative. In March 1981, CSL reported the presence of an unusual compound ($C_{15}H_{24}$) in the vapor analyses from several clothing and tissue samples taken from the victim of a chemical attack. The compound was closely related in structure to the simple trichothecenes. This finding sparked the request for analysis of all future samples for the presence of trichothecene mycotoxins.

The Kampuchean Leaf and Stem Sample: The First Analysis for Trichothecenes. On March 24, 1981, a number of samples were received from the U.S. Embassy in Bangkok. Two were reported to have been collected from the site of a chemical attack that occurred in the vicinity of TV 3391, an area just south of Phnom Mak Hoeun. A vegetation sample and a water sample were collected within 24 hours of the attack. Examination of bodies of victims of this attack by medical personnel revealed highly unusual degeneration of the mucosal lining of the gastrointestinal tract. The effects described paralleled those known to be produced by the trichothecenes. The samples were submitted to the Chemical Systems Laboratory for analysis for the presence of chemical warfare agents. With the exception of the unusual presence of high levels of CN-, Cl-, and F-ions, no evidence of known chemical warfare agents was found. An initial test for the trichothecenes by thin layer chromatography was inconclusive because of severe problems with interfering substances and the lack of appropriate standards.

The trichothecenes are difficult to detect even under ideal circumstances, and the presence of interfering substances in the sample may make identification and quantification by thin layer chromatography inconclusive. A review of the limitations and potentials of the analytical methods for trichothecenes led to the conclusion that the computerized gas chromatography/mass spectroscopy method in the selected ion-monitoring mode enabled precise identification and quantification of these compounds in complex mixtures. A comparison of the currently available methods suitable for trichothecene analysis and an assessment of their utility and limitations is presented in Table E–3.

A portion of the leaf and stem sample was furnished to the U.S. Army Medical Intelligence and Information Agency for further analysis. This sample, a positive control sample to which T–2 toxin was added, and a negative control sample of similar vegetation were forwarded to Dr. Chester J. Mirocha of the Department of Plant Pathology, University of Minnesota. Dr. Mirocha was given no information concerning the history or content of the samples and was requested to analyze the three unknowns for the presence of trichothecene toxins using the best methods at his disposal.

The analysis involves a series of extractions followed by ferric gel separation, selected ion monitoring on a computerized gas chromatograph/mass spectrometer, and a full mass spectral scan for comparison with known standards. The methods used are among the most sensitive and specific for detection of these compounds; also, false positives are rare. Toxins can be identified by their mass spectra and quantified with a high degree of accuracy. The vegetation sample allegedly exposed to a chemical warfare agent was found to contain 109 parts per million (ppm) of nivalenol, 59.1 ppm of deoxynivalenol, and 3.15 ppm of T–2 toxin; each is a potent toxin of the trichothecene group. No trichothecenes were detected in the negative control sample, and 35 ppm of T–2 toxin were detected in the sample to which T–2 toxin had been added. It was Dr. Mirocha's assessment that a mixture of these particular toxins in the high levels detected could not have occurred as a result of natural contamination.

The possibility that the identified toxins were produced by natural fungal contamination was discounted on the basis of the climatic conditions required for production of T–2 toxin, the high levels of toxins detected, the unusual mixture of toxins found, and the results of surveys of Southeast Asia for the presence of these toxins. This conclusion was supported by the analysis of normal flora samples from Kampuchea described below.

Analyses of Control Samples From Kampuchea for the Presence of Trichothecenes. On September 20, 1981, the U.S. Army Medical Intelligence and Information Agency received nine control samples from U.S. Army personnel in Bangkok for the purpose of conducting laboratory analyses for background

TABLE D–1

Symptoms of Chemical Attacks Reported in Laos, Kampuchea, and Afghanistan

Symptom	% of Reports Mentioning Symptom	Tricho-thecenes	Nerve Agents	Arsines	Phosgene Oxime	Cyanogens	Incapacitant (BZ)	Riot-Control Agents
Laos								
Multiple deaths	84.6	X	X	X	—	X	—	—
Vomiting	71.4	X	X	X	—	—	—	X
Diarrhea	53.1	X	X	X	—	—	—	—
Hemorrhage	52.0	X	—	—	X[a]	—	—	—
Breathing difficulty	47.95	X	X	X	X	X	X	X
Itching and skin irritation	43.9	X	—	X	X	—	—	X
Nausea	42.8	X	X	X	—	—	X	X
Animal death	41.8	X	X	X	—	X	—	—
Blurred vision	39.7	X	X	X	X	X	X	X
Headache	36.7	X	X	—	X	—	X	X
Fatigue	35.7	X	X	—	—	—	X	—
Nasal excretion	34.7	X	X	X	X	—	—	X
Rash or blisters	32.6	X	—	X	X	—	—	X
Tearing	30.6	X	X	X	X	X	—	X
Coughing	28.6	X	X	X	X	X	—	X
Effect on vegetation	26.5	X	—	X	X	—	—	—
Dizziness and vertigo	25.5	X	X	—	—	X	X	X
Facial edema	20.4	X	—	X	X	—	—	X
Thirst and dry mouth	20.4	X	—	—	—	—	X	—
Skin color change	16.3	X	—	—	X	—	—	—
Tachycardia	12.3	X	X	—	X	X	X	X
Temporary blindness	9.18	X	—	X	X	—	X	X
Rapid loss of consciousness	9.18	X[b]	X	—	—	X	X	—
Salivation	6.12	X[c]	X	—	—	—	—	—
Hearing loss	5.1	X	—	—	—	—	—	—
Tremors or convulsions	4	X	X	—	X	X	—	—
Sweating	3	—	X	—	—	—	—	—
Paralysis	3	X	X	—	—	X	—	—
Loss of appetite	3	X	X	X	—	—	—	—
Frequent urination	2	X	X	—	—	—	—	—

Continued on p. 25

Note: This table is a compilation relating the signs and symptoms reported in the three countries to symptoms associated with certain chemical agents. The frequency with which a particular symptom was reported is expressed as a percentage of the total number of attacks.

levels of trichothecene toxins. The samples were collected from an area near TV 3391 that had not been subjected to any reported chemical attacks. The samples were collected by U.S. personnel under instructions to reproduce the sampling conditions, handling, packaging, and transfer conditions of the original sample as closely as possible. The same species of plant was sampled, and four other vegetation samples also were collected. A water sample and two soil samples were recovered. Corn and rice samples from the area also were taken. These grains provided an ideal substrate for growth of toxin-producing fungi and would, therefore, be a sensitive indicator of any natural occurrence. The nine samples were forwarded under code to Dr. Mirocha for trichothecene analysis. A portion of each sample also was submitted to Chemical Systems Laboratory for background determinations of CN-, Cl-, and F-levels. No trichothecenes were detected in any of these samples, indicating that nivalenol, deoxynivalenol, T–2, and diacetoxyscirpenol are not prevalent in the geographical area from which the alleged chemical warfare-exposed sample was collected. The appearance of these trichothecenes in high levels and unique combinations in a sample associated with a chemical attack—which produced symptoms typical of trichothecene exposure—indicates that these toxins may have been used as chemical weapons. This conclusion is further supported by the evidence provided by analysis of additional alleged chemical warfare samples from Laos and Kampuchea as described below.

Analysis of Additional Chemical Warfare Samples From Laos and Kampuchea for the Presence of Trichothecenes. The U.S. Army Medical Intelligence and Information Agency received from the Chemical Systems Laboratory three additional suspected chemical warfare samples for analysis for trichothecenes. The first sample consisted of 10 ml of water taken from the same chemi-

1226

TABLE D-1 (continued)

Symptoms of Chemical Attacks Reported in Laos, Kampuchea, and Afghanistan

Symptom	% of Reports Mentioning Symptom	Trichothecenes	Nerve Agents	Arsines	Phosgene Oxime	Cyanogens	Incapacitant (BZ)	Riot-Control Agents
Kampuchea								
Multiple deaths	72.4	X	X	X	—	X	—	—
Hemorrhage	62.06	X	—	—	X[d]	—	—	—
Dizziness and vertigo	51.7	X	X	—	—	X	X	X
Vomiting	41.3	X	X	X	—	—	—	X
Nausea	34.5	X	X	X	—	—	X	X
Skin irritation	27.6	X	—	X	X	—	—	X
Rapid loss of consciousness	24.1	X[b]	X	—	—	X	X	—
Fever	20.68	X	—	—	—	—	—	—
Headache	17.2	X	X	—	X	—	X	X
Tearing	13.8	X	X	X	X	X	X	X
Breathing difficulty	13.8	X	X	X	X	X	X	X
Fatigue	13.8	X	X	—	—	—	X	—
Paralysis	10.3	X	X	—	—	X	—	—
Numbness	6.9	X	X	—	—	X	X	—
Blurred vision	6.9	X	X	X	X	X	X	X
Dry throat and thirst	6.9	X	—	—	—	—	X	—
Edema	6.9	X	—	X	X	—	—	—
Salivation	3.4	X[c]	X	—	—	—	—	—
Vegetation affected	3.4	X	—	X	—	—	—	—
Diarrhea	3.4	X	X	X	—	—	—	—
Cough	3.4	X	—	X	X	X	X	X
Nasal discharge	3.4	X	X	X	X	—	—	X
Rash or blister	3.4	X	—	X	X	—	—	X
Chills	3.4	X	?	—	—	—	—	—
Hearing loss	3.4	X	—	—	—	—	—	—
Afghanistan								
Rapid loss of consciousness	47.9	X[b]	X	—	—	X	X	—
Skin irritation and itching	31.5	X	—	X	X	—	—	X
Multiple deaths	30.1	X	X	X	—	X	—	—
Nausea	20.5	X	X	X	—	—	X	X
Vomiting	19.1	X	X	X	—	—	—	X
Tearing	17.8	X	X	X	X	X	—	X
Dizziness and vertigo	16.4	X	X	—	—	X	X	X
Blisters or rash	15	X	—	X	X	—	—	X
Difficulty breathing	13.7	X	X	X	X	X	X	X
Paralysis	13.7	X	X	—	—	X	—	—
Headache	12.3	X	X	—	X	—	X	X
Temporary blindness	8.2	X	—	X	X	—	X	X
Salivation	6.8	X[c]	X	—	—	—	—	—
Loss of appetite	6.8	X	X	X	—	—	—	—
Effects on vegetation	5.5	X	—	—	—	—	—	—
Fatigue	5	X	X	—	—	—	X	—
Confusion	4.1	X	X	—	—	—	X	—
Hemorrhage	4.1	X	—	—	X[a]	—	—	—
Change in skin color	2.8	X	—	—	X	—	—	—
Diarrhea	2.8	X	X	X	—	—	—	—
Coughing	1.3	X	X	X	X	X	X	X

[a] Bloody frothing.
[b] Only at very high doses.
[c] Depending on which trichothecenes.
[d] Blood flecked frothing.

1227

cal attack site in Kampuchea as the leaf and stem sample previously examined. The second sample came from the site of a "yellow rain" attack occurring on March 13, 1981, in the village of Muong Cha (TF 9797) in the Phou Bia region of Laos. The agent was sprayed from a twin-engine propellor aircraft at about noon, local time. The falling substance was described as "like insect spray" and sounded like drizzling rain. Quite sticky at first, it soon dried to a powder. Symptoms described by victims included nausea, vomiting, and diarrhea. A sample of the agent scraped from the surface of a rock by a victim and carried into Thailand was turned over to U.S. Embassy personnel. The third sample was taken from the site of a "yellow rain" attack that occurred at 2:00 p.m. on April 2, 1981, at Ban Thong Hak (TF 9177). Twenty-four people reportedly died in this attack; there were 47 survivors. Symptoms included severe skin irritation and rash, nausea, vomiting, and bloody diarrhea. A survivor of the attack scraped this sample from the surface of a rock with a bamboo knife. Although the individual took precautions (that is, cloth mask), a severe skin rash and blisters developed.

These three samples were submitted to Dr. Mirocha for analysis. The water sample from Kampuchea contained 66 ppm of deoxynivalenol and a trace amount of diacetoxyscirpenol. A trace quantity of the second sample was screened as strong positive for trichothecenes. Further analysis of that sample confirmed the presence of high levels of T-2 toxin (150 ppm) and diacetoxyscirpenol (25 ppm). Nivalenol and deoxynivalenol may also be present but are being masked by interference from phtalate compounds (leached from the plastic packaging). An effort to modify the extraction process is being made in order to overcome the interference so that nivalenol and deoxynivalenol can be measured more easily. Interestingly, examination of the petroleum ether fraction from the sample revealed the presence of a yellow pigment almost identical to that previously identified by Dr (b)(6) in cultures of *Fusarium roseum,* indicating that the yellow powder probably consisted of the crude extract of a *Fusarium* culture.

There was little of the third sample contained in the vial received for testing. The quantity was too small to be weighed accurately, and inspection of the vial revealed only a small speck estimated to weigh much less than 0.1 mg. That speck contained 10 ng of diacetoxyscirpenol, a level equivalent to 100 ppm at the very least and probably much higher. The sample size was too small to allow adequate analysis for the other three trichothecenes of interest.

These results support the hypothesis that trichothecenes have been used as chemical warfare agents in Laos and Kampuchea. The presence of these high levels of trichothecene toxins in water and in yellow powder scraped from rocks argues against natural occurrence, since neither water nor rock is a suitable environment for growth of the fungi required to produce the toxins.

Differences between the analyses of the Kampuchean leaf and stem sample and the water sample collected from the same attack site raise additional questions. Failure to find T-2 toxin in the water sample is probably due to the relative insolubility of T-2 toxin in water. The presence of diacetoxyscirpenol in the water might be the result of biotransformation or breakdown of T-2, as they are so structurally similar, differing only in the substitution on carbon 8. While this hypothesis cannot be entirely ruled out, it is unlikely on the basis of known biotransformation of T-2 in the laboratory. The initial vegetation sample was not screened for diacetoxyscirpenol, although the mass spectra from the initial analysis will be reexamined for trace amounts of it.

The absence of nivalenol in the water sample is more difficult to explain because nivalenol is water soluble. The effect of environmental conditions and microorganisms on the stability of these compounds may vary widely for each of the specific compounds and may explain the analytical results. Further scientific investigation of these factors is needed.

Analysis of Blood Samples From Chemical Attack Victims

Blood samples drawn from victims of recent chemical attacks in Kampuchea have been received by the U.S. Army Medical Intelligence and Information Agency for analysis for indications of trichothecene exposure. Little is known concerning the rate of metabolism of trichothecenes in humans; it is difficult, therefore, to estimate the probability of detecting trichothecenes or their metabolites in blood samples. T-2 is rapidly cleared from the blood in animals, and 25% of the total dose is excreted within 24 hours after exposure; it is unlikely that trichothecenes could be detected unless blood samples were obtained within 24–48 hours after an attack. Other blood parameters are affected by the trichothecenes; however, and may prove to be useful markers. The trichothecenes induce a severe leukopenia (decrease in white cell count) which can persist for several weeks following exposure. In addition, the trichothecenes affect some liver and kidney function marker enzymes which can be monitored in the blood.

On October 11, 1981, four whole blood samples and four blood smears were received from the U.S. Embassy in Bangkok. The blood was drawn from four Khmer Rouge soldiers on October 7, 1981 at a Khmer Rouge hospital inside Kampuchea. Detailed medical histories as well as descriptions of the attack were recorded on each individual from whom a blood sample was taken. All four men were victims of a gas attack occurring near Takong on September 19, 1981. Symptoms experienced included vomiting, blurred vision, bloody diarrhea, difficult breathing, dry throat, loss of consciousness, frontal headache, tachycardia, and facial edema. Unfortunately, the samples could not be refrigerated until 48 hours after collection. Thus, it was impossible to obtain data concerning white cell counts and blood chemistry. The four whole blood samples were submitted to Dr. Mirocha for analysis for trichothecene metabolites because of the possibility, admittedly remote, that some of the metabolites might bind to blood proteins and might still be detectable even 3 weeks after an attack.

On October 22, 1981, additional blood samples were received. These had been drawn from nine victims from the September 19 attack and from four control individuals of similar age and background who had not been exposed to a chemical attack. The samples had been properly refrigerated and were accompanied by complete and detailed medical histories taken by trained medical personnel who examined the individuals. Included in the package were blood smears and heparinized and nonheparinized samples from each individual. The samples were submitted for blood assays to the U.S. Army Medical Research Institute of Infectious Diseases.

The above results show no statistically significant differences between exposed and control groups (students T-test). In eight individuals exposed to a chemical agent, a trend toward depressed white cell counts was observed. Such an observation would be compatible with the clinical picture of toxin exposure; however, it is also compatible with a number of other medical problems, and a larger control sample would be required before such results could be adequately interpreted. Abnormal liver and kidney functions were not indicated by these data.

Portions of the blood samples were analyzed by (b)(6) for the presence of trichothecenes and/or trichothecene metabolites. The results of the analyses are consistent with trichothecene exposure in at least two of the gassing victims and tend to support the hypothesis that a trichothecene-based agent was used in this attack.

Using the selected ion-monitoring gas chromatography/mass spectroscopy analysis technique, Dr. Mirocha was able to identify tentatively a metabolite of T-2 toxin (that is, HT-2) in the blood of two alleged victims. The compound was identified on the basis of its selected ion masses and gas chromatographic retention times.

The tentative identification of HT-2 in the blood of two victims, and the trend toward depressed white cell counts in these same victims, cannot be taken as conclusive scientific proof of toxin exposure because the trace amount of the compound present precluded unequivocal identification and quantification and because many other medical problems in addition to toxin exposure can cause a decrease in white cell counts. It is interesting to note that the individual who showed the greatest amount of the compound tentatively identified as HT-2 in his blood reportedly received the greatest exposure to the agent. He was exposed to contaminated water for more than 30 minutes and was the only victim who fell down in the water and actually swallowed some of it. However, the description by victims of symptoms correlating exactly with those associated with trichothecene poisoning provides strong circumstantial evidence that trichothecenes were used as chemical agents in yet another chemical attack in Southeast Asia.

Trichothecenes have been identified previously in environmental samples taken from several other chemical attacks in Laos and Kampuchea. Analysis of control vegetation, water, soil, corn, and rice samples from these areas, as well as reviews of published scientific literature, indicates that the particular toxins that have previously been identified are not known to occur naturally in the combinations found and at the levels detected in Southeast Asia. The latest analysis results contribute another piece of evidence to the growing body of data supporting the charge that trichothecenes have been used as chemical/biological agents in Southeast Asia.

ANNEX E

Overview of Natural Occurrence and Significant Properties of Trichothecenes

Historical Trichothecene Mycotoxicoses

The trichothecenes are members of a large group of naturally occurring toxins known as mycotoxins. The word "mycotoxin" is derived from the Greek "mykes" meaning fungus and the Latin "toxicum" meaning poison. It refers to a metabolite produced by a mold that is toxic to man and animals. Mycotoxicoses have been described as the "neglected diseases," and before 1960 English-language literature concerning the diseases caused by mycotoxins was scarce. Soviet scientists have been involved in research with some of these compounds for almost 30 years longer than their Western counterparts. The Soviet Union has had serious problems with mycotoxin contamination of food and has suffered several severe outbreaks of disease in humans. The first comprehensive studies of mycotoxin diseases were conducted in the Soviet Union in the late 1930s.

Since the 1940s, the group of mycotoxins figuring most prominently in Soviet scientific literature are the trichothecenes, a class of chemically related, biologically active fungal metabolites produced primarily by various species of *Fusarium*. Table E-1 lists some of the toxins in this group and producing fungi. The fungi are well-known plant pathogens that frequently invade many agricultural products.

Trichothecene toxins, perhaps more than any other mycotoxins, have been associated with acute disease in humans. Most of the human intoxications have occurred in the Soviet Union (Table E-2). The earliest recognized outbreak occurred in 1891 in the Ussuri district of eastern Siberia. Humans who consumed contaminated grain exhibited headache, chills, nausea, vomiting, vertigo, and visual disturbances. Dogs, horses, pigs, and domestic fowls reportedly were affected.

The most extensive mycotoxicosis outbreak reported to have caused multiple fatalities in man also occurred in the Soviet Union. In 1944, 30% of the population of Orenburg district, near Siberia, was affected by alimentary toxic aleukia (ATA), a disease later shown to be caused by ingestion of trichothecene toxins. More than 10% of the entire population of the district died of the disease. Many other outbreaks of ATA occurred in the Soviet Union, mainly during the 1942-47 period. The contamination was traced to overwintered millet, wheat, and barley infected with *Fusarium*. Symptoms of the disease included vomiting, skin inflammation, multiple hemorrhaging (especially of the lung and gastrointestinal tissue), diarrhea, leukopenia, and suppression of bone marrow activity.

In 1939, Premier Joseph Stalin dispatched Nikita Khrushchev to the Ukraine to organize and improve agricultural operations and to identify the disease causing the deaths of many horses and cattle. The problem was traced to hay and straw contaminated with *Stachybotrys atra*. The disease, later referred to as stachybotryotoxicosis, occurred after ingestion or contact with the contaminated grain. Symptoms included ulcerative dermatitis, peroral dermatitis, blood dyscrasias, hemorrhagic syndromes, abortion, and death. The greatest economic impact was due to loss of horses, although cattle, sheep, poultry, and humans also were affected.

Other disease outbreaks in which similar symptoms were present occurred in 1958 and 1959 among horses and cattle in the Soviet Union and Eastern Europe; thousands of animals were lost. Other intoxications were reported later

Soviet Scientists Involved in Mycotoxin Research

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(b)(6)

1229

in Japan, Europe, the Soviet Union, and the United States, affecting various domestic animals and—in the case of "red mold toxicosis"—man. All of these diseases have now been shown to be due to ingestion of trichothecenes rather than to an infectious agent. In earlier outbreaks, the levels of toxin present in the contaminated grain were not measured; however, the levels of nivalenol and/or deoxynivalenol measured in toxic grains implicated in more recent outbreaks (i.e., "moldy corn toxicosis" and "red mold toxicosis") typically were between 2 and 8 ppm.

Natural Occurrence of Trichothecene Mycotoxins

Publications concerning the occurrence of trichothecenes are relatively scarce because of the lack of convenient detection methods and the complexity of the trichothecene family of compounds. Only recently have scientists developed methods capable of distinguishing between close structural derivatives and accurately quantifying the levels of toxin present (see Table E-3 for comparison of analytical methods). Extreme care must be taken when reviewing the scientific literature on natural occurrence of these compounds because erroneous conclusions can be drawn on the basis of results obtained with inadequate analytical techniques. Misidentification of compounds and gross overestimation of concentrations have occurred using techniques such as thin layer chromatography.

Table E-4 lists the reports of natural occurrence of T–2 toxin, diacetoxyscirpenol, and nivalenol that were obtained from a literature search of more than 3,000 citations concerned with trichothecene toxins. Levels that are questionable on the basis of techniques used are indicated. It is immediately apparent that the levels of toxins found in the various samples from Laos and Kampuchea are highly unusual, even if one accepts the questionable reports in Table E-4 as valid. The levels of these toxins (150 ppm of T–2 toxin, 109 ppm of nivalenol, more than 100 ppm of diacetoxyscirpenol, and 66 ppm of deoxynivalenol) are markedly higher than those reported to occur in nature. It should also be noted that the incidences recorded in Table E-4 concern levels of toxin produced when *Fusarium* is growing on its ideal substrate, while the Laos and Kampuchea samples were taken from surfaces—rocks and water—that would be extremely unlikely to support *Fusaria* growth and toxin production. Higher levels of toxin production can, of course, be induced when the mold species is grown in pure culture under ideal laboratory conditions; for instance, the Soviets have succeeded in producing 4 grams of T–2 per kilogram of substrate. In a natural environment, however, the *Fusaria* species cannot compete well with other molds such as species of *Aspergillus* and *Penicillium*, and levels of toxin produced are orders of magnitude lower.

The conclusion that the levels of toxins found in the Southeast Asia samples could have occurred only by means of an unnatural mechanism is also strengthened by surveys of the area conducted

TABLE E-1
Trichothecene-Producing Fungi

Type	T–2 Type	Nivalenol-Type	Macrocyclic
Trichothecenes	T–2 Toxin	Nivalenol	Roridins
	HT–2 Toxin	Monoacetyl-Nivalenol	Veirucarins
	Diacetoxyscirpenol	Diacetyl-Nivalenol	Satratoxins
	Neosolaniol	Deoxynivalenol	Vertisporin
Fungus	F. tricinctum	F. nivale	Myrothecium verrucaria
	F. roseum	F. opisphaeria	
			M. roridum
	F. equiseti	F. roseum	
	F. sporotrichioides		Stachybotrys atra
			Verticimonosporium diffractum
	F. lateritium		
	F. poae		
	F. solani		
	F. rigidiusculum		
	F. semitectum		

TABLE E-2
Historical Trichothecene Mycotoxicoses

Toxicosis	Districts and Affected Species	Symptoms
"Taumelgetreide" Toxicosis	U.S.S.R.: man, farm animals	Headache, nausea, vomiting, vertigo, chills, visual disturbances
Alimentary toxic aleukia	U.S.S.R.: man, horse, pig	Vomiting, diarrhea, multiple hemorrhage, skin inflammation, leukopenia, angina
Stachybotryotoxicosis	U.S.S.R., Europe: horse	Shock, stomatitis, hemorrhage, dermal necrosis, nervous disorders
Bean-hull toxicosis	Japan: horse	Convulsion, cyclic movement
Dendrodochiotoxicosis	U.S.S.R., Europe: horse	Skin inflammation, hemorrhage
Moldy corn toxicosis	United States: pig, cow	Emesis, hemorrhage
Red mold toxicosis	Japan, U.S.S.R.: man, horse, pig, cow	Vomiting, diarrhea, congestion and hemorrhage of lung and intestine

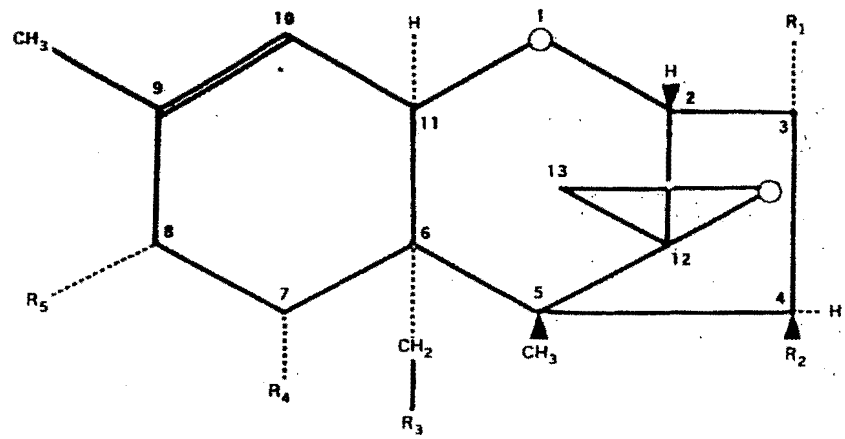
1230

by various researchers. Surveys of the toxigenic fungi and mycotoxins naturally present in Southeast Asia conducted by the Mahidol University in Bangkok and the Massachusetts Institute of Technology have not revealed the presence of T-2, nivalenol, deoxynivalenol, or diacetoxyscirpenol, although other mycotoxins such as aflatoxin were identified. These results were confirmed by our analysis, using our own methodology, of normal flora samples of vegetation, soil, water, corn, and rice from Kampuchea that failed to reveal the presence of trichothecenes.

Skeptics have formulated theoretical explanations for the analytical results to support a hypothesis of natural occurrence of these toxins. It was postulated that the trichothecenes found were absorbed through the roots of a plant, translocated to the leaves, and exuded and washed onto the surface of a rock and into water where they were found. A 1981 publication by Jarvis et al. reported a Brazilian shrub that appeared to absorb, translocate, and chemically alter a macrocyclic trichothecene produced by soil fungi. While this citation is used to support a hypothetical mode for natural deposition in Southeast Asia, it should be noted that the plant reported in this publication did not exude the toxin, that the toxin was extremely phytotoxic to all other plants assessed, and that the plant was not capable of de novo trichothecene synthesis. No other trichothecenes have been found to be absorbed and translocated in any other plant in this manner. Control samples of soil and vegetation from Southeast Asia do not support endemic presence of these toxins. The appearance of these particular trichothecene toxins in these high levels in environments generally inhospitable to their formation cannot reasonably be attributed to a natural contamination.

FIGURE E-1

General Structure of Trichothecenes



T_2 Toxin	Nivalenol	Deoxynivalenol
R_1=OH	R_1=CH	R_1=OH
R_2=OAc	R_2=CH	R_2=H
R_3=OAc	R_3=OH	R_3=OH
R_4=H	R_4=OH	R_4=OH
R_5=$OCOCH_2CH(CH_3)_2$	R_5= =O	R_5= =O

Chemical and Physical Properties of the Trichothecenes

When considering the suitability of trichothecenes as agents, factors such as stability, solubility, and ease of production must be considered. The general structure for the trichothecene group is shown in Figure E-1. There are more than 40 currently known, naturally occurring, 12 to 13 epoxytrichothecenes. The R groups may be hydroxyls, acylated hydroxyl groups or esters. The R group for the toxins detected in the sample is shown below the general structure. All of the compounds have in common an olefinic double bond at carbon atoms 9 and 10 and an epoxy group at carbon atoms 12 and 13. These compounds are stable, especially in the solid form. They may be stored for years at room temperature with no loss of activity. They are heat stable with no loss of activity noted after heating for 1 hour at 100° centigrade. The solubility depends on the R groups; highly hydroxylated derivatives are more water soluble. The compounds are also quite stable in solution. Detoxification can be accomplished by treatment with strong mineral acid, which will open the 12 to 13 epoxide bond and abolish all biological activity. Most of the toxins are well absorbed through mucous membranes and some through skin; this property is also a function of the R group.

Some of these compounds have been synthesized chemically; however, biosynthesis employing *Fusarium* species is the most effective way to produce large quantities. In a preliminary search of recent Soviet literature, 50 articles dealing

1231

TABLE E-3

Physicochemical Methods for Detection of Trichothecenes in Feedstuffs

Method	Trichothecenes Detected	Detection Limits	Required Standards	Use and Limitation
Thin-layer chromatography 1-dimension	All	0.1 microgram/spot (H_2SO_4)	Reference Standard	Qualitative Interference Not confirmatory
Thin-layer chromatography 2-dimension	All	0.1–1.0 microgram/spot (H_2SO_4)	Reference Standard	Qualitative Less interference Confirmatory
Gas-liquid chromatography	Nonhydroxylated or TMS derivatives	0.03–0.05 microgram/microliter injection	Reference Standard	Quantitative Monoglyceride interference Equivocable identification
Gas chromatography/mass spectrometry-normal scanning mode	TMS derivatives	0.02–0.05 microgram/microliter injection	Reference Standard or Spectrogram	Semiquantitative Less interference Unequivocable identification
Gas chromatography/mass spectrometry-selection ion monitoring	TMS derivatives	0.007–0.02 microgram/microliter injection	Reference Standard or Spectrogram	Quantitative Best for complex mixtures Unequivocable identification
Nuclear-magnetic-resonance	All	—	Reference Standard or Spectrogram	Confirmatory Purified toxin structure elucidation
Radio-immunoassay (developmental stage)	T–2 toxin	1–20 nanogram	Rabbit anti-T–2 toxin anti-body	Sensitive Low interference
			HT–2 toxin	Relative structural specificity

with the trichothecenes were reviewed. Of these, 22 dealt with defining optimum conditions for biosynthesis of the compounds. N.A. Kostyunina has reported production of T–2 toxin at levels of 4 grams per kilogram of substrate (normally wheat grain or rice). Many industrial microbiology plants have been identified in the Soviet Union. Some are involved in production of single-cell protein for fodder additives, others produce antibiotics, and the function of still others is unknown. *Fusaria* are produced in the Soviet Union at a facility long reported in the open literature as being a suspected biological warfare agent production and storage facility. This facility, Berdsk Chemical Works, is near the science city of Novosibirsk in Siberia. The only difference between an antibiotic and mycotoxin is their target specificity. Both are produced by fungi, but the mycotoxins are relatively more toxic to man than to microorganisms. Mycotoxins can be produced in good yield employing the same techniques used to produce some antibiotics. Thus, it may be concluded that the Soviets could produce trichothecenes in large amounts. They produce an antibiotic that is a trichothecene derivative, which would provide an ideal cover for agent production facilities.

Medical Effects of the Trichothecenes in Humans

The most prominent symptoms associated with trichothecene poisoning are listed in Table E–2. Striking among these is the rapid onset of vomiting, along with severe itching and tingling of the skin. Hemorrhage of the mucous membranes and bloody diarrhea follow. The symptoms shown in Table E-2 are similar to those reported by victims of trichothecene attacks in Laos, Kampuchea, and Afghanistan. The correlation is striking.

The LD_{50}'s (dose required to produce death in 50% of a test population) of the trichothecenes in laboratory animals range from 0.1 mg/kg to greater than 1,000 mg/kg, depending on the particular toxin, species, and route of exposure. The LD_{50} of T–2 toxin in a cat is 0.5 mg/kg. However, the ED_{50} (dose required to produce a desired physiological effect in 50% of a test population) is much lower. The ED_{50} to produce a vomiting reaction is 0.1 mg/kg; for skin irritation it is in the tenths of microgram range.

Most of the data concerning the toxicological effects of the trichothecenes are derived from animal data in which pure compounds were administered by oral, subcutaneous, intraperitoneal, or intravenous routes. Unfortunately, there are no reports concerning the effects of inhalation of mixtures of the compounds. Therefore, it is difficult to speculate concerning the effects that would be expected in humans exposed to an aerosol of mixtures of these potent toxins. The most useful data concerning exposure in humans were obtained in a phase I clinical evaluation of anguidine (diacetoxyscirpenol) as an anticancer drug. Diacetoxyscirpenol was administered by intravenous infusion. Doses of 3 mg/m^2/day caused immediate onset of nausea, vomiting, diarrhea, somnolence and/or mental confusion, fever, chills, a generalized erythema with a burning sensation, hypotension, dyspnea, stomatitis, hives, and ataxia. Because of the side effects, the treatment was discontinued. The properties which make the use of diacetoxyscirpenol potentially useful as an anticancer drug are the same as those responsible, in part, for its extreme toxicity. It and the other trichothecenes cause extensive damage to rapidly dividing cells such as tumor cells. Unfortunately, the cells of the lining of the gastrointestinal tract and bone marrow are also rapidly dividing, and the effects of the trichothecenes on these cells result in severe, rapid degeneration of these tissues. The compounds also have direct effects on the clotting factors in the blood (that is, a primary effect on Factor VII activity and a secondary effect on prothrombin), which result in excessive hemorrhage following trauma.

The other useful body of clinical data concerning the effects of trichothecenes in humans is drawn from descriptions of the course of the disease in the natural

TABLE E-4

Spontaneous Occurrence of Trichothecene Mycotoxins

Toxin	Country	Source	Concentration (parts per million)	Reference[a]
T-2 Toxin	U.S.	Mixed feed	0.08[b]	15
	U.K.	Brewer's grains	ND[c]	19
	India	Sweet corn	4[b, d]	5
	Canada	Corn	ND	4
	India	Sorghum	ND[d]	22
	Canada	Barley	25[d]	20
	India	Safflower seed	3–5[d]	6
	U.S.	Corn stalks	0.11[b]	16
	U.S.	Feed supplement	ND	7
	U.S.	Corn	2	8
	U.S.	Mixed feed	0.3	14
	France	Corn	0.02[b]	10
	U.S.	Corn	ND	2
Diacetoxy-scirpenol	U.S.	Mixed feed	0.5	15
	U.S.	Mixed feed	0.38	15
	India	Safflower seed	3–5[d]	6
	India	Sweet corn	14[d]	5
	Germany	Corn	31.5[d]	23
	U.S.	Corn	0.88	21
Deoxynivalenol	U.S.	Corn stalks	1.5[b]	16
	U.S.	Corn	1.8[b]	15
	U.S.	Corn	1.0[b]	15
	U.S.	Corn	0.1[b]	15
	U.S.	Mixed feed	0.04[b]	15
	U.S.	Mixed feed	1.0[b]	15
	U.S.	Mixed feed	1.0[b]	15
	U.S.	Corn	7.4	9
	U.S.	Corn	0.1–25[d]	21
	U.S.	Corn	trace–25[d]	2, 21
	U.S.	Corn	1.1–10.7	26
	U.S.	Corn	41	25
	U.S.	Corn	1.0[b]	17
	U.S.	Oats	5	17
	Japan	Barley	ND	18
	U.S.	Corn	1.0[b]	13
	U.S.	Corn	0.06[b]	13
	U.S.	Mixed feed	0.07[b]	13
	France	Corn	0.6[b]	10
	South Africa	Corn	2.5	11
	Zambia	Corn	7.4	11
	U.S.	Corn	ND	2
	Japan	Barley	7.3	18
	Austria	Corn	1.3	24
	Austria	Corn	7.9	24
	Canada	Corn	7.9	24
Nivalenol	Japan	Barley	ND	18
	France	Corn	4.3[b]	10
Partially characterized trichothecenes	U.S.	Corn	ND	25
	India	Safflower seed	ND[d]	6
Skin irritant factors—not analyzed chemically	U.S.	Corn	93 positive[b] of 173	3
	U.S.	Corn	Multiple positive samples	21
	Yugoslavia	Corn	16 positive of 191	1

FOOTNOTES

[a] References:

1. Balzer et al. (1977)
2. Ciegler (1978)
3. Eppley et al. (1974)
4. Funnel (1979)
5. Ghosal et al. (1978)
6. Ghosal et al. (1977)
7. Hibbs et al. (1974)
8. Hsu et al. (1972)
9. Isshi et al. (1975)
10. Jemmail et al. (1978)
11. Marasas et al. (1977)
12. Miller (1976)
13. Mirocha (1979)
14. Mirocha (1979)
15. Mirocha et al. (1976)
16. Mirocha et al. (1979)
17. Mirocha et al. (1979)
18. Morooka et al. (1972)
19. Petrie et al. (1977)
20. Puls and Greenway et al. (1976)
21. Romer, T., Ralston Purina, St. Louis, MO (personal communication)
22. Rukmini and Bhat (1978)
23. Siegfried (1979)
24. Vesonder and Ciegler (1979)
25. Vesonder et al. (1976)
26. Vesonder et al. (1978)

[b] Zearalenone (F-2 toxins) also detected in the sample.

[c] ND = toxin concentration was not determined.

[d] Levels that are questionable on the basis of techniques used.

outbreaks that occurred in the Soviet Union. The effects produced are similar to radiation poisoning, and there is a latent phase similar to that seen in radiation poisoning, in which the overt symptoms disappear.

The clinical picture may be divided into four stages.

The first stage occurs within minutes to hours after ingestion of toxic grains. The symptomatology described was produced by oral exposure to low doses. In exposure by inhalation, the symptoms may be more pronounced or the time course accelerated. The characteristics of the first stage include primary changes, with local symptoms, in the buccal cavity and gastrointestinal tract. Shortly after ingestion of toxic grain, the patient experiences a burning sensation in the mouth, tongue, throat, palate, esophagus, and stomach as a result of the toxin's effect on the mucous membranes. The tongue may feel swollen and stiff, and the mucosa of the oral cavity may be hyperemic. Inflammation of the gastric and intestinal mucosa occurs, along with vomiting, diarrhea, and abdominal pain. In most cases excessive salivation, headache, dizziness, weakness, fatigue, and tachycardia accompany the initial stage. There may be fever and sweating, but the body temperature normally does not rise. The leukocyte count may begin to decrease in this stage, and there may be an increased erythrocyte sedimentation rate. This first stage may last from 3 to 9 days.

The second stage is often called the latent stage or incubation period because the patient feels well and is capable of normal activity. It is also called the leukopenic stage because its main features are disturbances in the bone marrow and the hematopoietic system, characterized by a progressive leukopenia and granulopenia and a relative lymphocytosis. In addition, anemia and a decrease in erythrocytes, in the platelet count, and in hemoglobin occur. Disturbances in the central nervous system and autonomic nervous systems may occur as well as weakness, vertigo, fatigue, headache, palpitations, and mild asthmatic conditions. Visible hemorrhagic spots (petechiae) begin to appear on the skin, marking the transition to the third phase. The second stage may last 3–4 weeks. The transition to the third stage is sudden, and symptoms progress rapidly.

In the third stage, petechial hemorrhages occur on the skin of the trunk, arms, thighs, face, and head. They can vary from a millimeter to a few centimeters in size. Capillaries are fragile, and any slight trauma results in hemorrhage. Hemorrhages of the mucous membranes of the mouth, tongue, soft palate, and tonsils occur. Nasal, gastric, and intestinal hemorrhages can be severe. Areas of necrosis begin to appear on the lips, fingers, nose, jaws, eyes, and in the mouth. Lymph nodes are frequently enlarged, and the adjoining connective tissue can become so edematous that the patient has difficulty opening his mouth. Blood abnormalities previously described are intensified. Death may occur from hemorrhage, strangulation due to swelling, or secondary infection.

The fourth stage is convalescence. Three or 4 weeks of treatment are required for disappearance of necrotic lesions and hemorrhagic effects. Two months or more may elapse before the bloodforming capability of the bone marrow returns to normal. ■

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