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Minutes of the Meeting of the  
Chemical Corps Technical Committee  
9 December 1954

Reg. Conf. - All secret items  
contained herein were downgraded  
per CCTC Item 4090, 24 Apr. 63

Meeting No. 3, 1954

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ATOMIC ENERGY ACT 1946

~~GROUP 1 SUPPLEMENT~~

~~RESTRICTED DATA~~  
~~RESTRICTED DATA~~  
ATOMIC ENERGY ACT 1946

- Items 2889, 2890, 2891, 2892, 2893, 2898, 2899, 2905
- 2909, 2913, 2923, 2925, 2929, 2931, 2932, 2933
- 2934, 2935, 2936, 2947, 2959, 2962, 2963, 2964

GROUP 1  
EXCLUDED FROM AUTOMATIC REGRADING  
DOD DIR 5200.10 DOES NOT APPLY

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HEAD FOR RECORD

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

Item 2889

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

CMLWH

26 August 1954

MEMORANDUM FOR RECORD

SUBJECT: ARDC Project No. 5140, CW Logistic Support Equipment (C)

The attached data sheet for the subject Air Force project is reproduced as information pertinent to the work of Chemical Corps project 4-89-19-003, Field Filling Equipment for Spray Tanks.

FOR THE CHAIRMAN, CHEMICAL CORPS TECHNICAL COMMITTEE:

*T. S. Eckert*

T. S. ECKERT  
Secy, CCTC

Incl.  
As noted

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5140  
Item 2889

PROJECT DATA SHEET

1. PROJECT TITLE: CW Logistics Support Equipment (Conf)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 5140
5. REPORT DATE: 24 May 1954
6. BASIC FIELD OR SUBJECT: Common Component Development
7. SUB FIELD OR SUBJECT: 36 - Chemical & Biological Weapons
- 7a. TECHNICAL OBJECTIVE: CW-3
8. COGNIZANT AGENCY: Hq ARDC
9. DIRECTING AGENCY: Armament Laboratory, WADC
10. REQUESTING AGENCY: Hq USAF
11. PARTICIPATION AND/OR COORDINATION: Department of the Army - Chemical Corps (P); AMC (P); AFAC (P); APGC (P)
12. CONTRACTOR AND/OR LABORATORY: Department of the Army, Chemical Corps
13. RELATED PROJECTS: Essential: 5134 - 5136; Related: None
14. DATE APPROVED: 2 October 1952
15. PRIORITY: 1-C
17. ESTIMATED COMPLETION DATES: See Tasks  
par 21.c.
18. FISCAL ESTIMATES: 43-53 - 99M; 54 - 182M; 55 - 11M; 56 - 152M;  
57 - 11M; T - 455M
19. SUPERSEDED REPORTS: This project supersedes project No. R-555-754 dated 29 December 1952 and project No. R-555-817 dated 2 October 1952.
20. REQUIREMENT AND/OR JUSTIFICATION:
  - a. To provide means for rapid and efficient field filling of airplane spray tanks and fire bombs, development of equipment is required which will pump the fill agents out of shipping containers, condition the agents (temperature and/or composition wise), and safely deliver them into the airplane tanks or bomb cases. (~~CONFIDENTIAL~~)
  - b. Authority: Letter from Hq USAF to Hq AMC and Hq ARDC dated 26 March 1951, subject: (Unclassified) "Spray Tank Servicing Equipment", (51S-44124) and seven (7) indorsements thereto. (UNCLASSIFIED)
21. BRIEF OF PROJECT AND OBJECTIVE:
  - a. Brief: This project will result in two different field filling devices, intended to service two different types of weapons. The filling device for the GB spray tank will have the special sealing and decontamination provisions required for handling this agent. The filling device for fire bombs will require both heating and mixing but no sealing. (~~SECRET~~)
  - b. Approach: Both tasks are being carried on by the Chemical Corps under MIPR. In the spray tank filling device, factory methods of transferring chemicals will be studied and equipment adapted to mounting into a mobile field unit. Then functioning and environmental tests will be performed and changes necessary to make a fully serviceable unit incorporated. The fire bomb filling unit development will constitute basic improvements in the present service items. (UNCL)



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c. Tasks:

Task No. 50468: (Secret Title) Field Filling Equipment for GB Spray Tank. (~~SECRET TASK~~)

Contractor: Department of the Army, Chemical Corps  
CSO&A No. R-52-927; Principal Investigator: Mr. R. B. Wheeler  
Objective and Nature of Task: To develop equipment for field filling of spray tanks with nerve gas GB. A mobile device will be developed which includes special suction and feed lines, pumping apparatus, decontaminating system, and controls for safely delivering GB from shipping drums to the airplane spray tanks.

Completion of Development: July 1956

Completion of Test: July 1957

Coordination: Department of the Army, Chemical Corps -  
WADC, Development Operations Division, WCOES -  
AFAC, ACOP, - APGC, Unknown (~~S~~)

Task No. 50470: (Unclassified Title) Field Filling Equipment for Fire Bombs. (~~CONFIDENTIAL TASK~~)

Contractor: Department of the Army, Chemical Corps  
CSO&A No. (33-616)-54-163 WADC; Principal Investigator: -  
Mr. E. E. Cornick

Objective and Nature of Task: To develop equipment for field mixing of incendiary gels and filling of fire bombs. A wheel mounted device will be developed, patterned after the E3R2 Mixing and Transfer Unit now in service, but incorporating a positive feeding device for mixing of gel, and incorporating other features to make it function satisfactorily down to -65°F.

Completion of Development: July 1954

Completion of Tests: April 1955

Coordination: Department of the Army, Chemical Corps  
WADC, Development Operations Division, WCOES  
AFAG, ACOP  
APGC, Unknown (UNCLASSIFIED)

- d. Other Information: These developments have been given to the Chemical Corps because of their experience in the handling of toxic chemicals and incendiaries. The Chemical Corps has consented to pursue these developments, as evidenced in their 1st Indorsement to WADC dated 30 June 1952, subject: (Unclassified) "Spray Tank Servicing Equipment", and Chemical Corps Technical Committee Item No. 1876 dated 3 April 1948 from CMLWH to Chairman, Chemical Corps Technical Committee, subject: (Unclassified) "Military Characteristics for Field Filling, Mixing, and Transfer Equipment for Fire Bombs".

Requirements for AMC support funds have been or will be as follows:

FY 1953 & Prior: \$40,000 (est) to procure service test articles and support equipment for test of Fire Bomb Filling Equipment.

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- FY 1954: \$6000 to procure agent materials needed in support of tests.
- FY 1956: \$21,000 to procure 3 service test fire bomb filling equipment and test support items (agent materials).
- FY 1957: \$5000 to procure agent materials needed in support of tests, and \$25,000 to procure 3 service test items of spray tank filling equipment. (UNCLASSIFIED)

e. Background History: Spray tanks for aircraft do not make good containers for shipping dangerous chemicals. This fact has established a requirement for field filling equipment. However the transfer of GB from one container to another is so dangerous that considerable study was warranted on the advisability of field filling GB. The Chemical Corps has undertaken such a study. The Chemical Corps has also undertaken the development of field filling equipment applicable to incendiary gels. Work on the mixing and filling unit for fire bombs has been underway for several years, and units of this type have been in service use in Korea. However, this unit has given some service troubles and has been limited in temperature range. The Chemical Corps is now developing a positive feeding device for mixing of gel, and is developing improved components for processing of fuel.  
(~~SECRET~~)

f. References

- (1) Letter from Hq USAF to Hq AMC and Hq ARDC dated 26 March 1951, subject: (Unclassified) "Spray Tank Servicing Equipment" (51S-44124) with 1st Ind to Hq USAF dated 16 March 1951, 2d Ind to Hq ARDC dated 2 July 1951, 3d Ind to WADC dated 20 July 1951, 4th Ind to Hq ARDC dated 11 September 1951, 5th Ind to Hq USAF dated 28 September 1951, 6th Ind to Hq ARDC dated 20 November 1951, 7th Ind to WADC dated 30 November 1951. (~~SECRET~~ CORRESPONDENCE)
- (2) Statement of Military Characteristics from Hq USAF dated 12 March 1951, subject: (Unclassified) "Airplane Spray Tank Servicing Equipment". (~~CONFIDENTIAL~~ M.C.)
- (3) Letter from Hq ARDC to Hq USAF dated 22 January 1953, subject: (Unclassified) "Spray Tank Servicing Equipment" (53WC-18679), with 1st Ind to Hq ARDC dated 25 March 1953, 2d Ind to WADC dated 2 April 1953, 3d Ind to Hq ARDC dated 27 May 1953. (~~SECRET~~ CORRESPONDENCE)
- (4) Chemical Corps Technical Committee Item No. 1876 dated 3 April 1948 from CMLWH to Chairman Chemical Corps Technical Committee, subject: (Unclassified) "Military Characteristics for Field Filling, Mixing and Transfer Equipment for Fire Bombs". (~~CONFIDENTIAL~~ REPORT)

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- (5) Air Proving Ground Final Report, Project No. APG/TAB/47-AB, subject: (Unclassified) "Operational Suitability Test of the E-74 Fire Bomb and the E3R2 Incendiary Oil Mixing and Transfer Unit", dated 29 February 1952. (~~CONFIDENTIAL~~ REPORT)
- (6) APGC Final Report, Project No. APG/TAT/47-C, subject: (Unclassified) "Cold Weather Test of the E3R2 (M3) Incendiary Oil Mixing and Transfer Unit and the E-74 Fire Bomb", dated 20 April 1952. (CONFIDENTIAL REPORT)
- (7) Air Force Armament Center Technical Report No. 53-19, subject: (Unclassified) "Cold Weather Test of the E3R3 Incendiary Oil Mixing and Transfer Unit", dated June 1953. (~~CONFIDENTIAL~~ REPORT)
- (8) Hq USAF Statement of Military Characteristics, subject: (Unclassified) "Field Filling, Mixing and Transfer Equipment for Fire Bombs", dated 14 May 1948. (~~CONFIDENTIAL M/C~~)(UNCLASSIFIED)

REASON FOR SECURITY CLASSIFICATION

This document is classified Secret since information is provided on a weapon being developed for dissemination of the nerve gas GB. This is in accordance with policy outlined in letter from Hq USAF (AFOAT) to all major Commands, dated 16 December 1952, subject: "(Unclassified) 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 wartime 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.

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HEAD FOR RECORD

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(7 Pages)

Item 2890

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

CMLWH

23 August 1954

MEMORANDUM FOR RECORD

SUBJECT: ARDC Project No. 5136, CW Spray Tanks (U)

The attached data sheet for the subject Air Force project is reproduced as information pertinent to the work of Chemical Corps project 4-04-15-021, Spray Tank for Jet Aircraft.

FOR THE CHAIRMAN, CHEMICAL CORPS TECHNICAL COMMITTEE:

*T. S. Eckert*

T. S. ECKERT  
Secy, CCTC

Incl.  
As noted

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WH5445  
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Item 2890

Project Data Sheet

1. PROJECT TITLE: CW Spray Tanks (Unclassified)
2. SECURITY CLASSIFICATION: Secret
3. PROJECT NUMBER: 5136
5. REPORT DATE: 24 May 1954
6. BASIC FIELD OR SUBJECT: Common Component Development
7. SUBFIELD OR SUBJECT SUBGROUP: Chemical and Biological Weapons
- 7a. TECHNICAL OBJECTIVE: CW-3
8. COGNIZANT AGENCY: Hq. ARDC
9. DIRECTING AGENCY: WADC - Armament Laboratory
10. REQUESTING AGENCY: Hq. ARDC
11. PARTICIPATION, COORDINATION, INTEREST: Dept of Army, Cml C (P);  
Dept of Navy, BuAer (I);  
AFAC (P); AFFTC (P);  
AMC (P) See Item 21d.
12. CONTRACTOR AND/OR LABORATORY: D/A Chemical Corps, CSO&A Nos. R-52-938  
& 54-90 and 54-167
13. RELATED PROJECTS: None
14. DATE APPROVED: 14 February 1952
15. PRIORITY: 1-B
17. ESTIMATED COMPLETION DATES: Dev. - June 1956  
Test - June 1957
18. FISCAL ESTIMATES: FY 50-53 - 218M; 54 - 147M; 55 - 263M; 56 - 131M;  
57 - 257M; T - 1016M
19. SUPERSEDED REPORTS: This report supersedes project numbers: R-555-804  
dated 31 December 1952 and R-555-810 dated  
14 February 1952.
20. REQUIREMENT AND/OR JUSTIFICATION: The armed forces have been directed to possess a capability of waging various types of toxic warfare at the outset of hostilities. In order to provide tactical air forces with munitions and equipment for the delivery of chemical agents, and in addition provide a method for laying screening smokes in support of ground operations, specific requirements for spray equipment have been established. (SECRET)

This project is in partial fulfillment of the requirements established in Top Secret letter from ARDC (RDDRW) to WADC, Subject: "(Confidential) USAF Biological and Chemical Warfare Program", dated 20 August 1952. In addition this project is in support of ARDC Development Directive 3054, dated 11 December 1952, and Military Characteristics spray tank, chemical agent airborne, external, dated 4 June 1952. (CONFIDENTIAL)

21. BRIEF OF PROJECT AND OBJECTIVE:

- a. Brief. This project will result in the ~~development of external~~

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stores which shall disseminate chemical smoke screening agents and toxic chemical agents of the nerve gas type. The design characteristics of the munitions will vary with properties of the agents and tactics used in their employment, taking into consideration factors such as; high velocity effects on liquid droplets and vapor generation, meteorological effects on quality of smoke screening and rate of descent of liquid droplets and or vapor, attainment of significant area coverage of lethal nerve gas vapor dosages within a thirty second surprise period. (SECRET)

b. Approach:

(1) The development of a chemical smoke dissemination munition which shall yield a desired high agent to munition weight ratio, directs emphasis to investigation of spray tank devices. Pertaining to spray tanks, highly corrosive properties of smoke agents and excessive particle breakup at high speeds such that the quality of screening is unsatisfactory, are problems that may find solution in selection of proper materials for fabrication and regulation of the agent flow rate to high speed discharge. Because only occasional operational requirements for smoke screening are foreseen, development of a reusable and returnable store as opposed to a munition necessitating jettisoning, indicates an economic advantage. (UNCLASSIFIED)

(2) Dissemination of nerve gases requires a munition capable of: producing large lethal dosage areas within a surprise period for tactical use, functioning at lowest possible altitudes without the delivering aircraft descending below 100 feet at speeds of .5 to .75 Mach or below 200 feet at speeds between .75 and .95 Mach, generating either droplets of optimum size, vapor in close proximity to the ground or agent in such a form that rate of descent is a maximum. In addition, utilization of a nerve gas disseminating device must not cause contamination of the aircraft upon which it is mounted to the extent that the aircraft personnel are endangered or such that the aircraft requires more than minor decontamination. Successful development entails investigation of physical and dynamic agent properties relating to spray techniques, and analysis of the operational potentiality of nerve gas dissemination from fighter bomber aircraft at low altitudes. (SECRET)

c. Tasks: The following tasks are assigned to this project:

Task 50455: Chemical Smoke Spray Tank (UNCLASSIFIED)

Contractor: Department of Army, Chemical Corps

MIPR 52-1027, 31 August 1951

CSO&A-R-52-938, 54-90 and 54-167

Principle Investigator: Mr. Robert Kegan, Chemical and Radiological Labs, Army Cml Center.

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Objective: To develop a reusable and returnable airborne smoke screen generating device of maximum agent capacity, that shall be compatible with present and future fighter-bomber aircraft and function satisfactorily through a speed range of .5 to .95 Mach. (UNCLASSIFIED)

Completion of Development, June 55, Completion of tests, June 56.

Coordination: WADC, Development Operations Division WCOES  
Directorate of Flight and All  
Weather Testing

AFAC

WCTP

AFFTC

ACOPP

D/O (FTOPP)

Task 50456: (Unclassified Title) CW Spray Tank (SECRET TASK)

Contractor: Department of the Army, Chemical Corps

MIPR: 33-600-4-39B-151, 30 August 53.

CSO&A: 33-616-54-167, 28 November 1953.

Principle Investigator: Mr. Carl Farnsworth, Chemical and Radiological Labs, Army Chemical Center.

Objective: To investigate the feasible methods of generating a spray nerve gas and develop an airborne munition to accomplish the above and satisfy requirements as determined by operational employment. (SECRET)

Completion of Development, June 56, Completion of tests, June 57

Coordination: WADC, Development Operations Division WCOES  
Directorate of Flight and All

Weather Testing

AFAC

WCTP

AFFTC

ACOPP

C/O (FTOPP)

d. Other Information:

Justification for organizations listed in block 11, is as follows:

- (1) Department of Army, Chemical Corps, is the contractor for the USAF.
- (2) Department of Navy, BuAer, is the Naval counterpart of the WADC and interservice intelligence of parallel development work must be maintained for economic and scientific reasons.
- (3) AFAC and AFFTC are both WADC test support Centers.
- (4) AMC provides 212 funds for service test items expended in developmental testing.

CW Spray Tank, Type E-26 (Former USAF Project R-555-804) Chemical Corps Project 4-04-15-017, is undergoing developmental flight tests. This spray tank may meet requirements for a Chemical Smoke Spray Tank, but only with major modifications of the present spray tank.

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CW Spray Tank, Type E-29 (former USAF Project R-555-810) Chemical Corps Project 4-04-15-021, development is halted until studies of physical and dynamic agent properties, and operational analysis are completed and indicate in detail what form a nerve gas spray tank shall take. (SECRET)

AMC support will be required to provide funds for service test items as follows:

<u>Task</u>	<u>Amount</u>	<u>FY</u>
50455	50M	56
50456	100M	56
	250M	57

Previous AMC support for procurement of service test items has been provided as follows:

<u>Task</u>	<u>Amount</u>	<u>FY</u>
50455	79M	50-53
50456	100M	1952
	660M	1952
	260M	1953
	109M	1954

e. Background History:

(1) During World War II and the Korean action, aircraft smoke screening operations played a progressively reduced ground-support role. Before the advent of jet aircraft, the M-10 Chemical Smoke Tank was the acceptable munition and was capable of disseminating both mustard and smoke. Present and future fighter-bomber aircraft however, will not permit the use of the M-10 Tank and since there exists the possibility of occasional operational requirements, a new chemical smoke spray tank shall be developed which is to be compatible with higher aircraft performance criteria. The need for a mustard spraying capability no longer exists and because chemical smoke operations shall be infrequent, the tank to be developed shall be returnable and reusable thus economically permitting the development of a chemical smoke spray tank of maximum agent capacity and possessing dissemination device refinements. (UNCLASSIFIED)

(2) In May 1951, a requirement was issued to develop a spray tank for the dissemination of agents GB and X. The latter requirement was removed because of unavailability of the agent and the incompatibility of agent properties to the spray technique. 1952 saw the nerve gas spray tank development put on a crash basis by



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application of 212 funds at the direction of Hq USAF. At the same time a study to determine the feasibility of spraying GB was initiated. The study was limited to treatment of conventional ram-air spray tank also because of the crash basis development. Based on an analysis of spray trials with GB in E-26 spray tanks and GA in M-10 tanks, it was determined that a period well above the desired surprise period of 30 seconds was required to achieve lethal dosages of agent over significant areas. The Chemical Corps undertook the development of a nerve gas spray tank by contracting with the Rheem Mfg. Co. Design criteria for the tank was established in WADC Exhibit No. WCLG-551, dated 2 December 1952. Failure of prototype spray tanks to meet criteria delayed progress until October 1953 when the Chemical and Radiological Labs issued report No. 271, which indicated a basic inability to obtain objectives with ram-air spray tanks flown under operational altitude limitations. Because of the results of feasibility trials and technical problems encountered, the project has been reduced from 1-A to 1-B priority. (SECRET)

f. References:

- (1) ARDC Development Directive No. 3054, 11 December 1952. (SECRET DIRECTIVE)
- (2) WADC Technical Directive No. 53-48 (SECRET DIRECTIVE)
- (3) Hq ARDC letter, (Confidential Title) USAF Biological and CW Program, 20 August 1952, ADTS-832 (Top Secret Letter).
- (4) Dugway Proving Grounds Reports:  
(UNCLASSIFIED TITLES)
  - (a) No. 121 Test CW-8-52, 31 March 1953
  - (b) No. 132 Test CW-1-53, 30 April 1953
  - (c) No. 135 Test CW-6-53, 12 June 1953 (SECRET REPORTS)
- (5) Chemical and Radiological Labs Reports No. 271, 23 October 1953.  
(SECRET REPORT)

REASON FOR SECURITY CLASSIFICATION:

This document is classified SECRET since information is provided on a weapon being developed for dissemination of the agent GB. This is in accordance with the policy expressed in letter from Hq, USAF (AFOAT) to all major Commands, dated 16 December 1952, subject: "(Unclassified) Classification Guide for Matters Concerning Biological Warfare and Chemical Warfare."

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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 ninety (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.

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READ FOR RECORD

Copy No. \_\_\_\_\_

(3 Pages)

Item 2923

WRIGHT AIR DEVELOPMENT CENTER  
Wright-Patterson Air Force Base  
Ohio

WCLGW

3 August 1954

SUBJECT: (Uncl) Chemical Warheads for USAF Guided Missiles

TO: Commanding Officer  
Cml C Research and Engineering Command  
ATTN: Mr. W. R. Maslin  
Army Chemical Center, Maryland

1. The Air Force has just completed a comprehensive review of its research and development program on BW-CW warheads for USAF guided missiles, as a result of which requirements have been reaffirmed for BW-CW warheads for the B-61, B-62, B-63, and B-64 missiles. However, the decision was made that no further effort or additional funds will be expended on the development of specific BW-CW warheads until advancement in the state of the art indicates that effective warheads can be developed. In this connection, and as a matter of record, since present information indicates that the B-61A missile will be phased out in 1957, it is doubtful that any further development work will be done on BW-CW warheads for this missile.

~~(SECRET)~~

2. In view of the foregoing, it is requested that the necessary action be taken to terminate all effort and expenditures on projects covering development of specific BW-CW warheads for USAF guided missiles. This work has progressed under the following Chemical Corps projects:

4-16-16-005	4-16-16-007
4-16-16-012	4-16-16-011
4-16-16-006	4-16-16-013
4-16-16-017	

~~(SECRET)~~

3. Prior to official project termination through MIPR and CSO&A action it is requested that notification of funds remaining under the following CSO&A's and MIPR's and any other USAF funds on hand for these projects be forwarded to the Wright Air Development Center:

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CSO&A 51-653	MIPR R51-3031
51-521	R51-3026
52-751	R51-3030
53-222	R51-3027
53-228	R51-3029
53-231	R51-3025
53-70	R51-3032
	33-600-3-39B-129
	33-600-3-39B-130
	33-600-3-39B-440
	33-600-3-39B-252

(UNCLASSIFIED)

4. It is further requested that an inventory of all hardware procured and presently on hand for support of the above projects be forwarded to the Wright Air Development Center. (UNCLASSIFIED)

5. This document is classified SECRET in accordance with paragraph 23c of AFR 205-1.

FOR THE COMMANDER:

s/Arthur E. Kimberly  
 ARTHUR E. KIMBERLY  
 Lt Colonel, USAF  
 Air Munitions Section  
 Plans and Operations Office  
 Armament Laboratory

cc: Hq ARDC  
 Attn: RDTDM

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Item 2923

CMLRE-RWD-4  
(3 Aug 54)

1st Ind

SUBJECT: (Uncl) Chemical Warheads for USAF Guided Missiles

Headquarters, Cml C Research and Engineering Command, Army Chemical Center, Maryland, 12 October 1954

TO: Commander, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, ATTN: WCLGW

1. This Command has cancelled development work on projects per your request par 2 above. Final reports on each project are being prepared. It is estimated that the cost of preparing and reproducing these reports will be \$23M. Inventory of remaining hardware on these projects is currently being prepared and will be included as part of the final report on the individual projects. Remaining R&D funds on each of these projects are being determined and upon completion such information will be forwarded to your Center.

2. The warheads for the MX-771 were being developed in accordance with the military characteristics established by CCTC Item 2483. Based on preliminary results obtained to date, it is believed that the warheads could have been developed in time to meet your specified deadline in line with the established characteristics. Your statement that "the decision was made that no further effort or additional funds will be expended on the development of specific BW-CW warheads until advancement in the state of the art indicates that effective warheads can be developed" is thus confusing. If the military characteristics are not to be used as the guide for our development work, all requirements should be furnished this Command in the future so that we can properly guide our efforts to meet your needs.

FOR THE COMMANDING GENERAL:

cc: AFDPR, ACC, Md.  
CCCm10

BERNARD BERGER  
Actg Asst for RW & Non-Toxic Mat'l

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Copy No. \_\_\_\_\_  
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Item 2932

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ORDNANCE COMMITTEE  
ITEM 35516

A-511  
HRosenthal/sd/74833  
27 July 1954

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. 4-04-15-020.
- d. Aberdeen Proving Ground Firing Record, P-50431, 19 November 1951 to 11 January 1952.
- e. D/F 00471/3459 (G3 470 (4 Aug 52)), G4/F3 (25 Aug 54)) dated 25 August 1952, subject: Shell, Chemical 105mm, T173 and inclosing Letter ATDEV - 10 471/800 (4 Aug 52) with letter GNEA - FAG 471 from Headquarters Army Field Forces Board No. 1 dated 23 July 1952.
- f. GCTC 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.

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j. OCM 34346 dated 3 July 1953.

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

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

o. File OO 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 those 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.

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d. Chemical Corps evaluation, after completion of the corrosion tests and the cyclic surveillance tests is covered in reference lc. 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 lc, later correspondence between Chief of Ordnance and Chief Chemical Officer, reference lo, 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 lp.

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 ld. 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.

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

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

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

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

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

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

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

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

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

(5) Shell filling, drg. P-83472

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Burster, M40 (T67); with GB filling, Case Cartridge, ML4; Primer, M28A2; Charge, Propelling, M1.

- (1) Proposed using agencies: Army Field Forces, National Guard Bureau, and U. S. Marine Force.
- (2) Related materiel: Howitzer, 105-mm, M2A1, M2A2, M4 and M4A1,
- (3) No existing items need be modified or replaced by the GB filled Shell, 105-mm, M360 (T173)
- (4) The filled, assembled and fuzed shell, assembled as a complete cartridge will cost approximately \$40 each in production quantities.
- (5) The item meets current military characteristics for GB filled, non-persistent gas shell for the 105-mm Howitzers, except for possible occasional "leakers" as indicated above.
- (6) The item is intended for immediate procurement.
- (7) Critical or strategic material used (exclusive of filler which is a standardized Chemical Corps item). Gilding metal of rotating bands, and small quantities of brass and aluminum in the fuze and primer.
- (8) Item is air transportable.
- (9) The Ordnance Corps is to be charged with responsibility for:
  - (a) Specifications for the round (including all components except filler).
  - (b) Purchase and inspection of all parts, except filler.
  - (c) Determination of requirements and funding.
  - (d) Assembly of the filled shell, and the cartridge.
  - (e) Storage and issue of the cartridge.
  - (f) Maintenance of the cartridge.

The Chemical Corps is to be charged with responsibility for:

  - (g) Specifications for the filler.
  - (h) Purchase and inspection of the filler and the filling.
  - (i) Storage and issue of the filler.
  - (j) Maintenance of the filler.

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(10) Training and maintenance literature is required.

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

s. Since, Shell, Chem, 105-mm, M360 (T173) with Casing, Burster, M16 (T27), and Charge, Burster, M40 (T67) with GB Filling covers a requirement for which there is at present no existing standard projectile, it is the opinion of the Subcommittee that it should be authorized as Standard Type. Reference 1p recommends that development be continued on improvement of closures under Project 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 MRRMR basis as of 1 July 1954. Funds for the procurement of the round will be required to meet the computed MRRMR. 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-H-4 be revised to include Cartridge, Gas, Non-Persistent, M360, w/fuze.

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

e. This report be placed in the SECRET category.

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

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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 ORDINANCE 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

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