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WHEN SEPARATED FROM CLASSIFIED
INCLOSURES

CCTC
ITEM 2885
COMMENT NO. 1

G4/P2 6437 (SF) SUBJECT: Chemical and Biological Warfare (U)

TO: CCMLO
COFORD
TSG
TQMG

FROM: OCOFS, G-4 DATE: 9 Jul 54

[redacted]

1. The inclosed Department of the Army directive is forwarded for appropriate action.

2. With reference to paras. 4a and 5f, the Chief Chemical Officer will be responsible for completion of development of the BW data required for submission to the JCS on or before 1 July 1955.

3. With reference to para. 5g, the Assistant Chief of Staff, G-2, Intelligence, will continue to place increased emphasis on the collection, evaluation and dissemination of intelligence data through coordination with the appropriate Technical Services and through such support and guidance to these Technical Services as may be felt desirable.

BY DIRECTION OF THE ASSISTANT CHIEF OF STAFF, G4:

1 Incl
TAG ltr dtd 23 Jun 54,
subj as above, cys 12 & 13

cy 33/40

(signed) L. T. VICKERS
Colonel, GS
Asst Chief, Plans Division
Office, A CofS, G-4

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IEA-S-343 (71)

DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON 25, D. C.

CCTC ITEM 2885

AGAC-C (M) 385 TS (21 Jun 54) G3 [redacted]

23 June 1954

SUBJECT: Chemical and Biological Warfare

TO: Chief of Information
Assistant Chiefs of Staff
Chief of Army Field Forces

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DOD DIR 5200.10

1. Reference is made to Department of Defense Directive No. TS 3145.1, dated 5 March 1954, which cancelled DOD Directive, same number, dated 21 December 1951.

2. The Department of the Army has been assigned responsibility for coordinating, in detail, all military research, development, testing, production, procurement, distribution and storage (storage within the United States) programs on toxic chemical and biological warfare munitions, defensive materiel and techniques and for establishing its requirements for these items.

3. The Secretary of Defense in the directive referenced in paragraph 1 above has directed that the military departments:

a. Maintain existing offensive capabilities in chemical warfare and increase these capabilities where feasible, based upon military requirements.

b. Maintain the existing limited capabilities in offensive anti-personnel and anti-crop biological warfare.

c. Continue to maintain and improve chemical and anti-personnel biological warfare defensive readiness of the United States forces as appropriate, based upon the best estimates of potential enemy capabilities.

d. Pursue a comprehensive research and development effort, including adequate field test program in chemical and biological warfare.

e. Construct no additional GB production facilities to satisfy mobilization requirements until the best available manufacturing process has been demonstrated in pilot plant operations.

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f. Construct no additional BW agent production facilities, other than pilot plants, and procure no more BW munitions until [illegible] ility to achieve success with BW has been demonstrated.

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g. Place increased emphasis on the collection, evaluation and dissemination of intelligence data regarding the capabilities of potential enemy nations in chemical and biological warfare.

h. Continue to develop doctrine, tactics and techniques in the offensive and defensive aspects of CW and BW and insure that training keeps pace with the development of such doctrines and techniques.

4. The Secretary of Defense directive further provides that:

a. Evidence will be presented on or before 1 July 1955 to the Joint Chiefs of Staff for a critical appraisal of BW.

b. The fact that chemical warfare has not been used previously by the United States except in retaliation must not deter achievement of realistic preparedness in chemical or biological warfare.

5. To implement the general guidance outlined above, and in coordination with other services where applicable, the following actions are directed as possible within the limits of present and projected budgetary guidance:

a. Stockpile quantities of offensive and defensive materiel for chemical warfare will be established in terms of Mobilization Reserve Materiel Requirements concept. These quantities will be based upon current approved war plans and will be continuously reviewed to reflect changes in development and standardization status.

b. Place the same relative priority on the procurement of CW ground ammunition as that applied to the procurement of other types of ground ammunition except that:

(1) Quantities of ammunition metal parts procured will be within the capabilities of CW agent production.

(2) Newly developed items, when standardized, and for which no stockpiles of substitute items are available, will be procured within available funds at accelerated rates until the attained percentages of mobilization reserves are approximately equal to those of other ammunition.

c. Maintain a comprehensive research and development program in toxic and non-toxic CW with the objective of achieving adequate offensive and defensive capabilities immediately and maintaining those capabilities in the future as new developments dictate. Maximum emphasis will be placed upon GB munitions, particularly those for tactical use, and defensive measures required for nerve gas warfare. New GB production processes will be developed through pilot plant operations. At the earliest practicable time prior to 1 July 1955, the Chief Chemical Officer, Department of the Army, will recommend to Assistant Chief of Staff, G-4, Department of the Army, the best procedure for increasing GB production to meet requirements established by the three Departments.

d. Maintain existing BW production facilities in ready stand-by status.

[redacted] TOP SECRET [redacted] SECRET

e. Maintain a balanced research and development effort including an adequate field test program in biological warfare. Place primary emphasis on the development of a lethal anti-personnel BW agent munition combination through user tests not later than July 1955. A secondary objective of such research and development will be the development and testing of a BW weapon for tactical use by ground troops with an objective date of July 1956.

f. Prior to 1 July 1955, essentially complete the development of the basic information and criteria for the JCS appraisal of anti-personnel BW to include the following:

(1) An extrapolation of experimental results to humans which is acceptable to the three Departments.

(2) An analysis of weapons effects data adequate to permit computation of munition requirements for various strategic or tactical types of targets.

(3) Data to indicate the logistical feasibility of the BW weapons system being considered.

(4) The data and criteria for appraisal of BW will be developed in a manner which will indicate the degree of effectiveness of BW as a weapons system in certain recurring strategic and tactical situations.

g. Place increased emphasis on the collection, evaluation and dissemination of intelligence data regarding the capabilities of potential enemy nations in the field of chemical and biological warfare.

h. Place continued emphasis, at all echelons, on the BW and CW segments of individual, unit and field exercise training programs.

i. Continue to develop doctrine, tactics and techniques for chemical and biological warfare and insure that offensive and defensive training keeps pace with such doctrine.

6. Letter, AGAC-C (M) 381 TSSI (27 Apr 53) G3, Department of the Army, 1 May 1953, subject: "Chemical and Biological Warfare," is hereby rescinded.

BY ORDER OF THE SECRETARY OF THE ARMY:

JOHN A. KLEIN
Major General, USA
The Adjutant General

CCTC ITEM 288

DEPARTMENT OF THE ARMY
Office of The Adjutant General
Washington 25, D. C.

AGAM-P (M) 385 TS (15 Dec 55) G3 29 December 1955

SUBJECT: Chemical and Biological Warfare (U)

CO[redacted]IAL

TO: Deputy Chief of Staff for Logistics
Assistant Chiefs of Staff
Commanding General
Continental Army Command

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Paragraph 5e of letter, AGAC-C (M) 385 TS (21 Jun 54) G3, Department of the Army, 23 June 1954, subject as above, is rescinded and the following substituted therefor:

"5e. Maintain a balanced research and development effort including an adequate field test program in biological warfare. Place primary (1) emphasis on the development of a lethal anti-personnel BW agent munition combination through user tests not later than July 1955. A secondary objective (2) of such research and development shall be the completion of development of a BW weapon for tactical use by ground troops with an objective date of 1 January 1958."

BY ORDER OF THE SECRETARY OF THE ARMY:

REGRADED: SECRET 2/28/68
(Appropriate classification) (Date)
per GROUP 3, AR 380-6.

John A. Klein
JOHN A. KLEIN
Major General, USA
The Adjutant General

Copies furnished:
Office, Secretary of the Army
Chief of Information and Education
Chief Chemical Officer

DOCUMENT REVIEWED
BY: D. T. Eckert
DATE: 23 June 67
Initials & Date

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Item 2893

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(7 Pages)

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2893

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF CHEMICAL OFFICER
Chemical Corps Technical Committee
Army Chemical Center, Maryland

CMLWH

23 August 1954

MEMORANDUM FOR RECORD

SUBJECT: ARDC Project No. 5142, Anti-Crop BW Munitions (4)

The attached data sheet for the subject Air Force project is reproduced herewith as information pertinent to the work of Chemical Corps project 4-04-14-024 (-016) 750-lb. Biological Bomb.

FOR THE CHAIRMAN, CHEMICAL CORPS TECHNICAL COMMITTEE:

T. S. Eckert

Incl
As noted

T. S. ECKERT
Secy, CCTC

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Item 2893

PROJECT DATA SHEET

1. PROJECT TITLE: Anti-Crop BW Munitions (S)
2. SECURITY: Top Secret
3. PROJECT NUMBER: 5142
5. REPORT DATE: 8 June 1954
6. BASIC FIELD OR SUBJECT: Supporting Services Developments
7. SUBFIELD OR SUBJECT SUBGROUP: (36) Chemical & Biological Weapons
7a. TECHNICAL OBJECTIVE: BW-5
8. COGNIZANT AGENCY: ARDC
9. DIRECTING AGENCY: Armament Laboratory, WADC
   Office Symbol: WCLGW; Telephone No. 31335
10. REQUESTING AGENCY: Hq, ARDC
11. PARTICIPATION, COORDINATION, INTEREST: D/A - Chemical Corps (P); AFAC (P); HADC (P); AFFTC (P); AMC (P); AFCRC (C)
12. CONTRACTOR AND/OR LABORATORY: Department of the Army, Chemical Corps.
13. RELATED PROJECTS: None
14. DATE APPROVED: 29 September 1952
15. PRIORITY: 1-B
17. ESTIMATED COMPLETION DATES: Dev - Mar 58
    Test - Jul 59
18. FISCAL ESTIMATES: 50-53 - 620M; 54 - 355M; 55 - 306M; 56 - 254M; 57 - 253M; 58 - 405M; 59 - 405M; T - 2598M
19. SUPERSEDED REPORTS: R555-777 dated 2 Sep 52
    R555-783 dated 29 Sep 52

20. REQUIREMENT AND/OR JUSTIFICATION: Intelligence has shown that the food-crop-complex of probable enemy nations is highly vulnerable to attack by certain anti-crop BW munitions. Any attack of strategic significance must appreciably reduce the caloric intake of the populace. Therefore, the damage to the crops must be greater than the normal yearly fluctuation in crop yield since stockpiling in above average years could be used to compensate for normal below average yields. (Conf)

Since an enemy food-crop-complex will probably cover a vast land area, anti-crop agents must be effective in minute concentrations and cover a large area if its delivery is to be operationally practicable. Therefore a requirement has been established for munitions which can be used to disseminate adequate quantities of BW anti-crop agents over large land areas. (Secret)

AUTH: Top Secret document No. ADTS-832 (Hq WADC) subject: (Unclass Title) "USAF Biological and Chemical Warfare Program" dated 20 August 1952. (Confidential Title) Hq USAF Statement of Military Characteristics for Anti-Crop BW and CW Agents, dated 18 December 1952. (Secret Document)

21. BRIEF OF PROJECT AND OBJECTIVE:

a. Brief: This project will result in the development of BW anti-crop munitions designed to take advantage of the agent characteristics, characteristics of target, and the various possible methods of delivery to the target. The specific munitions now being considered are mentioned in paragraph 21c below. However, it is to be noted that no single type of BW anti-crop agent will be suitable for use against all types of crops so the munitions must be capable of being used with those agents that are dry in form. (Secret)

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b. Approach: In general, the E-77 and E-86 munitions consist of a metal bomb case filled with packages of a light weight carrier (feathers, etc.) which has been liberally covered with agent. Enroute to the target the viability of the agent is protected from adverse environmental conditions by both insulation and heat generated through electrical and/or chemical means. After bomb release from the delivery vehicle, the bomb case opens below 5,000 feet allowing the agent carrier to settle over a large land area. (Secret)

Results of preliminary investigations indicate that the overall effectiveness of a combat sortie will be increased by the utilization of munitions which can be widely dispersed over the target area and will disseminate pure agent short distances above the ground. The initiation of development of a specific munition for combat use will be held in abeyance pending the completion of a study designed to determine the extent of increase in effectiveness when disseminating pure agents and to indicate the most practical size and type of munition to utilize. The FY 1955 funds indicated for task 50567 will be utilized for the performance of the feasibility study and supporting tests. (Secret)

Among the problems to be solved during the performance of the feasibility study are:

(1) Determination of a size and aerodynamic characteristics of a munition which will give adequate area coverage.

(2) The determination of the suitability of an inexpensive barometric fuze to insure air-burst.

(3) The determination of the crop infection to be expected from a given quantity of pure agent in dry form as compared with the same quantity of agent-carrier combination. (Secret)

In the case of all three bombs, the tasks of determining the optimum weight ratio of agent-to-"hardware" and the crop area which can be infected by the contents of a single munition are major problems. In order to determine a factual solution, agent tests are required. Facilities within the continental limits of the United States which can be used for active agent tests are limited. However, field tests of limited size and number can be performed to verify data accumulated from laboratory tests and theoretical calculations. (Secret)

Other problems concerning all BW anti-crop munitions are:

(1) The determination of types and quantities of insulation necessary to protect the agent against adverse affects of temperature extremes during storage and flight. Laboratory tests on various types and quantities of insulation are now being performed, and the results of these tests will indicate the proper solution. (Conf)

(2) The determination of the simplest and most effective means of bomb heating during flight. Both chemical and electrical heating have been investigated. Where aircraft are used as delivery vehicles, the electrical means appear to be the most economical method while chemical means are preferred for bombs delivered by free floating balloons. (Secret)

c. Tasks: Task No. 50475: (Secret Title) Biological Bomb, Type E-86 (Top Secret Task)
Contractor: Department of the Army, Chemical Corps.
Contract No. CSO&A No. (33-616)-54-76
Principle Investigator: Mr. E. Stombler, Chemical Corps Biological Labs, Camp Detrick, Md.

Item 2893

Objective and Nature of Task: This task is to result in the development of a bomb of conventional shape which can:

(1) Be delivered by bomber aircraft.
(2) Be used as an alternate bomb load for the 750-lb. GP bomb in the "new series" of bomb.
(3) Effectively disseminate proper amounts of BW anti-crop agents over a maximum target area. (Secret)

Completion of Development, September 1955; Completion of Testing, September 1956
Coordination: AMC
Directorate of Supply & Services, MCSWB
AFAC, ACOP
HADC, HDOR
AFFTC, D/O (FTOPP)
Department of Army, Chemical Corps

Task 50476: (Secret Title) BW Bomb for Balloon Delivery (Top Secret Task)
Contractor: Department of the Army, Chemical Corps. Contract No. CSO&A No. (33-616)-54-16 w/Amend #1
Principle Investigator: Mr. R. E. Stine, Chemical Corps Biological Labs, Camp Detrick, Md.
Objective and Nature of Task: This task will result in the development of a bomb designed for delivery to the target area by a free floating unmanned balloon. Its features will be such as to take advantage of the peculiar characteristics of the delivery system. In general, the bomb will:

(1) Be released at an altitude ranging between 25,000 and 39,000 feet.
(2) Will chemically deactivate its agent in the event of premature descent of the balloon while over friendly territory.
(3) Be used to complement the M-115 and E-86 type bombs which must be delivered by bomber aircraft.
(4) Effectively cover a large land area with required quantities of anti-crop BW agents. (Secret)

Completion of Development, July 1955; Completion of Tests, July 56.
Coordination: AMC - Directorate of Supply & Services, MCSWB
AFAC, ACOPP
HADC, HDOR
AFFTC, D/O (FTOPP)
Department of the Army, Chemical Corps
AFCRC, CRHD

Task 50567: (Secret Title) Pure Agent (Anti-Crop) Disseminator (Top Secret Task)
Contractor: D/A Chemical Corps
Contract No. To be established in FY 55.
Principal Investigator: To be established
Objective and Nature of Task: This task will result in the development of a munition which will eliminate the need for agent carrier, and through the dissemination of pure agent, increase the overall effectiveness of a combat sortie. The munition will:

(1) Effectively disseminate proper amounts of dry BW anti-crop agents over a maximum target area.

(2) Be capable of being clustered in conventional cluster adapters and/or ejected from specially designed dispensers.

(3) Function at altitudes ranging from 10 to 50 feet above the ground. (Secret)

Completion of Development, July 1958; Completion of Tests, July 59.

Coordination: AMC, MCSWB
AFAC, ACOPP
HADC, HDOR
AFFTC, D/O (FTOPP)
D/A, Chemical Corps

d. Other Information:

The Department of the Army, Chemical Corps, is supervising the development of all BW bombs for the USAF. The AFAC will perform tests required to complete USAF Phase I thru VI tests as defined by AFR 80-14. HADC will support AFAC to the extent directed by higher authority. AFFTC will provide test aircraft and test facilities required to obtain ballistic data. The AMC will furnish funds for the purchase of service test items. Additional funds as indicated below have been used or scheduled for use on this project.

TASK NO. AMC FUNDS FOR SERVICE TEST ITEMS

	FY 53	No. Items	FY 54	No. Items	FY 55	No. Items	FY 56	No. Items
50475, E86 Bomb	200M	200	100M	200	0	0	0	0
50476, E77 Bomb	150M	200	25M	50	50M	50	0	0
50567, Pure Agent Bomb	0	0	0	0	0	0	70M	700

The Air Materiel Command processed MIPR's to purchase service test items from FY 53 and FY 54 funds as indicated below:

TASK NO & ITEM	MIP R NO.	NO. ITEMS	TOTAL AMT OF MIPR	DATE MIPR
50475, E86	33-600-3-39B-325	200	100M	31 October 1952
50475, E86	33-600-4-39B-147	200	100M	30 August 1953
50475, E86	33-600-4-39B-347	54	14.31M	8 February 1954
50476, E77	33-600-3-39B-324	200	150M	31 October 1952
50476, E77	33-600-4-39B-146	50	25M	30 August 1953

(Conf)

e. Background History

Prior to 1950 Hq USAF stated a primary operational need for BW agent-munition combinations which will provide the capability during war of reducing the food-crop production of enemy countries to the point that the enemy's capability of prosecuting the war will be materially reduced. As a result, the M115 bomb was developed. This bomb could be used as an alternate bomb load for the 500-lb. GP bomb used during World War II.

The M115, although providing the capability required, leaves many things to be desired and imposes several operational restrictions upon the methods of operating in combat. Among its undesirable features and characteristics are:

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(1) Agent viability is materially reduced by exposure to the low temperatures encountered during flight at high altitudes. As a result, carrier aircraft must be equipped with bomb bay heaters or operate at relatively low altitudes. (Secret)

(2) Because of its light weight and poor center of gravity location, its separation characteristics from the aircraft upon release are poor. With the advent of high speed bombers such as the B-47, these characteristics became critical. (Conf)

(3) Because of its light weight and poor center of gravity location, the accuracy with which the M115 can be dropped is limited. (Conf)

(4) With the advent of bombers designed to carry the maximum number of bombs in the "new series", the use of the M115 will be an inefficient utilization of bomb bay space. (Conf)

As a result of the deficiencies of the M115, the USAF started in 1951 to develop a bomb, similar in principle to the M115, which would be a member of the "new series" and would eliminate the deficiencies listed. This new bomb is now known as the E86. Development has progressed to the extent that flight tests have been initiated to determine the optimum weight and cg location as well as to obtain an estimate of the ballistic characteristics. (Conf)

In 1950, work began to determine the practicability of attaining the desired anti-crop capability while leaving combat aircraft free to perform other duties. The resulting investigation revealed that it would be economical to use unmanned free-floating balloons to deliver bombs containing anti-crop agents. Therefore, upon the recommendation of the Chemical Corps, the USAF established project R555-783 under WADC cognizance to provide for the development of the bomb. An additional project under the cognizance of AFCRC was initiated for the development of the balloon delivery system. Laboratory tests designed to provide preliminary data on the operating characteristics are scheduled for completion by 1 April 1954 and functioning tests under simulated flight conditions are scheduled for initiation on 15 April 1954. (Conf)

For several years scientists have believed that the dissemination of pure anti-crop agent would be more effective than dissemination through the means of an agent-carrier combination. As a result, the USAF under project R555-728 provided funds for experiments and the applied research required to verify the belief. Results of preliminary experiments and tests, utilizing the E95 bomb as a test munition, indicate that the belief is true. As a result, Task 50567, described in paragraph 21c, above, has been established. (Secret)

f. References

(1) Top Secret document No. ADTS-832 (Hq WADC), letter from Hq ARDC to CG, WADC dated 20 August 1952, (Uncl Title) "USAF Biological and Chemical Warfare Program".

(2) Top Secret document No. ADTS-1469 (Hq WADC), letter from Hq ARDC to CG, WADC dated 10 July 1953 (Secret Title) "BW Balloon Delivery System" with inclosures. (Secret)

(3) Top Secret Document No. ADTS-776 (Hq WADC), Chemical Corps Biological Laboratories Annex to Quarterly Technical Report of Crops Div, dated 31 March 1952.

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(4) Top Secret Document No. ADTS-708 (Hq WADC), CIA Report dated 11 June 1952.

(5) APGC Report No. APG/SAS/74-A dated 1 December 1952, (Secret Title) "Operational Suitability Test of Bomb, Biological, 500-lb., E73". (Secret Report)

(6) WADC Exhibit No. WCLG-605 dated 28 July 1953, (Secret Title) "Cluster, BW, Anti-Crop, 750-lb., (E86)" (Secret Document) (Secret)

REASON FOR SECURITY CLASSIFICATION

This document is classified Secret since it reveals intent to obtain offensive capability in biological warfare. This is in accordance with the policy expressed in letter from Hq USAF (AFOAT) to all major Commands, dated 16 December 1952, subject: (Uncl Title) "Classification Guide for Matters Concerning Biological Warfare and Chemical Warfare".

DOWNGRADING OF SECURITY CLASSIFICATION

This document shall retain the security classification of Secret until such time as equipment developed under this project has been used in war-time operations for a period of 90 days at which time classification will be reduced to Confidential or until such time as policy expressed in the BW-CW Security Guide mentioned above has been revised.

"This document is classified SECRET in accordance with Paragraph 23b(12) of AFR 205-1 dated 24 July 1953."

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Item 2932

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CCTC ITEM 2932

A-511

ORDNANCE COMMITTEE
ITEM 35516

23 Sep 54

HRosenthal/sd/74833
27 July 1954

DEPARTMENT OF THE ARMY
Office of the Chief of Ordnance

FROM: Subcommittee on Ammunition

TO: The Ordnance Technical Committee

SUBJECT: Shell, Chem, 105-MM, M360 (T173): Casing, Burster, M16 (T27E1); Charge, Burster, M40 (T67) Classified as Standard Type

1. REFERENCES:

a. OCM Item 33567 dated 5 February 1951, Subject:
Shell, Chemical, 105mm, T173
Shell, Chemical, 155mm, T179
Shell, Chemical, 8-inch, T174
Initiation of Development

b. Test Division Chemical Corps, Chemical and Radiological Laboratories, Final Engineering report No. 15 on Shell, 105mm, Howitzer, Gas, T173, Filled GB.

c. Test Division Chemical Corps Chemical and Radiological Laboratories, Supplement to Final Engineering Report No. 15 on Shell, 105mm Howitzer, Gas, T173, Filled GB. Project No. 4-04-15-020.

d. Aberdeen Proving Ground Firing Record, P-50431, 19 November 1951 to 11 January 1952.

e. D/F 00471/3459 (G3 470 (4 Aug 52)), G4/F3 (25 Aug 54)) dated 25 August 1952, subject: Shell, Chemical 105mm, T173 and inclosing Letter ATDEV - 10 471/800 (4 Aug 52) with letter GNBA - FAG 471 from Headquarters Army Field Forces Board No. 1 dated 23 July 1952.

GROUP-4
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Declassified after 12 years

f. CCTC Item 1890 dated 19 May 1946

g. SR 380-5-6 dated 18 June 1952

h. OCM 34444 dated 9 October 1952, Subject: Security Policy for GB Filled Munitions.

i. OCM 34008 dated 6 December, 1951.

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j. CCM 34346 dated 3 July 1953.

k. SR 700-51-190 dated 4 June 1951.

l. File 00 400/955 (s) (CMLWR-C) from Chief Chemical Officer to Chief of Ordnance, 24 August 1953, Subject: Standardization of Chemical Warfare Munitions.

m. File AGAC-C(M) 381 TSS1 (27 April 53) G3, Subject: Chemical and Biological Warfare Readiness.

n. File 00 471/2061 (misc)(s), CMLWX-T dated 2 October 1952, Subject: Adequacy of Press Fit Closure in GB filled Artillery Ammunition.

o. File 00 471/3049 (misc) from OCO to Chief Chemical Officer dated 23 November 1953, Subject: Shell, Gas of the 105mm, T173 and 155mm, T77 types.

p. Subcommittee Report A-306A dated 24 July 1954, Subject: Shell, Chem, 155-mm, M121 (T77), Casing Burster, M15(T29); Charge, Burster, M37 - Classified as Standard Type.

2. DISCUSSION

a. Development of Shell, Chemical, 105mm, T173 was initiated and approved by reference 1a. In order to complete the development by the desired date, the T173 Shell for Development and Engineering tests were produced by modification of Shell, Chem, 105mm, M60, which were available. The modifications comprised:

(1) Providing new nose adapters to fit the increased burster size required for properly disseminating the filler.

(2) Providing new and larger burster casings and burster charges.

b. Initially a small number of shell with several sizes of burster casings and burster charges were manufactured and delivered to the Chemical Corps. These shell were filled by the Chemical Corps, and a series of tests were conducted at Army Chemical Center to establish a burster charge for the best dispersion of GB in an airborne cloud. Under the conditions of these tests a shell design with an agent/burster ratio of 1.6 to 1 was selected as producing the best results. A supply of shell with this 1.6 to 1 ratio were produced. These shell were supplied the Chemical Corps for filling. A number of the shell were GB filled for tests by the Chemical Corps at their Dugway Proving Ground, and the remainder were simulated filled (furfural) for firing at Aberdeen Proving Ground and at Army Field Forces Board No. 1.

c. Chemical Corps evaluation of the T173 (M360) Shell is reported in reference 1b. This report indicated satisfactory results in all phases except the corrosion tests and the cyclic surveillance tests which were at that time incomplete.

d. Chemical Corps evaluation, after completion of the corrosion tests and the cyclic surveillance tests is covered in reference 1c. The following recommendations were made by this reference:

> "On the basis of the test results, incorporated in basic Final Engineering Report No. 16, dated 13 May 1952, as supplemented by surveillance and ballistic data outlined herein, it is recommended that the Shell, 105mm, Howitzer, Gas, T173, (Filled GB), as submitted, be considered satisfactory as regards filling the stated military requirement and meeting the stated military characteristics."

e. Notwithstanding the above recommendations of the Chemical Corps in reference 1c, later correspondence between Chief of Ordnance and Chief Chemical Officer, reference 1o, indicated that some difficulties might be expected from leaks at silver soldered joints. Also leakage at one of the silver soldered joints was experienced in development of Shell, Chem, 155mm, T77 for GB filling, see par 2c of reference 1p.

f. It is desirable to specify one piece construction for the shell body and one piece construction for the burster casing in order to eliminate the possibility of leaks thru silver soldered joints. Current production of 20000 of the T173 (M360) shell bodies is with the body adapter made integral with the shell body. It is intended to amend present drawings, which show a silver soldered adapter, and to make the one piece shell design mandatory.

g. The present drawings for Casing, Burster, T27 (M16) shows a two piece design closed with a plug, silver soldered to the bottom of the tubing. However, a one piece design made by cold forming is in manufacture for the 20000 shell cited in par 2f above. It is intended to amend the drawings to show only the one piece burster casing design.

h. Results of Aberdeen Proving Ground tests are reported in reference 1d. The Aberdeen tests included range and accuracy tests in comparison with Shell, HE, 105mm, M1 as well as excess pressure tests and sympathetic propogation tests. The range and accuracy tests indicated:

(1) The difference in corrected range is not significant at subsonic and supersonic muzzle velocity levels.

(2) At the charge 5 transonic muzzle velocity level, the difference is significant.

(3) Existing tables for the M1 Shell are also applicable to the T173 Shell in all charges except charge 5, which can in practice be made applicable to the T173 Shell by assuming an effect on range equivalent to the effect of a 6.5% increase in ballistic air density at all ranges. Recovered rounds indicate that the metal components of the T173 Shell have satisfactorily withstood the forces of setback. Propagation tests indicate that most extensive detonation results when projectiles are stacked together rather than alternately. In neither case did all rounds detonate.

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i. Shipment of 200 Shell, S/F, Chemical (simulated GB), w/f PD, M51A5, for 105-mm Howitzer was made to President, Army Field Forces Board No. 1, Fort Bragg, N. C. The board was advised of the deviation in range from the M1 shell when fired at charge 5, as is indicated in par. 2h, above. The results of the Board No. 1 tests are reported in reference 1e. The recommendations of the Board are quoted as follows:-

"a. Shell, Chemical, 105-mm, T173 be considered suitable with regard to accuracy and stability for field artillery use."

"b. Firing Table 105-H-4 be considered suitable for use with Shell, Chemical, 105-mm, T173."

j. Construction of the items to be standardized is shown on the following drawings:

(1) Shell, Chem., 105-mm, T173 (M360) drg. P-83122 and P-83123

(2) Casing, Burster, T27E1 (M16), drg. P-86118 (being prepared).

(3) Charge, Burster, T67 (M40), drg. P-83124

The following drawings will apply to the assembly of the complete round:

(4) Complete round assembly, drg. P-83471

(5) Shell filling, drg. P-83472

The drawings of the shell metal parts and of the burster casing will be revised as is indicated in par. 2f and 2g above.

k. GB was standardized by reference 1f. Paragraph 3c of this reference recommended that:

"GB itself be classified as a RESTRICTED item, that the symbol GB, when used alone be UNCLASSIFIED; etc."

This recommendation was approved by higher authority. An UNCLASSIFIED category for the filled T173 Shell would meet the requirements quoted above as the GB itself would be under cover, hermetically sealed within the shell body.

l. Reference 1g in paragraph 2h classifies as SECRET munitions developed, or under development, for dissemination of the nerve gases until such time as munitions are standardized for operational use and issue. When munitions are standardized for operation use and issue, the appropriate classification for such will be designated by the agency having prime cognizance in accordance with applicable current directives of higher authority.

m. All ballistic tests of the T173 Shell were conducted with Fuze, PD, M51 (Series) since a more satisfactory fuze was not available at the time. The Chemical Corps indicated that somewhat better terminal ballistics could be expected with a faster operating fuze. Consequently the mechanical Fuze,

PD, T237E1 and the electrical Fuze, PD, T244 have been under development under authority of reference 1h for use on all rotated GB Shell. Development of the T237E1 Fuze has been completed, and the item released for procurement with rotated GB Shell. The T244 Fuze which will be an optimum type to include minimum functioning time and graze sensitivity is still in the preliminary stage of development.

n. Reference 1k is a special regulation covering Logistic Responsibility for Standard Commodity Classification, Major Group 90, Ordnance. This regulation assigns responsibility of toxic ammunition for rifled weapons as follows:

(1) Ordnance Corps: Specifications, requirements and funds, purchase and inspection, storage and issue, and maintenance of the complete round and requirements and funds for the filler.

(2) Chemical Corps: Specifications, purchase and inspection, storage and issue, and maintenance for the filler.

o. Procurement of 20000 each, Shell, Chem, 105-mm, T173 was undertaken and joint surveillance tests on these 20000 shell, filled GB, was arranged between the Ordnance Corps and the Chemical Corps (see ref. 1n). This test which has not yet been completed, was arranged to overcome certain objections to the closure, internal of the Ordnance Corps. These objections resulted in non-concurrences to Sub-Committee Report A306 recommending Standardization of Shell, Chemical, 155-mm, T77 which was developed for GB filling.

p. By reference 1l, the Chief Chemical Officer recommended to the Chief of Ordnance to immediately standardize the currently released GB ground munitions utilizing press fit closures. The following is quoted from this reference:

"-----the Chemical Corps -----has designed, investigated, studied and tested some thirty (30) different designs of closures. None have been found to excel the current design press fit closure. Approximately seven thousand (7000) press fit closures have been accomplished by this Corps in the past two years without detecting a single closure leak. This record was attained by careful inspection of metal parts by capable inspectors."

"Hesitancy to standardize these munitions and confusion relative to closures are due to fear of physical contact with agent GB. This agent is a more hazardous material than most; however, the Chemical Corps has developed adequate detection and protective devices-----"

q. By 1st Indorsement to reference 1l the Ordnance Corps advised the Chemical Corps

"The Ordnance Corps is taking action to effect standardization of the 105-mm and 155-mm Howitzer GB Shell with the present closure design. The internal Ordnance non-concurrences to such action have been withdrawn."

r. The following information is pertinent to standardization of Shell, Chemical, 105-mm, M360 (T173) with Casing, Burster M16 (T27), Charge,

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Burster, M40 (T67); with GB filling, Case Cartridge, M14; Primer, M28A2; Charge, Propelling, M1.

(1) Proposed using agencies: Army Field Forces, National Guard Bureau, and U. S. Marine Force.

(2) Related materiel: Howitzer, 105-mm, M2A1, M2A2, M4 and M4A1.

(3) No existing items need be modified or replaced by the GB filled Shell, 105-mm, M360 (T173)

(4) The filled, assembled and fuzed shell, assembled as a complete cartridge will cost approximately $40 each in production quantities.

(5) The item meets current military characteristics for GB filled, non-persistent gas shell for the 105-mm Howitzers, except for possible occasional "leakers" as indicated above.

(6) The item is intended for immediate procurement.

(7) Critical or strategic material used (exclusive of filler which is a standardized Chemical Corps item). Gilding metal of rotating bands, and small quantities of brass and aluminum in the fuze and primer.

(8) Item is air transportable.

(9) The Ordnance Corps is to be charged with responsibility for:

(a) Specifications for the round (including all components except filler).

(b) Purchase and inspection of all parts, except filler.

(c) Determination of requirements and funding.

(d) Assembly of the filled shell, and the cartridge.

(e) Storage and issue of the cartridge.

(f) Maintenance of the cartridge.

The Chemical Corps is to be charged with responsibility for:

(g) Specifications for the filler.

(h) Purchase and inspection of the filler and the filling.

(i) Storage and issue of the filler.

(j) Maintenance of the filler.

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(10) Training and maintenance literature is required.

(11) This item is in Supply Class V for issue.

s. Since, Shell, Chem, 105-mm, M360 (T173) with Casing, Burster, M16 (T27), and Charge, Burster, M40 (T67) with GB Filling covers a requirement for which there is at present no existing standard projectile, it is the opinion of the Subcommittee that it should be authorized as Standard Type. Reference 1p recommends that development be continued on improvement of closures under Project TA1-1546 (D/A 504-04-004) and of a faster fuze under Project TA1-2706 (D/A 505-04-023). Approval of this subcommittee report is not intended to modify the recommendations in Reference 1p as concerns development of improved closures or development of a faster fuze.

t. Funds for procurement of 423, 490 complete Cartridge, Gas, GB, T173 w/fuze PD, T237E1 for 105-mm Howitzer was authorized by references 1i and 1j. This authorization was subsequently reduced to 20000 rounds. On 14 June 1954, the Chief of Staff approved a revision of reference 1m. The revised directive eliminates the stockpile concept of chemical munitions and directs computations on an MRMR basis as of 1 July 1954. Funds for the procurement of the round will be required to meet the computed MRMR. Funds to procure 870,000 rds. have been approved by G4 and will be made available to Industrial Division.

3. RECOMMENDATIONS:

The Subcommittee recommends that:

a. Shell, Chemical, 105-mm, M360 (T173); Casing, Burster, M16 (T27E1); Charge, Burster, M40 (T67) be classified as Standard Types.

b. The shell filled GB, assembled with Case, Cartridge, M14; Primer, Percussion, M28A2; and Charge Prop., Dwg 71-9-100 be authorized as Cartridge, Gas, GB, Non-Persistent, M360, w/fuze for 105-mm Howitzers.

c. Firing Table 105-H-4 be revised to include Cartridge, Gas, Non-Persistent, M360, w/fuze.

d. The security classification of Cartridge, Gas, GB, Non-Persistent, M360, for 105-mm Howitzers together with its component parts, drawings, and specifications be UNCLASSIFIED except that complete details of the methods of manufacture of GB is classified SECRET: its chemical composition is UNCLASSIFIED. The methods of handling, antidotes and physiological effect of the filler are UNCLASSIFIED. Also the amounts of stocks of M360 shell and M360 cartridge available or about to become available should be classified CONFIDENTIAL. Correspondence concerning stocks of M360 ammunition may be CONFIDENTIAL or UNCLASSIFIED at the discretion of the originating office in accordance with the subject of the communication, provided such communication does not reveal information leading to the quantities available for use.

e. This report be placed in the SECRET category.

f. Logistic responsibilities are to be as assigned in SR 700-51-190 dated 4 June 1951 (this SR is currently under review).

JOHN H. HINRICHS Brig Gen, USA	J. B. HENDARIS Brig Gen, USA	JOHN G. ZIERDT Col, Ord Corps
LAWRENCE W. BYERS Col, GS OCAFF	F. G. BRYAN Col, Ord Corps	S. A. HALL Col, Ord Corps
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W. W. STOREY Ord Corps	W. J. WISEMAN Jr. Chemical Corps	H. G. ADAMS Lt Col, Ord Corps

Action By: Amm Br, Ord Res & Dev Div.
Res & Mats Br, Ord Res & Dev Div.
Amm Br, Industrial Division
Amm Supply Br, Field Service Div.
Requirements Br, Field Service Div.

Approval by higher authority is required

APPROVED BY ORDNANCE COMMITTEE
23 SEP 54
/S/ A. W. STODDARD
Col, Ord Corps
Secretary

APPROVED
/S/ M. H. CLARK
Col, Ord Corps
Chairman Pro Tem

APPROVED BY ORDER OF
THE SECRETARY OF THE ARMY

/S/ GARRARD FOSTER, Lt Col, GS
For the Deputy Chief of Staff for Logistics

Regraded Confidential
ir accordance with
par. 3.e.

Item 2950

Report "N"
Copy No.__
(5 Pages)

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF CHEMICAL OFFICER
Chemical Corps Technical Committee
Army Chemical Center, Maryland

4-80-06-015
TSE/5190/mm
6 Oct 1954

CMLWH

SUBJECT: Military Requirements & Characteristics for an Expendable G-Agent Detector

TO: Chairman, Chemical Corps Technical Committee

1. References:

a. CCTC Item 2480, Classification of Kit, Chemical Agent Detector, M9A2 (E16) as a Standard Type and Obsoletion of the Superseded M9A1 Kit, 22 May 52.

b. Report (S), AFF Pd No. 3, Project 2640, Military Characteristics for Expendable Detector, 22 Jun 54.

c. Letter (S), ATDEV-4 CCAFF, 18 Aug 54, Report of Project Nr 2640, Military Characteristics for Expendable Detector of G-Agents (DA Project 4-08-06-015), to ACofS, G3, w/Incl (ref b.)

d. D/F (S), G3 400, same subject as c., to CCmlO, w/Incl (ref c.).

e. Letter (S), CMLWR-P CCCmlO, 24 Sep 54, Expendable Detector of G Agents (Change Order No. 7 to R&D Program 7A), to CG, R&E Comd w/Incl (ref d.) & 1st Ind, CMLRE-CWD-3, 4 Oct 54, to Chm, CCTC.

2. Discussion:

a. Reference a. identifies action of this Committee which type-classified the currently standard M9A2 Chemical Agent Detector Kit as an item of issue for the detection of chemical agents in the field. This kit is approximately 3" x 5½" x 8½" in size and differs essentially from earlier models in that it provides for the detection of G-series agents. Major componets are the (1) air sampling pump, (2) sets of brown, green, blue and yellow dot detector tubes, (3) sampling tubes (white dot), (4) detector crayons, (5) bottles and vials for liquid and solid reagents, and (6) report forms, pencil and instruction cards. The M9A2 Kit is designed for the use of CBR NCO's and as such requires adequate training for its use. Because the use of the M9A2 Kit requires a skilled operator, prepared reagents, and a certain length of time before confirmation of

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the presence of an agent is possible. Army Field Forces has studied and considered the need for a simplified detector which will assure positive identification of the more toxic agents in the least possible time.

b. Reference b. identifies the report of the reference AFF study wherein it was envisioned that the simplified detector would be under the control of the unit commanders who would entrust gas warning missions to selected individuals in small units as required. An expendable detector, based on a definitive color change, that could be worn by individuals or attached to any piece of equipment, appeared to be the most satisfactory solution to the problem of providing a combat soldier with a timely gas warning device. In order to outline the detailed mission and performance of the subject item, reference b. incorporated a list of military characteristics which were listed in order of relative importance. The report of AFF Bd. No. 3 (ref b.) was reviewed by Hqs, CCAFF, as recorded in reference c. which indicated concurrence in the study subject to changes in the statement of the military purpose of the kit and the operational concept together with changes in the subparagraph concerning the temperature limitation performance. Based upon the correspondence from the Chief Chemical Officer, which referenced the fact that the subject kit would possess a 24 hour life, reference c. considered that the item should therefore be considered in the expendable category. As the result of this review, reference c. recommended that the military characteristics as revised be approved and that development be initiated under a 1-A Priority by the appropriate developing agency.

c. The military characteristics for the subject kit as reported in reference b. and revised by CCAFF in reference c. are reproduced herewith:

"3. a. Military purpose. - The Expendable G-agent Detector is to provide the soldier an extremely lightweight, small detection device which will furnish timely warning against G-agent attack during day or night.

b. Operational and organizational concept.

(1) This device will provide a clear and identifiable indication of the necessity of implementing individual protective measures. As such, the device must be displayed either on the individual or on the equipment so that it will be readily visible to the wearing individual and others in the immediate vicinity. The device should be available to troops on the same basis as the Field Protective Mask.

(2) In order to provide immediate warning, the expendable detector should have the same basis of issue as the Field Protective Mask. Should the device be so expensive that distribution to each individual would be prohibitive, distribution of one device to each three to five individuals would be acceptable.

"4. Related Items.

a. M9A2 Chemical Agent Detector Kit.

b. M10A1 Chemical Agent Analysis Kit.

c. M7 type Detector Crayon.

d. M5 Liquid Vesicant Detector Paint.

e. M6 Liquid Vesicant Detector Paper.

"5. Essential Military Characteristics in Order of Desirability

a. Shall detect G-agents at potentially hazardous dosages and give warning by instantaneous sharply contrasting color change.

b. Shall not react to harmless substances such as motor vehicle exhaust, explosive fumes, or smoke.

c. Shall be capable of convenient and secure attachment to common military items, such as cloth, metal, wood, glass and plastic surfaces in field equipment.

d. Shall remain effective for 24 hours when exposed to all types of weather and field conditions; a 30-day service life desirable.

e. Shall be in the nature of a small patch not over 0.5 ounces in weight.

NOTE: The characteristics listed below in paragraphs 5f through 5i are essential, but are of a lower priority than those listed above and possess no priority in relation to each other.

f. Shall be conveniently packaged for quick and easy use by small units and individuals.

g. Shall contain simple instructions for use.

h. Shall, when in its original field issue package, withstand submersion for 2 hours under 3 feet of salt, or fresh water.

i. Shall be usable in amphibious landings including salt water conditions.

"6. Desirable Characteristics

a. Color change will produce luminescence to make it visible at night without artifical light.

b. Shall revert to a neutral color when the hazard from chemical agents have ceased.

c. Shall contain the additional capability of detecting choking gases, blood gases and blister gases by separate, easily recognized color changes.

d. Shall be of a color that will blend with that of common army equipment.

e. Shall be suitable for use under all climatic conditions including air temperature ranges extending from + 125°F (minimum exposure of 4 hours with full impact of solar radiation) to -25°F (minimum exposures of 3 days without benefit of solar radiation); -65°F desirable. Shall be suitable for transport and storage at temperatures ranging from + 160°F to -80°F."

d. Reference d. indicated that ACofS, G3 has reviewed the study of reference b. and the recommendations of reference c. and has concurred therein. In consonance therewith, it was directed that the Chief Chemical Officer initiate the development with funds that were made available by reprogramming the R&D allocations for FY 55. The correspondence identified as reference e. directed that the work be done under Project 4-08-06-015, Detection Methods and Materiel for Toxic Agents, and that this revision would be identified as Change Order No. 7 to the Chemical Corps 7A R&D Program.

e. The foregoing paragraphs review the results of the study conducted by AFF Bd. No. 3 on the subject item and indicate Staff concurrence with the military requirement and applicable military characteristics as revised by Hqs, AFF. Appropriate action to incorporate this development in the current Chemical Corps R&D Program under the provisions of SR 705-5-1 are noted below:

3. Recommendations:

It is recommended that:

a. A military requirement be established for an Expendable G-Agent Detector and so recorded in the Book of Standards.

b. The military characteristics for the subject item listed in paragraph 2.c. be approved.

c. Subproject 4-08-06-029-05, Expendable G-Agent Detector, be established to develop the subject item.

d. Subproject 4-08-06-029-05 be accorded a 1-A Priority, be assigned to Technical Objective CW-4a, and be classified Confidential. (Basic reactions and details of design and performance which justify the Secret category will be so classified).

e. This report be regraded to the Confidential category.

f. The Chemical Corps 7A R&D Program and all other pertinent records be revised in accordance with this action.

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Military Requirement & Characteristics for an Expendable G-Agent Detector

CONCURRENCE SIGNATURES

/s/R.N.Skaggs, Col, GS
Dev & Test Sec, OCAFF

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Cml Sec, OCAFF

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Corps of Engineers

/s/H.Rackowski
Ordnance Corps

/s/R.Raymond
Quartermaster Corps

/s/W.A.Martin, LtCol, USAF
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/s/Leo F.Walsh
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/s/V.F.LaPiana, Col, CmlC
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PT&I Div, OCCmlO

/s/L.M.Swanson
BuAero, Navy Dept

/s/R.A.Murdoch
BuShips, Navy Dept

/s/A.L.Russell
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/s/E.H.Lewis, LtCol, CmlC
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/s/B.H.Harris
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Ln O, CmlC Tng Comd

/s/J.A.Martin, LtCol, CmlC
A/RW&NTM, R&E Comd

/s/J.H.Rothschild, Col, CmlC
Chemical Corps Board

ACCEPTED BY THE CHEMICAL CORPS TECHNICAL COMMITTEE, 9 Dec 1954:
/s/T. S. ECKERT
Secy, CCTC

APPROVED FOR THE CHIEF CHEMICAL OFFICER, 9 Dec 1954:
/s/WILLIAM E. R. SULLIVAN
Colonel, Cml C
Chairman, CCTC

APPROVED BY ORDER OF THE SECRETARY OF THE ARMY, 9 Dec 1954:
/s/DONALD H. BEHRENS
Major, GS
Office, Deputy Chief of Staff for Logistics