

Item 2876

PROJECT DATA SHEET~~CONFIDENTIAL~~

1. PROJECT TITLE: Wet Suspension of Pasteurella tularensis (S)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 4-92-02-C31
5. REPORT DATE: 9 June 1954
6. BASIC FIELD OR SUBJECT: Processing & Manufacturing Methods & Techniques & Equipment.
7. SUBFIELD OR SUBJECT SUBGROUP: Agents, Biological
- 7a. TECHNICAL OBJECTIVE: BW-1a
8. COGNIZANT AGENCY: CmlC
9. DIRECTING AGENCY: ACCmlC/BW
10. REQUESTING AGENCY: Cml C
11. PARTICIPATION AND/OR COORDINATION: (AR) Army
12. CONTRACTOR AND/OR LABORATORY: Process Development Division  
Pilot Plants Division  
Camp Detrick, Md.
13. RELATED PROJECTS: 4-11-02-064; 4-92-02-029; 4-92-02-030
15. PRIORITY: 1-B
17. ESTIMATED COMPLETION DATES: Dev 1 Sept 56  
Test - 1 Jan 57
18. FISCAL ESTIMATES: FY 54 - 222M  
FY 55 - 750M  
FY 56 - 427M
19. SUPERSEDED REPORTS: Project Cards for 4-92-02-028 & 4-92-02-027
20. REQUIREMENT AND/OR JUSTIFICATION: Letter to Chief Chemical Officer from Commanding General, Air Research and Development Command, Subject: USAF Biological Program, dated 8 October 1952.
21. BRIEF OF PROJECT AND OBJECTIVE:
  - a. Brief (Applied Research). The main objectives of this project are: (1) To develop a process and equipment for the production of Pasteurella tularensis with properties which meet established military characteristics; (2) To develop equipment and techniques required for filling the agent into munitions and for transport and storage of the agent-munition combination; (3) To develop design criteria required for design of production facilities; and (4) To supplement research information in order to classify Pasteurella tularensis as a standard type agent.
  - b. Approach: The development of processes for the manufacture of Pasteurella tularensis and the development of filling and other subsidiary equipment is accomplished through properly coordinated research, development, and engineering performed

~~CONFIDENTIAL~~

in process development laboratories and pilot plants. This is required to make available the information necessary to design and operate a production facility and to standardize the agent. Emphasis will be placed on the development of a process for this agent, having the major elements of deep-tank fermentation, concentration, stabilization, and filling. Information available from research will be adapted to a feasible process for the manufacture of this agent by: (1) Development and evaluation of a process on a laboratory scale; (2) Development of equipment required to pilot the process, and (3) Development and evaluation of the recommended process in the pilot plant.

c. Subtasks. Cooperation with munitions development groups in the development of disseminating devices for this agent. Cooperation with the assessment groups in the assessment of this group.

d. Other Information:

(1) Basic Research - None

(2) Pasteurella tularensis has been prepared in small lots in pilot plant equipment. There is available most of the information required to proceed with the development of processes for the manufacture of this agent in the laboratory.

e. References:

(1) Guidance for Conduct of Research & Development Program for BW, G4/Fl 7700 (SF), 8 Sept 1953.

(2) USAF Biological Program, dated 8 Oct 1952, T-2-634.

~~SECRET~~  
Item 2876  
PROJECT DATA SHEET

1. PROJECT TITLE: Wet suspension of Bacillus anthracis (S)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 4-92-02-C32
5. REPORT DATE: 9 June 54
6. BASIC FIELD OR SUBJECT: Processing & Manufacturing Methods & Techniques & Equipment
7. SUBFIELD OR SUBJECT: Agents, Biological
- 7a. TECHNICAL OBJECTIVE: BW-1a
8. COGNIZANT AGENCY: Cml C
9. DIRECTING AGENCY: ACCm10/BW, Camp Detrick, Md.
10. REQUESTING AGENCY: Cml C
11. PARTICIPATION AND/OR COORDINATION: (AR) Army
12. CONTRACTOR AND/OR LABORATORY: Process Development Division  
Pilot Plant Division, Cp Detrick, Md.
13. RELATED PROJECTS: 4-11-02-064, 4-92-02-029, 4-92-02-030
15. PRIORITY: 1-B
17. ESTIMATED COMPLETION DATES: Res. -  
Dev. - 1 Jul 55  
Test - 1 Jan 56
18. FISCAL ESTIMATES: FY 54 - 924M \*  
FY 55 - 739M  
FY 56 - 442M
19. SUPERSEDED REPORTS: Project Cards for 4-92-02-028 and 4-92-02-027
20. REQUIREMENT AND/OR JUSTIFICATION: Letter to Chief Chemical Officer from Commanding General, Air Research and Development Command, Subject: USAF Biological Program, dated 8 October 1952.
21. BRIEF OF PROJECT AND OBJECTIVE:

- a. Brief. The main objectives of this project are: (1) To develop a process and equipment for the production of Bacillus anthracis with properties which meet established military characteristics; (2) To develop equipment and techniques required for filling the agent into munitions and for transport and storage of the agent-munition combination; (3) To develop design criteria required for design of production facilities; and (4) To supplement research information in order to classify Bacillus anthracis as a standard type agent.
- b. Approach. The development of processes for the manufacture of Bacillus anthracis and the development of filling and other subsidiary equipment are accomplished through properly coordinated research, development, and engineering performed in process development laboratories and pilot plants. This is required to make available the information necessary to design and operate a

production facility and to standardize an agent. Emphasis will be placed on the development of the process for this agent, having the major elements of deep tank fermentation, centrifugation, stabilization, and filling. Information available from research will be adapted to a feasible process for the manufacture of this agent by: (1) Development and evaluation of a process on a laboratory scale; (2) Development of equipment required to pilot the process, and (3) Development and evaluation of the process in the pilot plant.

c. Subtasks.

- (1) Cooperation with munitions development groups in the evaluation of disseminating devices for this agent. Cooperation with the assessment groups in the assessment of this agent.

d. Other Information.

Basic research - None

Bacillus anthracis has been prepared in pilot plant equipment. There is available most of the information required to pilot the process for the manufacture of this agent.

e. References.

- (1) Joint Chiefs of Staff, Staff Memo 229-53, Biological Warfare, 3 Sept 53.
- (2) Comment 3 by Chief Chemical Officer on Staff Memo 229-53.
- (3) U. S. Air Force Biological Program, dated 8 Oct 52, Doc. No. T-2-634.

\* Includes work on dry Bacillus anthracis.

PROJECT DATA SHEET~~CONFIDENTIAL~~

1. PROJECT TITLE: Dry Bacillus anthracis (S)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 4-92-02-033
5. REPORT DATE: 9 June 1954
6. BASIC FIELD OR SUBJECT: Processing & Manufacturing Methods & Techniques & Equipment
7. SUBFIELD OR SUBJECT SUBGROUP: Agents, Biological
- 7a. TECHNICAL OBJECTIVE: BW-1a
8. COGNIZANT AGENCY: Cml C
9. DIRECTING AGENCY: ACCmlO/BW, Camp Detrick, Md.
10. REQUESTING AGENCY: Cml C
11. PARTICIPATION AND/OR COORDINATION: (AR) Army
12. CONTRACTOR AND/OR LABORATORY: Process Development Division,  
Pilot Plants Division, Camp Detrick, Md.
13. RELATED PROJECTS: 4-11-02-064, 4-92-02-029, 4-92-02-030
15. PRIORITY: 1-B
17. ESTIMATED COMPLETION DATES: Dev - 1 Jan 56  
Test - 1 Jan 57
18. FISCAL ESTIMATES: FY 54 - \*\*  
FY 55 - 921M  
FY 56 - 677.1M
19. SUPERSEDED REPORTS: Project Cards for 4-92-02-028 and 4-92-02-027
20. REQUIREMENT AND/OR JUSTIFICATION: Letter to Chief Chemical Officer from Commanding General, Air Research and Development Command, Subject: USAF Biological Program, dated 8 October 1952. In addition to the specific Air Force requirement, guidance from higher authority has consistently emphasized the importance of developing dried agents.
21. BRIEF OF PROJECT AND OBJECTIVE:
  - a. Brief. (Applied Research) The main objectives of this project are: (1) To develop a process and equipment for the production of dry Bacillus anthracis with properties which meet established military characteristics; (2) To develop equipment and techniques required for filling the agent into munitions and for transport and storage of the agent-munition combination; (3) To develop criteria required for design of production facilities; and (4) To supplement research information in order to classify dry Bacillus anthracis as a standard type agent.
  - b. Approach. The development of processes for the manufacture of Bacillus anthracis and the development of filling and other subsidiary equipment are accomplished through properly coordinated research, development, and engineering performed in process development laboratories and pilot plants. This is required to make available the information necessary to design and operate a production facility and to standardize an agent. Emphasis will be placed on the development of processes for this agent having the major elements of deep tank fermentation, concentration, drying, and filling. Information available from research

~~CONFIDENTIAL~~

will be adapted to a feasible process for the manufacture of this agent by: (1) Development and evaluation of a process on a laboratory scale; (2) Development of equipment required to pilot the process, and (3) Development and evaluation of the recommended process in the pilot plant.

c. Subtasks.

- (1) Cooperation with munitions development groups in the development of disseminating devices for this agent.
- (2) Cooperation with the assessment groups in the assessment of this agent.

d. Other Information.

Basic research - None

Bacillus anthracis has been produced in the pilot plant as a liquid suspension. There is available most of the information required to proceed with development in the laboratory and through the pilot plant of a process for the manufacture of this agent in the dry form.

e. References.

U. S. Air Force Biological Program, dated 8 October 1952, Doc. No. T-2-634.

\*\* See Project Wet Suspension of Bacillus anthracis (4-92-02-032).

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

1. PROJECT TITLE: BW Assessment (U)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 4-98-05-027
5. REPORT DATE: 9 June 1954
6. BASIC FIELD OR SUBJECT: Special Tests and Operational Evaluation
7. SUBFIELD OR SUBJECT: Field (Excluding Arctic, Tropical & Desert)
- 7a. TECHNICAL OBJECTIVE: BW-5.
8. COGNIZANT AGENCY: CmlC
9. DIRECTING AGENCY: ACCm10/BW
10. REQUESTING AGENCY: CmlC
11. PARTICIPATION AND/OR COORDINATION: (AR) Army; USAF (Pers, Equip, Aircraft) (C); SigC (C); ONR (C).
12. CONTRACTOR AND/OR LABORATORY: Refer to 21 d., Contract Information
13. RELATED PROJECTS: 4-98-01-002, 4-98-05-024, 4-36-03-001, 4-36-05-001, 4-98-01-001, 4-11-04-005, 4-36-03-002.
15. PRIORITY: 1-B
17. ESTIMATED COMPLETION DATES: Res - Cont.
18. FISCAL ESTIMATES: FY 54 - 5204M  
FY 55 - 5428M  
FY 56 - 6008M
19. SUPERSEDED REPORTS: Project Cards 4-11-04-001, 4-98-05-020, 4-98-05-024, 4-98-05-025, 4-11-04-005, & 4-36-03-004.
20. REQUIREMENT AND/OR JUSTIFICATION: The existing requirement for BW weapons necessitates the assessment and testing of BW munitions and agents to evaluate such factors as munition reliability and functioning; munition-agent dispersion capability; agent effectiveness against personnel, animals and crops; agent viability in the field; meteorological parameters; safety and facilities required in the handling of agent-munition complexes. The assessment and testing of BW agent-munition complexes necessitates special apparatus, methods and techniques not normally employed in the assessment of conventional weapon systems.
21. BRIEF OF PROJECT AND OBJECTIVE:
  - a. Brief. (Applied Research) The objective of the project is to assess and test the effectiveness of BW agent-munition complexes. The immediate objective and prerequisite to assessment and test, is the development of safe and efficient apparatus and techniques for measuring aerosol concentration, particle size, material balance, effectiveness of agents against personnel, animals and crops, munition reliability, and meteorological aerosol parameters. The long range objective includes studies to determine, under field conditions, the suitability of various BW aerial munitions for offensive use in wartime operations, the effectiveness of BW agents against personnel, animals and crops, and the adequacy of materiel used in detection, protection and decontamination. The development and improvement of techniques, methods and special instrumentation essential to field evaluation of BW materiel encompasses the production of range tables relating the distribution of dosage produced by toxicological aerosol munitions to meteorological factors.

~~CONFIDENTIAL~~

b. Approach.

(1) The assessment of aerosols of toxic and simulated agents under controlled conditions in a confined space requires production and distribution of the aerosol, sampling for concentration and for particle size distribution, and assessment and determination of material balance. These processes will first be studied in enclosed chambers and then field tested. Tests will be carried out using simulants and viable agents. Characteristics to be determined will include adaptability of munition to the aircraft, handling problems and hazards, functioning, dispersion, agent viability, and effectiveness of BW defensive materiel. Sampling devices and test animals will be used in test areas to determine agent concentration, persistence, and viability. Results will be related to dissemination and meteorological factors.

(2) Approaches to the meteorological problem include both experimental and theoretical investigations. Experimentally, field data on dosage area coverage obtained with biological cloud releases will be correlated with those meteorological elements which have a significant effect on the observed diffusion of the clouds. The data obtained will include travel over short and long distances both over land and sea, and travel in urban and industrial areas. Development of suitable instrumentation and the study of the interrelationships existing between various meteorological factors affecting biological cloud travel and their spatial and temporal variations. Theoretical studies will be performed to apply theories of turbulence to the atmospheric dissipation problem.

(3) A continuous critical evaluation of present techniques, methods and equipment utilized in BW laboratory and field testing will be made. Based upon this evaluation, necessary steps will be taken to increase the reliability which can be assigned to assessment and test results. Action will also be taken to develop and procure suitable instrumentation applicable to field sampling, laboratory analysis, and data collection and processing.

c. Subtasks. To accomplish the objectives outlined above, it will be necessary to develop and improve:

(1) Apparatus and techniques for safe and accurate sampling of munition-produced aerosols.

(2) Instruments for measuring various factors affecting the production stability and degradation of BW aerosols in test chambers and in the field.

(3) Sampling methods and equipment which offer possibilities of more efficient sampling in larger quantities while increasing the validity of each sample and reliability of the equipment.



- (4) Design of field and laboratory tests to facilitate evaluation of collected data and assessment and testing methods for newly developed munitions, agents and other materiel.
- (5) Micrometeorological techniques and equipment which afford sufficient accuracy and sensitivity for use in test areas.
- (6) Ecological studies of wildlife to prevent the creation of epizootics.
- (7) Operation and maintenance of an animal colony. Test animals are required to determine the behavior of agents in the laboratory and field and to evaluate the probable effects on man.
- (8) Firing devices, recording instruments, photographic techniques, and other items which directly support the field testing effort.
- (9) Laboratory instrumentation, methods and techniques applicable to analysis of BW field samples.
- (10) Bioassay techniques applicable to field evaluation including determination of field infectivity characteristics of test animals.
- (11) Techniques for the employment of selected materials as simulants for biological agents during field trials by determining relative diffusion and viability characteristics between simulant and agent.

d. Other Information:

(1) The USAF maintains a Class BD, FL, FN, BG Weather Station at Camp Detrick to provide weather service. This project is coordinated with Dugway Proving Ground and with the Signal Corps, which has primary cognizance for meteorological research and development within the Department of the Army.

(2) Use is made of information developed by other laboratories and agencies, i.e.; CmlC Med Labs, Tech Operations - Dugway Proving Ground, USAF, ONR, Sig Corps, Great Britain and Canada.

(3) Contract Information:

Contract No. DA-18-098-CML-4776 Contract No. DA-18-098-CML-2455  
University of Utah University of Utah

Contract No. DA-18-064-CML-2282 Contract No. DA-18-064-CML-2399  
R. M. Parsons Co. Prime, Inc.

Contract No. DA-18-064-CML-2305 Contract No. DA-18-064-CML-2375  
Ohio State Research Foundation Battelle Memorial Institute

~~CONFIDENTIAL~~

Contract No. DA-18-064-CML-2406 Danielson Manufacturing Co. Contract No. DA-18-064-CML-2438 Dumont Laboratories, Inc.

Contract No. DA-18-064-CML-2283 R.M.Parsons Co. associated projects 4-04-14-001, -002, -008, -013, -014, -016, -020. Contract No. DA-18-064-CML-1907 University of Notre Dame

Contract No. DA-18-064-CML-1914 Battelle Memorial Institute Contract No. DA-18-064-CML-2333 Columbia University

Contract No. DA-18-064-CML-2120 R. M. Parsons Co.

~~CONFIDENTIAL~~

~~CONFIDENTIAL~~

Chemical Corps BW Program for FY 55

~~CONFIDENTIAL~~

Concurrence Signatures

- |  |  |  |
|--|--|--|
| /s/J.C.Bones, LtCol, USAF<br>AFDFR, A Cml C, Md.         | /s/T.E.Hedman<br>Signal Corps                    | /s/Dr.B.Berger<br>Asst/RW&NTM, R&E Comd                          |
| /s/L.W.Cather, Col, GS<br>R&D Sec, OCATF                 | /s/G.E.Ferguson, Maj, USMC<br>Hq, USMC           | /s/W.P.Swain<br>BuOrd, Navy Dept                                 |
| /s/S.E.Baker, LtCol, CmlC<br>PT&I Div, OCCmLO            | /s/J.F.Schaeffer<br>Chemical Corps Board         | /s/H.E.Staples, LtCol, RCE<br>Canadian Army Staff                |
| /s/E.L.Claussen<br>Corps of Engineers                    | /s/J.M.Davidson<br>BuShips, Navy Dept            | /s/H.S.Etter, Cmdr, MC, USN<br>BuMed&Surg, Navy Dept             |
| /s/I.R.Mollen, LtCol, CmlC<br>P&E O, R&E Comd            | /s/D.L.Irgens, Cmdr, USN<br>BuAero, Navy Dept    | /s/S.J.Curtis<br>BJSM (Air)                                      |
| /s/C.M.Bartlett, Maj, CmlC<br>Inspec Div, Mat Comd       | /s/F.V.Ludden<br>Ordnance Corps                  | /s/V.F.LaPiana, LtCol, CmlC<br>R&D Div, OCCmLO                   |
| /s/R.C.Morris, LtCol, CmlC<br>Sup Div, Mat Comd          | /s/L.T.Fleming<br>Transportation Corps           | /s/Dr.R.L.Fox<br>Asst Ch/TCW, R&E Comd                           |
| /s/Leo Walsh<br>Mat Div, OCCmLO                          | /s/J.B.S.Hamilton, LtCol<br>BAS, ADW&T (RE & SW) | /s/J.J.Hayes, Col, CmlC<br>ACCmLO/BW                             |
| /s/F.A.Abbruscato<br>Ind Div, Mat Comd                   | /s/Richard Raymond<br>Quartermaster Corps        | /s/Dr.L.D.Fothergill<br>Scientific Adviser/BW<br>Cp Detrick, Md. |
| /s/C.M.Freudendorf, LtCol, Inf<br>AFF Ln O, A Cml C, Md. |  | /s/J.C.Braxton, LtCol, CmlC<br>Ln O, CmlC Tng Comd               |

ACCEPTED BY THE CHEMICAL CORPS  
TECHNICAL COMMITTEE, 29 July 1954:

/s/T. S. ECKERT  
Secy, CCTC

APPROVED FOR THE CHIEF CHEMICAL  
OFFICER, 29 July 1954:

/s/WILLIAM E. R. SULLIVAN  
Colonel, Cml C  
Chairman, CCTC

APPROVED BY ORDER OF THE  
SECRETARY OF THE ARMY, 29 July 1954:

/s/DONALD H. EHRENS, Major, GS  
ACofS, G-4

~~CONFIDENTIAL~~

~~SECRET~~  
UNCLASSIFIED

READ FOR RECORD

Copy No. \_\_\_\_\_  
(5 Pages)

Item 2882

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

CMLWH

13 July 1954

MEMORANDUM FOR RECORD

SUBJECT: ARDC Project No. 6042, Detection of CW Agents, Ground (U)

The data sheet for the subject Air Force project is reproduced herewith as a document pertinent to the work of Chemical Corps projects 4-08-06-006 and 4-08-06-015.

FOR THE CHAIRMAN, CHEMICAL CORPS TECHNICAL COMMITTEE:

*T. S. Eckert*

Incl  
As noted

T. S. ECKERT  
Secy, CCTC

~~SECRET~~  
UNCLASSIFIED

~~SECRET~~  
WH5321  
1

~~CONFIDENTIAL~~

~~SECRET~~

UNCLASSIFIED

Item 2882

Project Data Sheet  
Rewritten Project

1. PROJECT TITLE: Detection of CW Agents, Ground (Unclassified Title)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 6042
5. REPORT DATE: 29 April 1954
6. BASIC FIELD OR SUBJECT: Technical Development
7. SUB FIELD OR SUBJECT: Toxicological Weapons Defense - (62)
- 7a. TECHNICAL OBJECTIVE: CW-4a
8. COGNIZANT AGENCY: Air Research & Development Command
9. DIRECTING AGENCY: Equipment Laboratory, WADC
10. REQUESTING AGENCY: Hq USAF
11. PARTICIPATION AND/OR COORDINATION: Army Chemical Corps (P); Bu Aer (I)
12. CONTRACTOR AND/OR LABORATORY: To be determined.
13. RELATED PROJECTS: (R) Army Chemical Corps Project 4-08-06-015 and 4-08-06-006 and AF Project 6017
14. DATE APPROVED: 23 April 1953
15. PRIORITY: 1-A
16. MAJOR CATEGORY: B-2
17. ESTIMATED COMPLETION DATES: Res - Cont; Dev - Cont; Test - Cont.
18. FY FISCAL ESTIMATES: Prior 2M; 55 28M; 56 3M; 57 2M; 58 1M; Annual Rate 1M
19. SUPERSEDED PROJECTS: This project supersedes in part Project No. R-655-1619 approved 23 April 1953.
20. REQUIREMENT AND/OR JUSTIFICATION: This project will result in a system which will fulfill an operational requirement established by Hq USAF in Development Directive 3015-J1. The program will result in a system capable of rapid detection of toxic CW agents at air installations. One device will warn personnel at an air installation in the event of the presence of toxic CW agents in order to permit protective measures to be taken before widespread exposure of personnel occurs. The second device will warn munition handling crews in the event of leaking component bombs within the E-10LR3 cluster. By warning of the presence of toxic CW agents, these devices will prevent casualties which might otherwise result. No equipment or systems capable of performing these functions now exists. (SECRET)
21. BRIEF OF PROJECT AND OBJECTIVE:
  - a. Brief. Two systems will be provided for the detection of toxic CW agents at air installations. The first item, which is expected to be available for testing by December 1955, will provide a warning to personnel at an air installation in the event of the presence of toxic CW agents. The second item will provide a warning to munition handling crews in the event of leaking component bombs in the E-101 cluster. It is expected that a prototype will be available for operational suitability tests by June 1955. (SECRET)
    - (1) The air installation detection device will be capable of continuous, unattended operation to provide a warning of the presence of hazardous concentrations of toxic airborne CW agents. Insofar as possible, the system shall be capable of specific identification of the agent detected. The device shall further be of minimum weight and be air transportable, be sufficiently rapid in detecting ability to

~~CONFIDENTIAL~~

Incl

~~SECRET~~

UNCLASSIFIED

Rec-54-S-2950

enable enactment of warning and protective measures prior to any marked increase in the airborne CW hazard, and be such that conditions at any point on the Air Force installation will be indicated at that point and may be communicated to a central point. The following principles are being developed for this area type alarm:

- (a) Long path infra-red adsorption.
- (b) Fluorescence quenching of chelated compounds by pyrolysis products of the toxic agent.
- (c) Observing color changes of an indoleperborate solution with the toxic agent.
- (d) Observing color changes of a dianisidine solution with the toxic agent.

It is anticipated that two systems will be necessary to fulfill the requirements. The first, to be utilized in open areas, will probably be based on (a) above. The second, to be used in confined areas, will probably utilize a principle listed in (b), (c), or (d) above.

- (2) The leaking munition detector will be a self-actuating visual type indicator. It shall be small, sensitive, and capable of being affixed to an opening into the interior of the cluster, positively identifying a minimum of 10 mg. of agent loosed into the cluster, and be attached in such a way that it may be read without the use of tools or other equipment. The Army Chemical Corps is presently developing a substance that will change color directly upon contact with G agents. It is anticipated that this substance can be placed in a glass or plastic container which can be affixed to the cluster. Major problem to date is the stability of the substance. At present it is stable for only 14 days at 22°C, but it is anticipated that it can be made sufficiently stable to meet the requirements.

- (3) In addition to development of these items, cognizance will be maintained over the field of toxic CW agent detection by means of visits and correspondence to other interested agencies. This is necessary to insure that developments of other agencies will meet Air Force requirements. (SECRET)

b. Approach. The system to detect CW agents at air installation will be developed by the Army Chemical Corps. It was felt that Air Force requirements for this item are not significantly different from those of the other services, and since the Army has prime responsibility in the field of CW, they have agreed to develop this item with Army funds. If it is apparent at a later date that Air Force requirements are different from those of the other services, funds might be required to modify the device for Air Force use.

It is anticipated that the leaking munition detector will also be developed by the Army Chemical Corps. Its development will probably be based upon investigations now under way at the Army Chemical Center. Since the requirement for this item is peculiar to the Air Force, funds will be required for its development and will be transferred to the Army Chemical Corps by Cross Servicing Order. If it is found to be more expedient, a contract will be let

to a private contractor for the development of this item based upon previous Chemical Corps investigations. (SECRET)

c. Tasks.

- (1) 6042-60860 (U) "System to Detect CW Agents at Air Installations". Development of this item is proceeding under Army Chemical Corps Projects Nos. 4-08-06-006 and 4-08-06-015. It is anticipated that the final system will be of two types, a long path infra-red absorption sytem for open areas and a system involving fluorescence quenching or color change principles for confined areas. (GFP)
- (2) 6042-60861 (U) "Equipment for Surveillance of CW Munitions". It is anticipated that this system will be developed by the Army Chemical Corps in conjunction with projects now being conducted. A direct acting color change type substance will probably be introduced into a transparent plastic, or glass vessel and affixed to the cluster. Air Force funds will be transferred by Cross Servicing Order for support of this development. If it is considered more expedient, a contract will be let to a private contractor for prosecution of the desired development. (GFP)
- (3) 6042-60862 (U) "Maintaining Cognizance of CW Detection Developments". Since the Air Force has no responsibility for development of non-airborne CW agent detection instruments, it is necessary to remain cognizant of new developments of other agencies to insure that they meet Air Force requirements. It is also necessary to remain cognizant of new developments in order to prevent unnecessary time delays in the event new characteristics are initiated by the Air Force to fulfill operational requirements in the field of CW defense. The cognizance will be maintained through visits to and correspondence with other interested agencies. (SECRET)

d. Other Information. Close technical liaison will be maintained with the Army Chemical Corps. It is anticipated that Chemical Corps facilities and personnel will be utilized to a large extent in prosecuting the required development. USAF Precedence Rating. II-3 for tasks 1 and 2, II-4 for task 3. (UNCLASSIFIED)

e. Background History and/or Progress. In 1950 Hq USAF directed the development of an airborne instrument capable of detection and identification of all airborne toxic (BW and CW) agents. Action was initiated under RDO No. R655-1591 to support the necessary investigations being conducted under Army Chemical Corps Projects 4-08-06-015 and 4-08-06-006. No single instrument capable of rapid detection and identification of all BW and CW agents, nor any principle on which such an instrument might be based, is known to exist. In view of this, Hq USAF has prepared revised Military Characteristics in which the detection of CW agents is considered separately. In July 1953 official revised Military Characteristics were received giving requirements for an air installations detection device for toxic CW agents. It is felt that Air Force requirements are not significantly different from those of other services, so no funds have been transferred to

UNCLASSIFIED

~~SECRET~~

~~CONFIDENTIAL~~

Item 2882

the Army Chemical Corps for the development of this item.

In October 1950 Hq USAF assigned responsibility for Ordnance, CW and BW research and development to Air Materiel Command. The responsibility for BW and CW detection was further assigned to the Equipment Laboratory, WADC, in June 1951. To fulfill the assigned responsibility it is necessary to remain cognizant of new research and development of CW detection equipment.

Hq AMC requires a leaking munition detector to adequately create a logistic support system for the E-101 cluster. A Disposition Form from WCOES-1 requested a study be made of feasible methods for detecting leaking munitions. Hq AMC has furnished a list of recommended characteristics for a leaking munition detection device. The Army Chemical Corps will be contacted to determine if a project can be initiated through the Chemical Center and the funds and time required. (SECRET)

- f. Future Plans. The Army Chemical Corps will continue to develop equipment for this project. Since the requirements are not specific for the Air Force, it is anticipated that Air Force funds will not be required unless extensive modifications are necessary to meet future Air Force requirements. If intelligence sources indicate an enemy capability in some CW agent not now considered, the prosecution of the project will be redirected to include this agent. New tasks will be added to this project in the event new and distinct requirements arise. The target date is December 1955. (SECRET)

g. References.

- (1) Hq ARDC Development Directive No. 3013-J1, title (U) "System to Detect CW Agents at Air Installations", dated 10 June 1952.
- (2) Statement of Military Characteristics from Director of Requirements, Hq USAF, dated 3 February 1953, title (U) "Rapid Detection System for Toxic Airborne CW Agent at Air Force Installations".
- (3) Letter from Hq USAF, dated 26 October 1950, Subject: (U) "Assumption of Responsibility for Air Force Ordnance, Chemical Warfare, and Biological Warfare Research and Development".

h. Project Engineer.

Milton A. Thompson, 1/Lt., USAF

WCLEM-3 39239

(UNCLASSIFIED)

~~CONFIDENTIAL~~

UNCLASSIFIED

~~SECRET~~



~~CONFIDENTIAL~~

RECLASSIFIED  
WHEN DERIVED FROM CLASSIFIED  
ENCLOSURES

GL/P2 6437 (SF) SUBJECT: Chemical and Biological Warfare (11)

TO: COMMO  
COFORD  
TSG  
TQME  
FROM: COOPS, G-4 DATE: 9 Jul 54

CCTC  
ITEM 2885  
CONCENT NO. 1

~~SECRET~~

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 Ed 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

COPI

GROUP 3  
DOWNGRADED AT 12 YEAR INTERVALS;  
NOT AUTOMATICALLY DECLASSIFIED  
DOB DIR 5200.10

PAGE \_\_\_\_\_ OF \_\_\_\_\_ PAGES

--- COPY 1 OF 3 COPIES, ---

*Downgraded from  
TS L Secret  
16 Aug 66 B.L.*

~~TOP SECRET~~

~~SECRET~~

*EA 1-1744(66)*

~~CONFIDENTIAL~~

~~SECRET~~

~~SECRET~~

*EA 5-343 (71)*

*WH 5340*

Ref: L-2828-4824

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 ~~CONFIDENTIAL~~

23 June 1954

SUBJECT: Chemical and Biological Warfare (2)

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

GROUP 3  
DOWNGRADED AT 12 YEAR INTERVALS;  
NOT AUTOMATICALLY DECLASSIFIED  
DOD DIR 5200.10

14347T  
DOD 3145.1

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.

Copy No. 1 of 3 Copies. SFR

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

Amirguled A. H... 1/6 Aug 64

~~CONFIDENTIAL~~  
Production of this document in whole or in part is prohibited except with permission of the issuing office  
EA-8-1744/66  
COPY OF 10 COPIES  
1-A-5-343(71) 4175329

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.

TOP SECRET

TOP SECRET

~~CONFIDENTIAL~~

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

SUBJECT: Chemical and Biological Warfare

~~SECRET~~

23 June 1954

*long*  
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.

*Rescind  
2  
sent for  
29 Dec 54  
44-7189*

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:

~~CONFIDENTIAL~~

~~SECRET~~

3

~~TOP SECRET~~

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

~~SECRET~~

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

CCTC  
ITEM 2885

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

29 December 1955

SUBJECT: Chemical and Biological Warfare (U)

~~CONFIDENTIAL~~

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

GROUP 3  
DOWNGRADED AT 12 YEAR INTERVALS;  
NOT AUTOMATICALLY DECLASSIFIED  
DOD DIR 5200.10

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:

CCTC  
2185

"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 of such research and development shall be the completion of development of a BW weapon for tactical use by ground troops with an effective date of 1 January 1958."

BY ORDER OF THE SECRETARY OF THE ARMY:

~~SECRET~~

RECORDED:

(Appropriate classification (Date)

2/28/68

Group 3, AR 380-6.  
Copies furnished:  
Office, Secretary of the Army  
Chief of Information and Education  
Chief Chemical Officer

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

RECORDED & INDEXED  
BY: D. A. T. Eckert  
DATE: 23 June 67  
INITIALS & DATE  
pittman

~~CONFIDENTIAL~~

Reproduction of this document in whole or in part is prohibited except with permission of the issuing office.

~~SECRET~~

Cy 173, SAH

~~TOP SECRET~~

Copies 30 of 34 Copies

EA-5-480 (48)  
1EA-5-243 (71)

W9 7199

~~CONFIDENTIAL~~  
~~CONFIDENTIAL~~  
Item 2893

READ FOR RECORD

Copy No. 86  
(7 Pages)

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

CCTC

2893

CMLWH

23 August 1954

MEMORANDUM FOR RECORD

SUBJECT: ARDC Project No. 5142, Anti-Crop BW Munitions <sup>4</sup>(5)

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*  
T. S. ECKERT  
Secy, CCTC

Incl  
As noted

GROUP 3  
DOWNGRADED AT 12 YEAR INTERVALS;  
NOT AUTOMATICALLY DECLASSIFIED  
DOD DIR 5200.10

*here is a  
log sheet*

~~CONFIDENTIAL~~  
~~CONFIDENTIAL~~  
CONFIDENTIAL

WH5447  
1

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: EW-5
8. COGNIZANT AGENCY: ARDC
9. DIRECTING AGENCY: Armament Laboratory, WADC  
Office Symbol: WCLCW; 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)

~~CONFIDENTIAL~~Item 2893

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 effects 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. Stompler, Chemical Corps  
Biological Labs, Camp Detrick, Md.

~~CONFIDENTIAL~~



~~CONFIDENTIAL~~  
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 EW 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) EW 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 EW 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 EW anti-crop agents over a maximum target area.

5142

Item 2893

(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:

(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.

~~CONFIDENTIAL~~

5142

Item 2893

(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."

~~CONFIDENTIAL~~

UNCLASSIFIED

~~SECRET~~

READ FOR RECORD

Copy No. 80  
( 8 Pages)

Item 2932

CCTC  
ITEM 2932

~~A-511~~

HRosenthal/sd/74833  
27 July 1954

ORDNANCE COMMITTEE  
ITEM 35516

23 Sep 54

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. CCM 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-C4-15-020.
- 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 CNBA - FAG 471 from Headquarters Army Field  
Forces Board No. 1 dated 23 July 1952.
- f. CCTC Item 1890 dated 19 May 1946
- g. SR 380-5-6 dated 18 June 1952
- h. CCM 34444 dated 9 October 1952, Subject: Security Policy for GB  
Filled Munitions.
- i. CCM 34008 dated 6 December, 1951.

GROUP-4  
Downgraded at 3 year intervals;  
Declassified after 12 years

*no copy  
sheet*

UNCLASSIFIED

~~SECRET~~

WH 6668  
WH5647  
1

j. OCM 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.

Item 2932

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 propagation 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.

Item 2932

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,



Item 2932

FD, T237E1 and the electrical Fuze, FD, T244 have been under development under authority of reference lh 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 lk 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. ln). 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 ll, 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 ll 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 C. sing, Burster M16 (T27): Charge,

Item 2932

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 fuze 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.

## Item 2732

(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 TAL-1546 (D/A 504-04-004) and of a faster fuze under Project TAL-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 li and lj. This authorization was subsequently reduced to 20000 rounds. On 14 June 1954, the Chief of Staff approved a revision of reference lm. 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, M25A2; 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-N-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.

UNCLASSIFIED

Item 2932

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. MENDARIS  
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

M. H. CLARK  
Col, Ord Corps

JOHN KELLER  
Lt Col, Ord Corps  
National Guard Bureau

H. H. EVANS  
Lt Col, USMC

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

UNCLASSIFIED

Regraded Confidential  
in accordance with  
par. 3.e.

~~CONFIDENTIAL~~

~~SECRET~~  
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

4-30-06-015  
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 Obsolescence of the Superseded M9A1 Kit, 22 May 52.
- b. Report (S), AFF Ed 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 ACoS, G3, w/Incl (ref b.)
- d. D/F (S), G3 400, same subject as c., to CCm10, w/Incl (ref c.).
- e. Letter (S), CMLWR-P CCCm10, 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 components 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 CER 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

~~CONFIDENTIAL~~

~~SECRET~~  
CONFIDENTIAL

Item 2950

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 Ed. 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 here-with:

"3. a. Military purpose. - The Expendable G-agent Detector is to provide the soldier an extremely light-weight, 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.

~~SECRET~~  
CONFIDENTIAL

(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 artificial 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  $\nearrow$  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  $\nearrow$  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 re-programming 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 Ed. 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.

Military Requirement & Characteristics for an Expendable G-Agent Detector

CONCURRENCE SIGNATURES

/s/R.N.Skaggs, Col, GS Dev & Test Sec, OCAFF	Concurred J.J.Hayes, Col, CmlC ACCmlO/BW	Concurred R.C.Morris, LtCol, CmlC Sup Div, Mat Comd
/s/L.E.Fellenz, Col, CmlC Cml Sec, OCAFF	/s/L.D.Fothergill Scientific Adv/BW	/s/L.T.Fleming Transportation Corps
/s/C.M.Freudendorf, LtCol, Inf AFF In O, A Cml C, Md.	/s/Leo F.Walsh Mat Div, OCCmlO	/s/D.H.Hale, Col, CmlC Dep Cmdr, R&E Comd
Concurred C.Lonero, LtCol, MSC Army Medical Service	/s/V.F.LaPiana, Col, CmlC R&D Div, OCCmlO	/s/E.H.Lewis, LtCol, CmlC P&E O, R&E Comd
/s/T.Emmett Thomas Corps of Engineers	/s/M.L.Denlinger, LtCol, CmlC PT&I Div, OCCmlO	/s/B.H.Harris A/TCW, R&E Comd
/s/H.Rackowski Ordnance Corps	/s/L.M.Swanson BuAero, Navy Dept	Concurred H.C.Gilbert, LtCol, CmlC Inspec Div, Mat Comd
/s/R.Raymond Quartermaster Corps	/s/R.A.Murdoch BuShips, Navy Dept	/s/J.C.Braxton, LtCol, CmlC Ln O, CmlC Tng Comd
/s/W.A.Martin, LtCol, USAF Air R&D Comd	/s/A.L.Russell BuYds&Dks, Navy Dept	/s/J.A.Martin, LtCol, CmlC A/RW&NTM, R&E Comd
/s/R.C.Kinne Wright Air Dev Center	/s/W.G.Willmann, LtCol, CmlC Ind Div, Mat 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 SECRE-  
TARY OF THE ARMY, 9 Dec 1954: /s/DONALD H. BEHRENS  
Major, GS  
Office, Deputy Chief of Staff  
for Logistics