

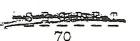


Work has been carried out (1) with the University of California, Northwestern University, University of Illinois, and the Squibb Institute for Medical Research (Mathieson Chemical Co.) on the isolation and determination of the chemical structure of the poison, (2) with the University of California and the US Department of the Interior on the collection of toxic shellfish, (3) with the Chemical Corps Medical Laboratories on the pharmacology of the poison, and (4) at Camp Detrick Biological Laboratories.

#### f. Future Plans

- 1. A program will be initiated to determine the structure of the shellfish poison.
- 2. The synthesis of compounds, based on the model shellfish poison structure, will be carried out.
- 3. A program will be initiated for the determination of the relationship between structure and physiological activity of compounds related structurally to the shellfish poison molecule.







#### PROJECT DATA SHEET

- 1. PROJECT TITLE: Area GB Alarm (U)
- 2. SECURITY: SECRET
- 3. PROJECT NUMBER: 4-08-06-025
- 5. REPORT DATE: 14 May 54
- 6. BASIC FIELD OR SUBJECT: Chemical Warfare
- 7. SUBFIELD OR SUBJECT SUBGROUP: Detection
- 7a · TECHNIC L OBJECTIVE: CW-4a
- 8. COGNIZANT AGENCY: Chemical Corps
- 9. DIRECTING AGENCY: Cml C Research and Engineering Command
- 10. REQUESTING AGENCY: Chemical Corps
- 11. PARTICIPATION AND/OR COORDINATION: Army (AR)
- 12. CONTRACTOR AND/OR LABORATORY: Cml C Chemical and Radiological Laboratories
- 13. RELITED PROJECTS: 4-08-06-006 4-08-06-015
- 1/1. DATE APPROVED:
- 15. PRIORITY: 1A
- 17. ESTIMATED COMPLETION DATES: Research 1955

Development - 1956

Testing - 1957

Operational Evaluation - 1958

- 18. FISCAL ESTIMATES: FY 55 \$150M
- 20. REQUIREMENT MD/OR JUSTIFICATION: Since G-agents are extremely toxic and give little or no sensory warning of their presence, automatic warning devices are required. Marms being developed under Project 4-08-06-006 are all of the spot-sampling type which sound when an agent cloud encompasses the alarm. The LOPATR alarm will scan a long path and detect the presence of agent which has not yet reached the alarm device.

#### 21. BRIEF OF PROJECT AND OBJECTIVE:

#### a. Briof (End Itom)

The objective is to develop an area scaming alarm operating over long paths, utilizing infrared principles. The following characteristics will be used as a guide in the development until formal military characteristics have been prepared.

- l. Shall automatically detect and give nearly instantaneous warning. by visual (light) means and by a sound system (boll) of the presence of potentially dangerous concentrations of G agents in the area scanned.
- 2. Shall be able to scan a total path length on the order of 1/2 to 5 miles or less when desired.
- 3. Shall be free of interference from substances likely to be encountered in the field.





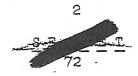
#### a. Brief (End Item) (continued)

- 4. Shall not emit visible or near infrared radiation (under 3 microns) which would reveal its location during either day or night operations.
- 5. Shall be capable of continuous operation for a period of at least twelve (12) hours without attention.
- 6. Shall be as small, compact, and easily transportable as consistent with other requirements, and the electrical power drain shall be as low as possible.
- 7. Shall require a minimum of supervision and maintenance, and be capable of operation in the field by enlisted personnel with a minimum of special training, training equivalent to that of "walky-talky" operators.
  - 8. Shall be sufficiently rugged to withstand normal field usage.
- 9. Shall be so constructed that it will be operable in the temperature range  $-47^{\circ}$ F. to  $125^{\circ}$ F. The alarm shall be capable of operation at RH values of 10 to 100% in the operational temperature range noted above.
- 10. Prolonged storage in any climate shall not impair the operational officiency of the alarm. (Engineering Test temperatures range from  $-80^{\circ}\text{F}$ . to  $165^{\circ}\text{F}$ .) The alarm shall be tropicalized in accordance with J.W-T-152 specifications.
  - 11. Shall operate from 24 volt D. C. power.

#### 3. Approach

This project is being set up to develop the LOPAIR principle into a usable end item, the feasibility having been previously determined under Project 4-08-26-015. This alarm is to be developed initially for G agents but eventually it should be possible to adapt it to a variety of toxic agents, perhaps including EW. Current LOPAIR models are too large and complex for front-line use. Initial emphasis will be to produce a prototype small and light enough for such use.

- c. Subtasks. Lone
- d. Other Information. None





#### Item .. 2868



#### PROJECT DATA SHEET

1. PROJECT TITLE: Area GB Alarm (U)

2. SECURITY: SECRET

3. PROJECT NUMBER: 4-08-06-025

5. REPORT DATE: 14 May 54

6. BASIC FIELD OR SUBJECT: Chemical Warfare

7. SUBFIELD OR SUBJECT SUBGROUP: Detection

7a · TECHNIC L OBJECTIVE: CW-4a

8. COGNIZANT AGENCY: Chemical Corps

9. DIRECTING AGENCY: Cml C Research and Engineering Command

10. REQUESTING AGENCY: Chemical Corps

11. PARTICIPATION AND/OR COORDINATION: Army (AR)

12. CONTRACTOR AND/OR LABORATORY: Cml C Chemical and Radiological

Laboratories

13. RELATED PROJECTS: 4-08-06-006 - 4-08-06-015

14. DATE APPROVED:

15. PRIORITY: 1A

17. ESTIMATED COMPLETION DATES: Research - 1955

Dsvelopment - 1956

Tosting - 1957

Operational Evaluation - 1958

18. FISCAL ESTIMATES: FY 55 \$150M

20. REQUIREMENT MD/OR JUSTIFICATION: Since G-agents are extremely toxic and give little or no sensory warning of their presence, automatic warning devices are required. Marms being developed under Project 4-08-06-006 are all of the spot-sampling type which sound when an agent cloud encompasses the alarm. The LOPATR alarm will scan a long path and detect the presence of agent which has not yet reached the alarm device.

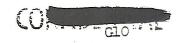
#### 21. BRIEF OF PROJECT AND OBJECTIVE:

#### c. Brief (End Item)

The objective is to develop an area scamning alarm operating over large paths, utilizing infrared principles. The following characteristics will be used as a guide in the development until formal military characteristics have been prepared.

- 1. Shall automatically detect and give nearly instantaneous warning, by visual (light) means and by a sound system (bell) of the presence of potentially dangerous concentrations of G agents in the area scanned.
- 2. Shall be able to scan a total path length on the order of 1/2 to 5 miles or less when desired.
- 3. Shall be free of interference from substances likely to be encountered in the field.









#### a. Brief (End Item) (continued)

- 4. Shall not emit visible or near infrared radiation (under 3 microns) which would reveal its location during either day or night operations.
- 5. Shall be capable of continuous operation for a period of at least twelve (12) hours without attention.
- 6. Shall be as small, compact, and easily transportable as consistent with other requirements, and the electrical power drain shall be as low as possible.
- 7. Shall require a minimum of supervision and maintenance, and be capable of operation in the field by enlisted personnel with a minimum of special training, training equivalent to that of "walky-talky" operators.
  - 8. Shall be sufficiently rugged to withstand normal field usage.
- 9. Shall be so constructed that it will be operable in the temperature range  $-40^{\circ}$ F. to  $125^{\circ}$ F. The alarm shall be capable of operation at RH values of 10 to 100% in the operational temperature range noted above.
- 10. Prolonged storage in any climate shall not impair the operational officiency of the alarm. (Engineering Test temperatures range from  $-80^{\circ}F$ , to  $165^{\circ}F$ .) The alarm shall be tropicalized in accordance with JW-T-152 specifications.
  - 11. Shall operate from 24 volt D. C. power.

#### b. Approach

This project is being set up to develop the LOPAIR principle into a usable end item, the feasibility having been previously determined under Project 4-08-06-015. This alarm is to be developed initially for G agents but eventually it should be possible to adapt it to a variety of toxic agents, perhaps including EW. Current LOPAIR models are too large and complex for front-line use. Initial emphasis will be to produce a prototype small and light enough for such use.

- c. Subtasks. None
- d. Other Information. None









#### Background

The name LOPATR has been coined to indicate the long-path infrared dotection system in which the atmosphere itself is scanned rather than a sample in an absorption cell.

Work on the LOPATR system is currently being stressed because it is potentially superior to spot-sampling systems in that large areas can be scanned at one time, and the system is potentially applicable to all G agents and possibly other CW agents, and BW agents. Field tests have been run at Carroll's Island with GB munitions, and detection has been made as the agent cloud passed through the infrared beam. Semiquantitative data obtained in these tests indicated that a path of less than 300 ft. would permit a detection of less than 0.1 mmg. GB/1. of air. Subsequent determinations of the GB vapor absorption coefficient by specially devised techniques yielded results which indicated that a path length of 200 to 225 feet would give an attenuation of 1% at the detecting wave length for 0.1 mmg. GB/1.

It has also been demonstrated with the modified laboratory spectrometer now being used as a LOPAIR instrument that operation over path lengths of at least 1,000 ft. should be possible. Improved instrumentation now being developed should permit even greater paths where topography and other conditions allow.

Work is also continuing on the development of more efficient optics and filters. Recent developments in these fields may make possible considerable reductions in size and complexity of the equipment, as well as increasing the ease of using this system for the almost simultaneous detection of other CW agents. Extensive studies have been made of possible interferences to be encountered in highly industrialized areas as well as in the field, where smokes and fumes are likely to be encountered. To date, no interferences have been found which should affect a bichromator system.

The Armour Research Foundation (contract DA18-108-CML-L320) constructed an instrument similar to that made at CRL. Interference studies were run in the Chicago area, and none were encountered. A new-type infrared source was developed, utilizing a rugged ceramic radiant, fueled by either gasoline or propane. A small, 2-1/2-1b. propane cylinder can operate the source for approximately 25 hours. Armour is continuing this work under contract DA18-108-CML-5065 and is engaged in converting their study instrument to a bichromator or two-wave length comparison instrument in order to prevent false alarms from objects intercepting the beam path and attonuation of the beam by dust and smoke, etc.







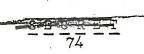


The Farrand Optical Company (contract DA18-108-CML-4819) is developing a small, portable LOPAIR unit for field use. This instrument will utilize a trichromator (three-wave-length comparison) principle for increased sensitivity and stability. This unit is now being assembled, and delivery is scheduled in the near future.

#### f. Future Plans

- l. Development of improved optics for collecting radiation from distant sources.
- 2. Investigation of narrow-band interference filters to replace prism or grating.
- 3. Continue tests to determine effect of fog, rain, smoke, and other atmospheric materials on the system.
- 4. Test prototype alarm when received from Farrand Optical Company.
- 5. Investigate and prepare a miniaturized prototype to meet stated requirements.
  - g. References: None







#### Project Data Sheet



- 1. PROJECT TITLE: CW Field Testing & Technology, DPG (U)
- 2. SECURITY CLASSIFICATION: Secret
- 3. PROJECT NUMBER: 4-98-05-026
- 5. REPORT DATE: 14 May 54
- 6. BASIC FIELD OR SUBJECT: Special Tests & Operational Evaluation
- 7. SUB FIELD OR SUBJECT: Field (Met)
- 7e. TECHNICAL OBJECTIVE: CW-3 (CW-4b IO-14)
- 8. COGNIZANT AGENCY: Cml C
- 9. DIRECTING AGENCY: Cml C R&E Cond, A Cml C, Md.
- 10. REQUESTING AGENCY: Cml C
- 11. PARTICIPATION AND/OR COORDINATION: (AR) Army, USAF, Sig C (C)
- 12. CONTRACTOR AND/OR LABORATORY: Dugway Proving Ground
- 13. RELATED PROJECTS:
- 14. DATE APPROVED:
- 15. PRIORITY: 1-B
- 17. ESTIMATED COMPLETION DATES: Res -

Dev -

Test - Cont

Op Eval -

- 18. FY FISCAL ESTIMATES: 55 1800M
- 19. SUPERSEDED PROJECTS: 4-98-05-021, 4-98-05-022 and 4-36-07-001.
- 20. REQUIREMENT AND/OR JUSTIFICATION: This project is needed to determine the field characteristics of CW munitions and agents as to functioning, aimability, agent concentration, and ground coverage, and the suitability of Chemical Corps items of material for detection, protection, and decontamination under field conditions. In addition, this project is necessary to develop and maintain a physical and technological capability to support the development program as required to accomplish field testing as outlined above. This capability of necessity includes suitable methods and techniques for the measurement and forecasting of atmospheric factors affecting the evaluation of field tests of CER agents.

#### 21. BRIEF OF PROJECT AND OBJECTIVE:

- a. Brief. (Applied Research) The purpose of this project is to develop and improve techniques, methods and instrumentation essential to field evaluation of Chemical Corps material utilized in chemical warfare. Determine in the field such characteristics of CW munitions and agents as functioning, aimability, agent concentrations and ground coverage as well as suitability of items for detection, protection and decontamination. Also methods and techniques for the measurement and forecasting of atmospheric factors affecting the evaluation of field tests of chemical, biological and radiological agents will be provided.
- b. Approach. Tests will be made on one or more of each munition filled with either a simulant or a CW agent fired statically or dynamically. CW agents will be studied in test chambers and in the field using sampling devices and test animals. Sampling devices will be

1 1 1 1 1





used in field grids to determine agent concentration, cloud travel, persistency, and dosage areas for various time intervals. An estimate of the agent's probable effect on man will be determined by the use of test animals on field grids. Individual items of CW materiel used in detection, protection, and decontamination of CW agents will be tested according to military characteristics and operational requirements.

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

Methods will be developed for forecasting relevant atmospheric factors in relation to scheduled field tests. Initial investigation will be confined to DPG until the need for additional test sites, such as tropical and/or arctic sites, is indicated; investigation may then be extended to these other sites. Data from a network of surface wind vector stations, together with detailed temperature, humidity, pressure and wind vector profiles, up to intermediate atmospheric layers, will be gathered and compared with the concurrent synoptic situations to determine the existence of systematic relationships between the values of the various parameters. Current methods for utilization of the meteorological factors in the evaluation of field tests will be investigated to determine their validity and limitations.

#### c. Subtasks.

- (1) Development of improved devices for collecting CW vapors and aerosols.
  - (2) Development of improved analytical techniques and methods.
- (3) Synthesis and purification of compounds necessary for use in field test program which are not available from other sources.
- (4) Development of improved methods for biological assay of  ${\it CW}$  agents.
- (5) Laboratory study of kinetics of reaction between agents and decontaminants.
  - (6) Analysis of CW agents and mixtures of agents.
- (7) Measurement of physical properties of compounds and mixtures used in field test program.
- (8) Field test support, including instrumentation methods, and additional items for telemetering network.



- (9) Research on the effect of meteorological parameters and physical factors involved in the prediction of agent cloud travel and diffusion.
- d. Other Information: None.



### Establishment of Four (4) Secret Projects in the Cml C FY 55 Program and Termination of Three (3) Consolidated Projects

#### Concurrence Signatures

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

/s/C.M.Freudendorf, LtCol, Inf AFF In O, A Cml C, Md.

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

APPROVED FOR THE CHIEF CHEMICAL OFFICER, 29 July 1954:

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

/s/T. S. ECKERT Secy, CCTC

/s/WILLIAM E. R. SULLIVAN
Colonel, CmlC
Chairman, CCTC

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







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

TSE/5190/ih 28 May 1954

CMLWH

SUBJECT: Military Characteristics for Air Force BW and CW Detection Systems

TO: Chairman, Chemical Corps Technical Committee

#### 1. References:

- a, CCTC Item 2224 (S), Military Requirements and Characteristics for Air Force Defense Materiel, 11 Jan 1951.
- b. Ltr(S), WCIEI-4 WADC, 18 Aug 1953, Air Force Requirements for EW and CW Detection Systems, to CG, Cml C R&E Comd, w/4 Incls.
- c. Ltr(C), CMLRE-CWD-3 R&E Comd, 21 Apr 1954, Air Force Requirements for BW and CW Detection Systems, to Secy, CCTC.

#### 2. Discussion:

a. Reference a. identifies approved action of this Committee which established military requirements for four (4) items peculiar to the Air Force with approval of military characteristics applicable to each. One of these requirements was for a "Rapid Detection Device for Airborne Toxic Agents" for which the following statement of characteristics was approved:

"PURPOSE: To provide sufficient warning of the appearance of toxic (CW and EW) agents to permit activation of protective measures before wide spread of exposure of personnel occurs."

- "PERFORMANCE: 1. The device shall be capable of continuous and automatic operation to provide warning of the appearance of effective concentrations of CW and BW agents.
  - 2. The device shall be capable of detecting the appearance of all CW and EW agents









regardless of the physical state of the agent.

- The device shall be capable of discriminating between CW or BW agents and nontoxic or nonpathogenic materials.
- 4. The device shall be suitable for storage and employment within the temperature range of plus 160°F and minus 65°F.
- 5. The device of supplementary equipment should be capable of determining the specific agent detected to enable preparation for intelligent activation of suppressive and therapeutic measures."

#### "TACTICAL DESIGN FEATURES:

- 1. The device shall be mobile, capable of air transportation, and airborne operations.
- 2. The device shall be self-contained with respect to operational power."

b. In connection with the Air Force requirements for detection of BW and CW agents reference b. stated that the USAF had operational requirements for four (4) systems; namely, (1) Sampling System for Detection of BW Agents within the Aircraft, (2) Rapid Detection System for BW Agents at Air Installation, (3) Rapid Detection System for Toxic CW Agents in Operating Aircraft, and (4) Rapid Detection System for Toxic CW Agents at Air Installations, for which applicable military characteristics Nos. 325, 324, 328 and 327 were transmitted. These are reproduced and inclosed herewith. In connection with these requirements, reference b. requested the Cml C R&E Command to undertake work specified in three (3) Cross-Servicing Orders based upon Military Characteristics Nos. 325 and 328. Reference b. further noted informal agreements with Chemical Corps personnel to the effect that the Chemical Corps would assume responsibility for funding and development of BW and CW detection systems in accordance with assignment of primary cognizance. In view of these agreements and assignments therefor, it was requested that the Cml C R&E Command develop (1) a rapid detection system for BW agents at air installations and (2) a rapid detection system for toxic CW agents at air installations, and subsequently, to supply to the Air Force at the earliest practicable date two (2) interim models of each system and ultimately two (2) fully engineered prototypes of each designed in accordance with the applicable USAF characteristics Nos. 325 and 328 noted above. Target dates of June 1954 and December 1953 were established, respectively, for the availability of this equipment. Chemical Corps work on development to meet these requirements is being conducted under projects 4-08-O6-O15, Detection Methods and Materials for Toxic Agents, and 4-11-05-011,





#### POTO TO

#### Item 2873



· Procedures and Equipment for Rapid Detection of BW Agents.

- c. Reference c. indicates the Cml C R&E Command review of the correspondence of reference b. wherein it is pointed out that the military characteristics reproduced in paragraph a. above were superseded by Air Force characteristics No. 327 and the parallel characteristics for In addition, it was noted that EW detection; namely, No. 324 and 325. the Air Force considers that the Army detection devices will fulfill the requirements for Air Force characteristic No. 327. Since the Army has no requirements for an installation alarm, it was considered that the field alarm being developed under project 4-08-06-006 would fulfill this need. Since there is nothing unduly restrictive in Air Force characteristic No. 327, prototypes developed under project 4-08-06-006 are expected to satisfy Air Force needs. It was also noted that Air Force characteristic No. 328 should be substituted for those approved by reference  $\underline{a}$ , and reproduced in paragraph  $\underline{a}$ , above and further identified as Air Force characteristic No. 173, in developing alarms for operating aircraft. In accordance with the terms of the Cross-Servicing Order (33-616) 53-20, priority would be given to GB alarms. Sensor elements of the present prototypes are expected to provide warning elements of the systems to be incorporated into aircraft by WADC. Reference c. noted further that the applicable military characteristics had been forwarded to CRL for guidance of work being carried out under projects 4-08-06-006 and 4-08-06-015. As a consequence, reference c. requested appropriate approval action by this Committee noting that the characteristics approved originally by reference a. were now considered obsolete.
- d. The foregoing discussion briefly reviews Air Force requirements for BW and CW detection systems and notes that applicable characteristics previously approved have been superseded by publication of more detailed Air Force characteristics reproduced and inclosed herewith. Appropriate approval action on these new characteristics and supersession of the older list are noted below.

#### 3. Recommendations:

It is recommended that:

- a. The Air Force military characteristics inclosed herewith and identified as follows be approved:
  - (1) Rapid Detection System for Airborne EW Agents at Air Force Installations (No. 324)
  - (2) Sampling System for Detection of BW Agents in Operating Aircraft (No. 325)
  - (3) Rapid Detection System for Toxic Airborne CW Agents at Air Force Installations (No. 327)
  - (4) Rapid Detection System for Toxic CW Agents in Operating Aircraft (No. 328)





- b. The military characteristics reproduced in paragraph 2.a. above be considered superseded by those of Inclosure 4 (No. 328).
- c. The military characteristics of Inclosure 1 and 2 be considered applicable to the work of Project 4-11-05-011, Procedures and Equipment for Rapid Detection of BW Agents.
- d. The characteristics of Inclosures 3 and 4 be considered applicable to the work of Project 4-08-06-015, Detection Methods and Materials for Toxic Agents.

4 Incls 1-AF MC 324 2-AF MC 325 3-AF MC 327 4-AF MC 328





#### DEPARTMENT OF THE AIR FORCE HEADQUARTERS UNITED STATES AIR FORCE DIRECTORATE OF REQUIREMENTS, DCS/D

M. C. No. 324
AFDRQ No. CSE-53-S4
DATE 3 February 1953

MILITARY CHARACTERISTICS FOR RAPID DETECTION SYSTEM FOR AIRBORNE BW AGENTS AT AIR FORCE INSTALLATIONS

(This Military Characteristic supersedes M. C. No. 173, "Rapid Detection Device for Airborne Toxic Agents", 27 November 1950.)

#### l. Mission

This requirement is for a technical development which it is anticipated will have application to Supporting Service activities for passive defenses.

#### 2. Objective

To provide a means for rapid detection of hazardous concentrations of airborne anti-personnel biological warfare agents around and within the boundaries of utilized areas at Air Force installations.

#### 3. Evaluation of Intelligence Factors

A survey of current intelligence establishes the capability of the enemy to wage biological warfare against the United States.

#### 4. Proposed Service Employment

To be used around and within the boundaries of utilized areas at an Air Force installation. This system to be used in conjunction with an effective warning not using existing facilities and equipment so far as possible.

#### 5. Availability Date

Systems capable of detecting existing BW agents should be available at the earliest possible date. The availability of suitable systems for detecting new BW agents should be in consonance with intelligence information that these agents are available to prospective enemy nations.

#### 6. Pertinent Statements Relating To

- a.  $\underline{\text{Cost}}$ . Lowest possible consistent with providing a suitable capability.
- b. <u>Personnel Involved and Skills Required</u>. Skills beyond the level of average Air Force personnel must not be required.

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Incl 1

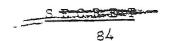
- c. <u>Specialized Support Equipment</u>. An efficient system for warning which may be used in conjunction with the detector is required.
- d. <u>Proposed Basis of Issue</u>. One unit or system which can effectively complete the requirement in paragraph 2 to each Air Force installation.

#### 7. Agreed values

- a. The system will be capable of continuous and unattended operation to provide detection of the presence of hazardous concentration of airborne anti-personnel BW agents.
- b. Inasmuch as is feasible, specific identification should be included but only if this requirement will not alter or detail development of a system capable of detecting a BW hazard regardless of its identity. An ability to determine the identity of the agent at the time of detection is desirable since it will aid in the rapid activation of specific protective and therapeutic measures.
  - c. Be compact of minimum weight and be air transportable.
- d. Be capable of withstanding temperatures within the range of plus  $160^{\circ}$ Fb  $65^{\circ}$ F, however, actual detection range will be governed by the effective pathological range of the agents.
- e. Be capable of withstanding and operating under conditions of moisture likely to be encountered at any USAF installation.
- f. Be sufficiently rapid in detecting ability to enable enactment of warning and protective measures prior to any marked increase in the airborne BW hazard.
- g. If requiring power, be capable of continuously effective operation with minimum power requirements. Have inherent qualities to allow for the employment of existing emergency power systems.
- h. System shall be such that conditions at any point on the Air Force installation will be indicated at that point and communicated to a central location utilizing existing base communication nets and alarm systems to the maximum extent.
- 8. This Military Characteristic is related to the following Military Characteristics. Complementary employment of equipment derived is desirable. MC 325, "Sampling System for Detection of BW Agents in Operating Aircraft"; MC 327, "Rapid Detection System for Toxic Airborne CW Agents at Air Force Installations"; MC 328, "Rapid Detection System for Toxic CW Agents in Operating Aircraft".

/s/ Lewis I. Mundell
/t/ LEWIS L. MUNDELL
Colonel, USAF
Deputy Director of Requirements

DISTRIBUTION: (CONTROLLED)







#### DEPARTMENT OF THE AIR FORCE HEADQUARTERS UNITED STATES AIR FORCE DIRECTORATE OF REQUIREMENTS, DCS/D

M. C. No. 325

AFDRQ No. CSE-53-S5

DATE 3 February 1953

MILITARY CHARACTERISTICS FOR SAMPLING SYSTEM FOR DETECTION OF BW AGENTS IN OPERATING AIRCRAFT

#### 1. Mission

This requirement is for a technical development which it is anticipated will have application to Strategic Air, Tactical Air and Air Transport systems. No specific weapon system or supporting system is applicable at this time.

#### 2. Objective

To provide a system of sampling for BW agents within an aircraft to enable subsequent effective identification.

#### 3. Availability Date

The availability of the system should be in consonance with the delivery date of BW agents and Agent-munition combination.

#### 4. Proposed Service Employment

This sampling system will be employed within aircraft operating with a potential BW hazard aboard. The samples taken will be processed in order to determine whether or not individuals within the aircraft were exposed to the BW hazard.

### 5. Pertinent Statements Relating To

- a. Cost. Lowest possible consistent with a suitable capability.
- b. <u>Personnel Involved and Skills Required</u>. Skills beyond the level of the average Air Force crew personnel must not be required.
- c. Specialized Suprort Equipment. A laboratory sufficiently equipped to process the samples is required.
- d. <u>Proposed Basis of Issue</u>. One sampling system for each aircraft engaged in combat operation or operational support where biological agents and/or munitions will be carried. (Ref. para. 3)







e. Requirements for New Organizations. Not applicable.

#### 6. Agreed Values

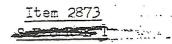
- a. The equipment must be capable of continuous and unattended air sampling for BW agents in all compartments accessible to crew members within the aircraft.
- b. Be capable of withstanding temperature ranges of plus 160°F to minus 65°F as well as humidity and pressure ranges likely to be encountered in aircraft operation. However, actual sampling range would be governed by the effective pathological range of the agents.
  - c. Be designed for compatability with the laboratory facility.
  - d. Be of minimum weight and occupy minimum space.
- e. The samplers be easily installed and removed from the aircraft by unskilled personnel.
  - f. Be easily maintained in the field.
- 7. This Military Characteristic is related to the following Military Characteristics. Complementary employment of equipments derived is desirable. MC 327, "Rapid Detection System for Toxic Airborne CW Agents at Air Force Installations"; MC 324, "Rapid Detection Systems for Airborne CW Agents at Air Force Installations"; MC 328, "Rapid Detection System for Toxic CW Agents in Operating Aircraft".

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/s/ Lewis L. Mundell
/t/ LEWIS L. MUNDELL
Colonel, USAF
Deputy Director of Requirements







DEPARTMENT OF THE AIR FORCE HEADQUARTERS UNITED STATES AIR FORCE DIRECTORATE OF REQUIREMENTS, DCS/D.

M. C. No. 327
AFDRQ No. CSE-53-S6
DATE 3 February 1953

MILITARY CHARACTERISTICS FOR
RAPID DETECTION SYSTEM FOR TOXIC AIRBORNE CW AGENTS
AT AIR FORCE INSTALLATIONS

(This Military Characteristic supersedes M. C. No. 173, "Rapid Detection Device for Airborne Toxic Agents," 27 November 1950.)

#### 1. Mission

This requirement is for a technical development which it is anticipated will have application to Supporting Service activities for passive defense programs.

#### 2. Objective

To provide a means of rapid detection of hazardous concentrations of toxic airborne chemical warfare agents around and within the boundaries of utilized areas at an Air Force installation.

#### 3. Evaluation of Intelligence Factors

A survey of current intelligence establishes the capability of the enemy to wage chemical warfare against the United States.

#### 4. Proposed Service Employment.

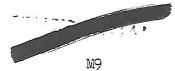
To be used around and within the boundaries of utilized areas at an Air Force installation. This system to be used in conjunction with an effective warning not using existing facilities and equipment so far as possible.

#### 5. Availability Date

Systems capable of detecting existing CW agents should be available at the earliest possible date. The availability of suitable systems for detecting new BW agents should be in consonance with intelligence information that these agents are available to prospective enemy nations.

#### 6. Pertinent Statements Relating To

a. Cost. Lewest possible consistent with providing a suitable capability.



Incl 3

b. <u>Personnel Involved and Skills Required</u>. This system should require no manual manipulation for its detection function. Skills beyond the level of average Air Force personnel must not be required.

- c. <u>Specialized Support Equipment</u>. An efficient system for warning which may be used in conjunction with the detector is required.
- d. <u>Proposed Basis of Issue</u>. One unit or system per Air Force installation which can effectively complete the requirement in paragraph 2 to each Air Force installation.

#### 7. Agreed Values

- a. Capable of continuous and unattended operation to provide detection of the presence of hazardous concentrations of toxic airborne CW agents.
- b. Inasmuch as is feasible, specific identification should be included but only if this requirement will not alter or detain development of a system capable of detecting a CM hazard regardless of its identity. An ability to determine the identity of the agent at the time of detection is desirable since it will aid in the rapid activation of specific protective and therapeutic measures.
  - c. Be compact of minimum weight and be air transportable.
- d. Be capable of withstanding temperatures within the range of plus 160°F to minus 65°F, however, actual detection range would be governed by the effective toxic range of the agents.
- e. Be capable of withstanding and operating under conditions of moisture likely to be encountered during contemplated employment.
- f. Be sufficiently rapid in detecting ability to enable enactment of warning and protective measures prior to any marked increase in the airborne CW hazard.
- g. If requiring power, be capable of continuously effective operation with minimum power requirements. Have inherent qualities to allow for the employment of existing emergency power systems.
- h. System shall 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, utilizing existing base communication nets or alarm systems.
- 8. This Military Characteristic is related to the following Military Characteristics. Complementary employment of equipment derived is



desirable. MC 325, "Sampling System for Detection of BW agents in Operating Aircraft"; MC 324, "Rapid Detection System for Airborne BW Agents at Air Force Installations"; MC 328, "Rapid Detection Systems for Toxic CW Agents in Operating Aircraft".

/s/ Lewis L. Mundell
/t/ LEWIS L. MUNDELL
Colonel, USAF
Deputy Director of Requirements

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## Item 2873...

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
DIRECTORATE OF REQUIREMENTS, DCS/D

M. C. No. 328 AFDRQ No. CSE-53-S7 DATE 3 February 1953

MILITARY CHARACTERISTICS FOR
RAPID DETECTION SYSTEM FOR TOXIC CW AGENTS
IN OPERATING AIRCRAFT

(This Military Characteristic supersedes M. C. No. 173, "Rapid Detection Device for Airborne Toxic Agents, 27 November 1950.)

#### 1. Mission

This requirement is for a technical development which it is anticipated will have application to Strategic Air, Tactical Air and Air Transport systems. No specific weapons system or supporting system is applicable at this time.

#### 2. Objective

To provide a means for rapid detection of leaking toxic chemical munitions or containers that create a concentration hazardous to occupants of the transporting aircraft.

#### 3. Proposed Service Employment

To be used in aircraft engaged in delivering or transporting filled toxic chemical munitions or bulk toxic chemical agents.

#### 4. Background and/or Related Information

The principles involved in "G" detection and color charge detection devices may be considered.

#### 5. Availability Date

Systems capable of detecting existing CW agents should be available at the earliest possible date. The availability of suitable systems for detecting new CW agents should be in consonance with the appearance of those agents.

#### 6. Pertinent Statements Relating to

- a. <u>Cost</u>. Lowest possible consistent with providing a suitable capability.
- b. <u>Personnel Involved and Skills Required</u>. Skills beyond the level of average Air Force crew personnel must not be required.







- c. Specialized Support Equipment. Not Applicable.
- d. Proposed Basis of Issue. Issue one unit or system per aircraft engaged in transporting toxic chemical warfare munitions or toxic chemical warfare bulk agents.

#### 7. Agreed Values

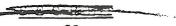
- a. The system to be capable of continuous and unattended operation to provide detection and warning of the presence of hazardous concentrations of the toxic chemical warfare agent or agents being transported.
- b. Capable of providing warning to all compartments within the aircraft accessible to crew member.
- •. Capable of withstanding temperature range of plus  $160^{\circ}F$  to minus  $65^{\circ}F$  as well as humidity and pressure ranges likely to be encountered in aircraft operation. However, actual detection and warning range would be governed by the effective toxic range of the agents.
  - d. Be of minimum weight and occupy minimum space.
- e. Be easily maintained, installed and removed by field personnel.
- 8. This Military Characteristic is related to the following Military Characteristics. Complementary employment of equipment derived is desirable. M. C. 324, "Rapid Detection System for Airborne BW Agents at Air Force Installations"; M. C. 325, "Sampling System for Detection of BW Agents in Operating Aircraft"; M. C. 327, "Rapid Detection System for Toxic Airborne CW Agents at Air Force Installations".

/s/ Lewis L. Mundell
/t/ LEWIS L. MUNDELL
Colonel, USAF

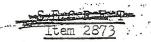
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Deputy Director of Requirements









#### Minitary Characteristics for Air Force BW and CW Detection Systems

#### Concurrence Signatures

/s/	J.C.Bones, LtCol, USAF AFDFR, A Cml C, Md.		/T.E.Hedman Signal Corps	/s,	/Dr.B.Berger Asst/RW&NTM, R&E Comd
/s/	L.W.Cather, Col, GS R&D Sec, OCAFF	/s,	F.A.Abbruscato Ind Div, Mat Comd	/s,	/W.P.Swain BuOrd, Navy Dept
	S.E.Baker, LtCol, CmlC PT&I Div, OCCmlO	/s,	/J.F.Schaeffer Chemical Corps Board		/H.S.Etter, Cmdr, MC, USN BuMed&Surg, Navy Dept
/s/	E.L.Claussen Corps of Engineers	/s,	/J.M.Davidson BuShips, Navy Dept		/S.J.Curtis BJSM (Air)
 /s/ 	I.R.Mollen, LtCol, CmlC P&E O, R&E Comd	/s/	D.L.Irgens, Cmdr, USN BuAero, Navy Dept	/s,	/V.F.LaPiana, LtCol, CmlC R&D Div, OCCmlO
	C.M.Bartlett, Maj, CmlC Inspec Div, Mat Comd			/s,	Dr.R.L.Fox Asst Ch/TCW, R&E Comd
/s/	R.C.Morris, LtCol, CmlC Sup Div, Mat Comd	/s/	L.T.Fleming Transportation Corps	/s/	/J.J.Hayes, Col, CmlC ACCmlO/BW
	Leo Walsh Mat Dov, OCCml0	/s/	J.B.S.Hamilton, LtCol BAS, ADW&T (RE & SW)		/J.C.Braxton,LtCol,CmlC Ln O, CmlC Tng Comd
	G.E.Ferguson, Maj, USMC Hq, USMC		Richard Raymond Quartermaster Corps	/s/	Dr.L.D.Fothergill Scientific Adviser/BW

/s/C.M.Freudendorf, LtCol, Inf AFF In O, A Cml C, Md.

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

APPROVED FOR THE CHIEF CHEMICAL OFFICER, 29 July 1954:

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

/s/T. S. ECKERT Secy, CCTC

/s/WILLIAM E. R. SULLIVAN Colonel, CmlC Chairman, CCTC

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

Co Detrick, Md.





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

(Revised)
Report "R"
Copy No. (41 Pages)

CONTINUENTAL

TSE/5190/amf 11 June 1954

CMLWH

SUBJECT: Chemical Corps BW Program for FY 55

TO: Chairman, Chemical Corps Technical Committee

#### 1. References:

- a. CCTC Items 2703 & 2730 (S/RD), Chemical Corps R&D Program for FY 54, approved 11 Sep 1953.
- b. CCTC Item 2810 (S), Security Classification Review of Chemical Corps R&D Projects, 8 Apr 1954.
- c. Progress Report (S), Chemical Corps R&D BW Projects, 31 Dec 1953.
- d. SR 705-5-1, Research and Development, Type Classification, and Modification of Materiel, 10 Feb 1954.
- e. SR 705-20-1, Priorities for Research and Development Projects, 14 May 1952.
- f. Ltr (S), CMLCD-5, Co Detrick, Md., 9 June 1954, Proposed Consolidation of BW Research and Development Projects, to Secy, CCTC, w/21 Incls.

#### 2. <u>Discussion</u>:

a. Reference a. identifies action of this Committee that reviewed the complete Chemical Corps project program for FY 54 which was approved with a total of 195 projects continued or established in accordance with applicable regulations and directives. The security classification of these projects was recently reviewed as recorded in reference b. in order to meet Staff requirements originating with changes in security procedures and elimination of the Restricted category as directed by D/A Circular 127, 23 Dec 1953. Of all projects in the Chemical Corps FY 54 program, 60 are assigned primary technical objectives in the EW area. Two of these projects were terminated by action of CCTC Item 2768, 17 Dec 53, and work on five (5) others, namely, 4-04-14-010, 4-16-16-005, -005, -006, and -007, which are concerned with cluster adapters and war-



heads, is done at army Chemical Center, Maryland, and is reported with the R&E Command section of the program. As the result, fifty-three (53) projects are now active at Camp Detrick under the direct supervision of the ACCmlO/BW and constitute Cml C Program 7B. All R&D projects in the CW and RW fields are included in Program 7A which is assigned to the R&E Command at Army Chemical Center, Maryland. Reference c. identifies the latest cumulative annual progress report on the EW projects of Program 7B.

- b. Reference d. is the basic regulation governing establishment of R&D projects in which paragraph 14. directs that timely and periodic review of these programs should be conducted by the Technical Committees to assure conformity with the over-all Army R&D guidance and to eliminate any unproductive or duplicating activities. Similarly, reference e. identifies the basic regulation governing the assignment of priorities for R&D projects and directs that these be reviewed semiannually. In consonance with these regulations, this Corps has reviewed its R&D projects annually in order to insure a completely integrated program fulfilling Chemical Corps responsibilities in the CBR area. With division of the over-all R&D effort into Programs 7A and 7B as note? above, this review is now conducted separately for the CW-RW work (7A) apart from the subject BW program (7B). Projects in Program 7A are to be considered in other actions before this Committee, consequently, it is the purpose of this paper to cover only those in the BW area under Program 7B.
- c. In connection with the review of the subject program, reference f. indicated that this had been done and that major emphasis had been given to reduction of the number of projects for FY 55 in order to improve the management thereof and, in consonance with informal Staff guidance, to eliminate projects of small dollar-wise proportions and at the same time assure consolidated projects with precise titles that preclude duplication. As a result, reference f. proposed reduction of the currently approved EW projects to a total of twenty-two (22) of which twelve (12) are new projects resulting from consolidations, and ten (10) are continued from the current fiscal year. Of the ten (10) continued projects, six (6) are re-numbered for security reasons. Proposed action on the 53 existing EW projects with deletions and additions thereto is indicated in the FY 54-55 BW Program Summary identified as Inclosure 1 herewith. Project Data Sheets for the twelve (12) new projects prepared by Camp Detrick are also inclosed and incorporate all essential data thereon in conformance with the : requirements of reference d. Appropriate recommendations to approve the subject program are noted below.

#### 3. Recommendations:

It is recommended that:

a. The 43 projects marked (#) and listed in Inclosure 1 for cancellation be terminated for the reason indicated and not included in the Cml C FY 55 BW Program.



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#### Item 2276

- b. The twelve (12) new projects marked (%) and listed in Inclosure 1 be established in the Chemical Corps FY 55 BW Program.
- c. The technical objective, priority, security classification, requirement, brief, and approach for each of the twelve (12) new projects, as indicated in the Project Data Sheet therefor, be approved.
- d. The ten (10) projects listed in Inclosure 1 for continuation in the FY 55 program, with the changes indicated therefor, be approved.
- e. The BW section of the Cml C FY 55 R&D Program, identified as Program 7B, consist of the twenty-two (22) new and continued projects described herein.
- <u>f</u>. All publications affected by this action be revised accordingly.

#### 13 Incls

- 1- FY 54-55 Summary
  Project Data Sheets for:
- 2- 4-04-14-021
- 3- 4-11-01-004
- 4-4-11-02-064
- 5- 4-11-05-013
- 6- 4-72-06-015
- 7- 4-72-08-002
- 8- 4-92-02-029
- -9- 4-92-02-030
- 10- 4-92-02-031
- 11- 4-92-02-032
- 12- 4-92-02-033
- 13- 4-98-05-027



### Item 2876 FY 54-55 BW PROJECT PROGRAM SULFARY \*\*

Froject No.	m.l.s. A. m	Sec. of	Prio	r- Current
& Tech. Obj.	Title & Classification	Project		0 44 - 4 - 2 0
#4-04-14-001 BW-5 (AW-4)(CW-3)	Air Contaminating BN Munitions (S)	S	1-B	Consolidate in 4-04-14-021.
#4-04-14-002 BW-5 (AW-4)	Surface Contaminating BW Muni- tions (S)	s s	1 <b>-</b> B	Consolidate in 4-04-14-021.
#4-04-14-003	Adoption of BW Disseminators to Guided Missile Varheads (S)	S	1 <b>-</b> B	Consolidate in 4-04-14-021.
4-04-14-004 75% BW-5 25% BW-1a	Special BW Operations (C)	TS	l-A	Continue.
4-04-14-006 BW-5	½-lb. Biological Bomb (S)	S	.1-B	Cont. w/title (C) & No. changed to 4-04-14-022 for security reasons.
#4-04-14-008 (AW-4) BW-5 	Distribution Systems for BW Munitions (S)	S .	1 <b>-</b> B	Consolidate in 4-04-14-021.
	Biological Bomb for Balloon Delivery (S)	S		Continue /No. changed to 4-04-14-023 for security reasons.
	Biological Bomb, Continuous Generator (S)	S		Continue w/No. changed to 4-04-14-024 for security reasons.
4-04-14-014 BW-5	BW Mine (S)	S	1-B	Continue m/No. changed to 4-04-14-025 for security reasons.
4-04-14-016 BW-5	750-lb. Biological Bomb (S)	S .	1-3	Continue m/No. changed to 4-04-14-026 for security reasons & title (C).

 Continued projects have no diacritical marking.
 Percentage-wise Tech. Objs. indicate split funding.
 Legend: # Project deleted for reason noted. % New projects added.





#### CERT T



	10611-22-70						
Project No. & Tech. Obj.		Sec. of Project		- Current Action			
4-04-14-017	10-oz. Spherical Biological Bomb (S)	11		Continue v/No. changed to 4-04- 14-027 for secu-			
				rity reasons & title (C).			
#4-04-14-018 BW-5	$1\frac{1}{4}$ -lb. Spherical Biological Bomb (S)	. S .	1 <b>-</b> B	Consolidate in 4-04-14-021.			
	Amphibicus B. Acrosol Generator (S)	S	1-C	Continue.			
%4-04-14-021 BW-5	BW Munitions Rescarch (C)	3		Establish new project per inclosed data sheet.			
75% BW-la	Screening & Evaluation of Viruses & Rickettsiee as Bu Agents (S)			Consolidato , in 4-11-02-064.			
#4-11-01-002 • BN-3a	Screening of Plant Fathogens as B. Agents (S)	S		Consolidato.in			
#4-11-01-003 75% BU+1a 25% BU-1b	Screening & Evaluation of Bacteria & Fungi as BU Agents (S)	. : S		Consolidate in 4-11-02-064.			
%4-11-01-004 BW-3a	Anticrop Warfare (C)	S	1 <b>-</b> B	Establish new project per inclosed data sheet.			
i y v			. *				
	Screening of Chemical Anticrop Agents (S)	S .	1 <b>-</b> C	Consolidate in 4-11-01-004.			
#4-11-02-023 B::-la.	Combinations of B. Agents (S)	S	,1 <b>-</b> B	Consolidate in 4-11-02-064.			
#4-11-02-057 50% BW-2a 50% BY-2b	Miscullaneous Exotic Anti- Animal Agonts (S)	S	1-B	Consolidate in 4-11-02-064.			
#4-11-02-05 75% BV-la 25% BV1b	Develorment of Virus's & Rickett- ciae as Bl. Agents (S)	S	1 <b>-</b> 3	Censolidate in 4-11-02-064.			
#4-11-02-059 75% BW-la 25% BW-lb	Development of Bacteria & Fungi as BW Agents (S)	s S	1 <b>-</b> B	Consolidate in 4-11-C2-064.			
#4-11-02-060 90% BW-3a 10% BW-3b	Development of Chemical Anticrop Agents (S)	S	1 <b>-</b> C	Consolidate in 4-11-01-004.			



# CONTIDENTAL

*			- B	Current
Project No. & Tech. Obj.	m: 1 - 0 07 · 01 11	Sec. of . Project	Prio-	Action
#4-11-02-061 75% BW-2b 25% BW-2a	Diseases of Ruminants & Horses of BW Significance (S)	S	1-B	Cancel per Staff guidance.
#4-11-02-062 90% 5W-3a 10% 5W-3b	Development of Plant Pathogens as BW Agents (S)	S	1-B	Consolidate in 4-11-01-004.
#4-11-02-063 BW-1a	Drying & Other Stabilizing Procedures for BW Agents (S)	S	1-B	Consolidate in 4-92-02-029.
	BW Antipersonnel Screening & Evaluation (C)	S	1-B	Establish new project per data sheet inclosed.
#4-11-04-001 BW-5	Apparatus, Methods & Techniques for Assessment of BW Munitions (	s s)	1—C	Consolidate in 4-98-05-027:
	Cloud Chamber Studies on BW Aerosols (S)	S	l—B	Consolidate in 4-11-02-054.
#4-11-04-004 5W-5	Arthropod Dissemination of BW Agents (S)	S	2	Consolidate in 4-11-02-064.
	Field Behavior of Aerosol Clouds (U)	S	1-8	Consolidate in 4-98-05-027.
	Materiels & Methods for Decontamination in BW (U)	S	1—B	Consolidate in 4-11-05-013.
#4-11-05-008 BW-4b	Studies of Vulnerabilities to EW Agents (U)	S	1—B	<b>H</b>
	Biological Detection & Analysis of Field Samples (U)	S	1-4	n n
	Procedures & Equipment for Rapid Detection of BW Agents (C)	i s	1 <b>-</b> A	ជ ជ
	Physical Protection of Personnel Against BW Agents (U)	L C	2	ff ff
	BW Detection, Decontamination & Protection (U)	<b>.</b>	1-A	Establish new project per data sheet inclosed.







	Item 2876			
Project No. & Tech. Obj.	Title & Classification	Sec. of Project		or- Current Action
#4-36-03-004 I0-14	Meteorology of Cloud Travel (U)	S	1-C	Consolidate in 4-98-05-027.
	BW Occupational Hazards & Related Safety Measures (S)	S	1-B	Continue with title (U).
	Bic ogical Measures for Protection of Personnel Engaged in BW Research (S)	n S	1-B	TT PS
#4-61-14-004 75% BW-la 25% BW-lb	Isolation & Purification of Microbiological Pelsons (C)	S	1-B	Consolidate in R&E Comd Project 4-08-03-015.
#4-64-03-001 75% BW-la 25% BW-lb	Nutrition of Potential BW Agents (S)	S	1-C	Consolidate in 4-11-02-064.
#4-64-04-001 SR-4	Chemical Methods Applicable to BW Research (C)	S	2	п п
#4-64-05-001 SR-4	Application of Statistical Methods to BW Research (U)	S ,	1-C	11 11
#4-64-06-002 75% BW-la 25% BW-lb	Physical Characterization of BW Agents & Their Derivatives (S)	S	2	n n
#4-64-09-001 75% BW-la 25% BW-lb	Pathology of Diseases of Man & Animals Caused by EW Agents (U)	· S·	1 <b>-</b> C	11 11
%4-72-06-015 45% BW-1a 10%BW-4a, b&c 45% BW-5	BW Product Engineering & Plant Design (C)	S	1-B	Establish new project per data sheet inclosed.
%4-72-08-002 50% BW-la 50% BW-5	BW Equipment & Facilities Development (U)	υ .	2	11 11
#4-85-09-003 SR-4	In-Service Training, CCBL (U)	U	_	Consolidate in Overhead.
#4-90-20-004 50% BW-la 50% BW-5	Maintenance & Operation of Auxiliary Equipment & Facilities, CCBL (U)	Ū	2	ппп
#4-90-20-011 50% BW-1a 50% BW-5	Fabrication, Installation & Repair of Equipment, CCBL (U)	Ü	2	n n



Project No.		Sec. of	Prio	Current
& Tech. Obj.	Title & Classification	Project		Action
α recn. 00,.				
#/ 00 00 000	The second of Dogs	s	2	Consolidate in
#4-92-02-019	Engineering Research & Design	9	~	4-72-06-015 &
	Applicable to BW, CCBL (U)			4-72-08-002
50% BV-5				# / E-08-002 ·
		- i		
#4-92-02-021	Pilot Plants for Viral &	S	1-B	Consolidate in
	Rickettsial BW Agents (S)			4-92-02-030.
J., 12				
#/ 22 22 227	Production Processes for	S.	1-B	Consolidate in
		-		4-92-02-029 -
5.7−1a	Bacterial & Fungal BW Agents (S)			, 2 32 62,
		~	7 D	Consolidate in
	Pilot Plant for Bacterial &	S	7-0	
BW-la	Fungal B7 Agents (S)			4-92-02-030.
24-92-02-029	BW Agent Process Development (C)	S	1-B	Establish new
BW-la	2			project per data
, 2"- <u>1</u> a				sheet inclosed.
d 1 00 00 000	Det 1 1 2 2 2 2 2 2	S	1-B	n n
	BW Agent Pilot Plant	J	1-5	
BW-la	Development (C)			
				n n
\$4-92-02-031	Wet Suspension of Bacterium	S	l-B	n n
	tularense (S)			,
			127	
21-32-02-032	Wet Suspension of Bacillus	S	1-B	n n
	anthracis (S)			
Dir-1a	andirects (5)			* ·
C / O P D D D D D	2 2 (2)	s	1-8	17 - 17
\$4-92-02-033	Dry Bacillus anthracis (S)	9	1-0	
37-la				
	7			0748-4-4-
#4-98-05-020	Field Test Operations (U)	\$	7-2	Consolidate in
B74-5				4-98-05-027
#4-92-05-004	BW Field Testing, DPG (U)	3	1-3	n n
BW-5	2 1 1010 100 0111pg 020 (0)			* ¥ .
				•
(BW-42,b&c)	•			
41 00 00 00	nm n: -7.1 m	đ	ם ר	n - n
#4-98-05-025	BW Field Test Technology (U)	S <sub>.</sub>	1-3	
B74-5	•			
\$4-98-05-027	BW Assessment (U)	S	1-3	Establish non
B72-5				project per data
/				sheet inclosed.

#### PROJECT DATA SHEET



- 1. PROJECT TITLE: EW Munitions Research (C)
- 2. SECURITY CLASSIFICATION: Secret
- PROJECT NUMBER: 4-04-14-021 3.
- 5. REPORT DATE: 9 June 1954
- 6. BASIS FIELD OR SUBJECT: Ammunition
- SUBFIELD OR SUBJECT: Munitions, Biological Warfare TECHNICAL OBJECTIVE: EW-5 7.
- 79.
- COGNIZANT AGENCY: Cml C 8.
- DIRECTING AGENCY: ACCm10/BW 9.
- 10. REQUESTING AGENCY: Cmlc, AFF, USAF
- PARTICIPATION AND/OR COORDINATION: (AR) Army: USAF (2172): Ord C 11. (Pers & fac); NRL (Pers & fac); CML C C&RL (Pers & fac); NOL (Pers & fac)
- CONTRACTOR AND/OR LABORATORY: M. Division, Camp Detrick, New York 12. University (See 21 d. below) DA-18-064-CML-2518
- RELATED PROJECTS: 4-04-04-006, 4-04-14-011, 4-04-14-013, 4-04-14-014, 4-04-14-016, 4-04-14-017, 4-04-14-020
- 15. PRIORITY: 1-B
- ESTIMATED COMPLETION DATES: Res .- 'Cont. 17. Dev - Cont.
- 537 M 18. FISCAL ESTIMATES: FY 54 -FY 55 - 866 M FY 56 - 1665 M
- SUPERSEDED REPORTS: Project Cards 4-04-14-001, 4-04-14-002 & ... 4-04-14-006, dated 1 Jul 52; 4-04-14-018 dtd 1 Oct. 52; & 4-04-14-003, dtd l Jul 51
- 20; REQUIREMENT AND/OR JUSTIFICATION: There is a requirement for a project to investigate means of producing biological aerosols from both liquid
- and dry biological materials, and to determine methods for delivering and dispersing BW munitions so that the potentialities of the agent aerosol can be realized.

#### 21. BRIEF OF PROJECT AND OBJECTIVE:

- Brief. (Applied Research) This is a general development project of a continuing nature for the scientific study of factors controlling the dissemination of BW agents from munitions and the distribution of these munitions by various means. Its objective is to furnish data from which specific end-item munitions can be developed. To achieve this, it is necessary te investigate candidate agent dissemination and munition distribution systems, and to develop new concepts and methods for accomplishing these ends with greater effectiveness.
- Approach. The problem of dissemination of BW agents will be approached by study and evaluation of candidate aerosol producing devices and methods for contaminating surfaces, by investigation of the inter-relationships of various physical and biological properties of agent-fill and aerosol production techniques, and examination of the effects of physical forces upon the agent (such as heat, shear, shock and pressure) encountered during dissemination. The problem of munition



distribution will be approached by investigation of self-dispersing aerodynamic shapes of unit bomb size; by developing dispensers capable of dispensing these bombs directly from aircraft; by studies of clusters which achieve lateral dispersion through rotation, controllable tail surfaces, retractable lift surfaces, or other such means; and by methods not employing aircraft such as marine and land mines or generators, guided missiles and similar factors.

- c. Subtasks. An outline of subtasks currently envisaged is given below. This outline may change as research adds to our knowledge and capability.
  - (1) Aerosol generation (non-explosive)
  - (2) Aerosol generation (explosive)
  - (3) Munition dispersion
  - (4) Instrumentation
  - (5) Fuze Investigations
  - (6) Support of standardized and interim items

#### d. Other Information. Contracts:

Aeroprojects, Incorporated
Ralph M. Farsons Co.
George Washing ton University
Armour Research Foundation
Minneapolis-Honeywell Regulator Co.
Aircraft Armaments, Inc.
Battelle Memorial Inst.
Rheem Manufacturing Co.
University of Maryland
Armour Research Foundation
Naval Research Laboratories
Bureau of Mines, Dept. of Interior

DA-18-064-CML-2026 DA-18-064-CML-2283 DA-18-064-CML-2307 DA-18-064-CML-2456 DA-18-064-CML-2238 DA-18-064-CML-1857 DA-18-064-CML-1914 DA-18-064-CML-2028 DA-18-064-CML-2520 DA-18-064-CML-2520 DA-18-064-CML-2371 CMLRE 13-53 CD 3-679

