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Minutes of the Meeting of the
Chemical Corps Technical Committee
30 March 1962

Meeting No. 276

SECRET SUPPLEMENT

Items

*3938, 3960, 3978

GROUP 3
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*Item 3938 in Mtg No. 275
5010-67

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READ
REPORT "X"

Item 3960

(Copy No. _____)
(Revised 15 Mar 62)

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

TSE/25110/ivk
26 Feb 1962

CMLWH

SUBJECT: Classification of Cluster, Bomb, Incapacitating BZ, 750-lb., M43 (E153); Cluster, Generator, Incapacitating BZ, 175-lb., M44 (154); and Incapacitating Agent, BZ as Standard-B Types (U) (*)

TO: Chairman, Chemical Corps Technical Committee

1. (C) References:

- a. Subproject 4-08-03-016-05 (S), Psychochemical Agents (MM1605) (U), established by CCTC Item 3060, 30 Jun 55.
- b. Report (S), Special Publication 28, EA 2277 (U), 15 Mar 61, Cml R&D Laboratories.
- c. Report (C), 2-61, Operational Utility Evaluation of Nonlethal Agent EA 2277 (CS4030) (U), Mar 61, Cml C Board.
- d. CCTC Item 3815 (C), USCONARC-Approved MC's for Incapacitating Agents, Nonlethal (U), approved by OCRD, 17 Jan 61.
- e. Report, Cml C Safety Directive No. 385-19, Safety Guide for the Processing, Filling, Handling and Decontamination of EA 2277 (U), 11 Aug 61.
- f. Task 4C04-013-032-23, Incapacitating Agents/Munitions Systems (U), established by CCTC Items 3891 & 3917, 2 Nov 61.
- g. Ltr (S), CMLRE OCCm10, 3 Aug 61, Program for EA 2277 Capability (U), to CRD, w/7 Incls.
- h. D/F (C), CMLRD-CR-I Cml R&D Labs, 6 Dec 60, Classification Guide for EA 2277 (U), to Dist, w/Incls.
- h' Ltr, CMLMO OCCm10, 23 Feb 62, Elimination of "Gas" from TK Munition Nomenclature (U), to Cml C Comdrs, w/Incl.

(*) BZ was formerly TK which was redesignated by Item 3978.

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compound identified as EA 2277 (previously CS 4030) was selected as the most promising candidate to meet the established QMR for this type of agent. As a candidate agent, symbol TK (redesignated BZ) was assigned to facilitate identification and program coordination. As reported in reference b., which is a definitive CRDL review of work on EA 2277, this compound is identified chemically as 3-quinuclidinyl benzilate, one of the group of compounds that causes severe mental effects including confusion, hallucinations, loss of muscular coordination, increase heart rate, and general disorganization. Reference b. summarized the data on the benzilates noting that these were developed by the pharmaceutical industry while searching for compounds similar to atropine. Based on impressive effects noted on animals EA 2277 was selected as the most potent of all samples evaluated. Subsequent work was concerned with detailed evaluation of the biological effectiveness of EA 2277, its producibility, stability, and ease of dissemination in consonance with the applicable criteria established at the 13th Tripartite Conference on Toxicological Warfare held in Canada during 15-26 Sep 1958.

c. (S) As reported in reference b., EA 2277 is the most potent of the compounds given serious consideration to date and is equal to other benzilates in effects produced, speed of action, and duration of incapacitation. In addition, there is a wide safety margin between the effective incapacitating and a lethal dosages. Reference b. indicated that this agent could be made in the quantities required and was stable in storage under normal climatic conditions. Dissemination could be accomplished either as a thermally-generated aerosol or by detonating micropulverized particles. Reference b. noted that although it is difficult to define the effects an agent should have to be classified as incapacitating, a simple definition would be those which adversely affect the ability of personnel to carry out their military missions. Incapacitation should consider not only the state of an individual but also the demands made on him. Essentially, this may be considered to involve (1) incapability of taking action as required, (2) choosing the proper course of action, and (3) implementing a chosen course of action. Reference b. noted that the subject agent was first synthesized in 1949 and that subsequent clinical results of this spasmolytic compound were encouraging enough to warrant development for commercial use. Many difficulties were initially encountered in translating laboratory synthesis to procedures for the production of pilot lots; however, most difficulties have been surmounted and large scale commercial manufacture now offers no problem.

d. (S) Reference c. identifies the Chemical Corps Board study of subject agent which evaluated the operational potential thereof based on limited data and projected potential tactical usage now incorporated as revised in Inclosure 3 herewith. As the result of this study, reference c. recommended that data on EA 2277 be validated as soon as possible and that R&D proposals be advanced for feasible nonlethal aerial and ground munitions or other devices for effective dissemination in the amounts required for potential target areas. Subsequently, appropriate testing was conducted at Dugway Proving Ground as reported in Inclosure 1 herewith which demonstrated the feasibility of disseminating EA 2277 with prototypes of the two clusters which are the subject of this report.

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- (U) Cluster, Generator, Incapacitating BZ, 175-lb., E154 (M44) (U)
 This is a quick-opening assembly (Drg D336-1-207) that is 57" long, 15" in dia. and weighs 175 lbs. When the arming wires are withdrawn six (6) buckles open permitting separation of the cluster adapter and release of the three (3) component E34 Generators. Major components may be described as follows:
1. Generator, Incapacitating BZ, 50-lb., E34 (M16) (3 required)
 This is a 6-gallon pail about 15" high x 12" in dia. functioned by the E21 Fuze and produces TK aerosol after the sealing tape is blown from the outlets. Burning time is about 18 seconds. The top section of the generator is provided with the E16 Parachute and Container that permits controlled delivery on the target area after the cluster opens.
 - a. Canister, Incapacitating BZ, E46 (M6) (42 required)
 This is a modified M18 Grenade 4" x 2.75" in dia. that contains 0.625 lbs. of TK-pyrotechnic mixture initiated by a match igniter.
 - b. Fuze, Generator, Delay, E21 (M220)
 This functions the E34 Generator and is about 2½" long x 1 3/8" in dia. It consists of a striker pin assembly & ball bearing detent assembly that are released by withdrawal of the fuze cap. A primer and pyrotechnic delay mixture complete the ignition train.
 - c. Parachute and Container, BZ Generator, E16 (M9)
 This is a metal container 4½" x 12" dia. that holds a 10 ft, 10 gore glide surface parachute. Suspension lines terminate in a loop and chain shackle that facilitates attachment to the generator. The parachute is withdrawn and opens after cluster separation permitting each generator to drop gently to the ground.
 2. Adapter, Generator Cluster, E63 (M39)
 This is a quick-opening type consisting of two (2) bars 57" long provided with six (6) buckles that permit release of the three (3) generators, when the E17 Arming Wire Assembly is withdrawn.
 3. Arming Wire Assembly, E17 (M92)
 This consists of two double wires (.035" dia.) attached to the swivel loop that are 15" and 26" long respectively. In use, the shorter wires are attached to the inner release buckles, whereas the longer wires are attached to the outer buckles all wires being secured by Fahnstock safety clips.
- (c)(S) Incapacitating Agent, BZ (EA 2277)
 This is 3-quinuclidinyl benzilate being the benzilic acid ester of 3-quinuclidinol. It is a nonhygroscopic, stable compound that can be disseminated thermally to 1100°F. without appreciable deterioration. For this purpose it is compounded in a 50% pyrotechnic mix. When inhaled it produces physical and mental symptoms so that normal duties cannot be performed. Detailed physiological effects are noted in In-closure 5. PD 196-131-775 (S) describes this agent as obtained from

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(b) <u>E154 Cluster:</u>	1111 Clusters	\$4,372,060 (%)
	Tooling	15,000
	Inspection Equipment	6,000
	Engineering	6,500
	Total	<u>\$4,399,560</u>

(%) Includes about \$3,740,000 for Agent, BZ.

(c) <u>Agent, BZ:</u>	100,000 lbs.	\$7,696,000 (#)
	Tooling	100,000
	Engineering	4,000
	Total	<u>\$7,800,000 (**)</u>

(#) Includes \$200,000 for concurrent production process engineering and \$500,000 to acquire patent rights.

(**) The entire agent cost is included in the two munition costs above.

(d) Total PEMA Funding Involved:

1. E153 Cluster \$4,440,000
2. E154 Cluster \$4,399,000
3. Modification of Filling
Assembly Facility as
covered by reference k. \$1,070,000

Total \$10,909,560

- (9) (U) Literature Requirements: Appropriate literature for the subject items is required and will be prepared. Currently, a Safety Directive for Processing, Filling, Handling and the Decontamination of BZ is available and is identified as reference e.
- (10) (U) Critical and Strategic Materiel Involved: None. It is anticipated that TK will be procured from commercial sources and that its production will not interfere with other items now typed classified. Patent rights for TK held by a commercial supplier will be obtained.
- (11) (C) Consumption Rate: Not applicable since the subject clusters will be retained in contingency reserve for emergency air shipment as required. Inclosure 3 indicates some concepts of use.
- (12) (U) Security Classification: The security guide for BZ and related munitions is covered in references h. and l. These are combined in Inclosure 4 herewith.

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Item 3960

- (2) Cluster, Bomb, Incapacitating BZ, 750-lb., M43
(E153) (U)
- (3) Cluster, Generator, Incapacitating BZ, 175-lb., M44
(E154) (U)

- b. The components of the subject items listed in paragraph 2.f.(1) be redesignated with "M" numbers indicated.
- c. The subject items be procured in the quantities indicated in paragraph 2.f.(8) above.
- d. Project 4C04-15-032-23, Incapacitating Agent/Munition System (U), be continued in the current Chemical Corps R&D Program to develop improved disseminating devices for TK.
- e. All records and publications affected by this action be revised accordingly.

5 Incls

- 1. Feasibility Test Rpt (DPG) (Conf)
- 2. CRDL Test Rpt (Conf)
- 3. Concepts of Use (Secret)
- 4. Security Class (Conf)
- 5. Physiological Evaluation of
EA 2277 (Conf)
- 6. D/F, OCCm10, 1 Mar 62, w/
Cmt #2, OCRD, 12 Mar 62;
Cmt #3, 15 Mar 62,

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CONCEPTS OF USE FOR AGENT EA 2277

(From Reference g.)

1. (C) GENERAL.

a. (U) Generalized concepts of use of incapacitating agents have been developed from time to time by the Chemical Corps; however, never has any potential user stated a concept. Thus those presented herein can only be assumed as possible applications. In addition to the concepts presented herein, Chemical Corps Board Report, CCB 2-61, outlines a number of situations in which other conceptual munitions are discussed, including non-lethal munitions.

b. (C) Although field tests have not been conducted with volunteers, laboratory and clinical tests show, that the effects on man appear to be those desired. Therefore field tests on volunteers will be necessary as the program progresses.

2. (S) TENTATIVE CONCEPTS OF USE. Based on the information presented in the foregoing Annexes, it is felt that the proposed munitions have application in a wide variety of situations ranging from cold war civil disturbances through general war. Munitions of this type offer the commander a degree of flexibility in the application of combat power not possible with conventional munitions. Here is a weapon system with the potential of neutralizing significant targets long enough for maneuver elements to secure the objective area and evacuate or segregate the target population. Casualty levels in the target are high, insuring neutralization, while deaths and injuries remain low. Before discussing use concepts, it is well to reiterate the munitions effectiveness figures on which these concepts are based. For the proposed munitions, effectiveness is based on total dose of agent to unprotected personnel. The forecast casualty areas for these munitions under standard meteorological conditions are: (a) 900 square meters per one massive thermal generator; and (b) approximately 2.2 hectares per bomblet cluster. The L-19 type aircraft could carry eight massive thermal generators for parachute delivery. The C-130 aircraft could carry sufficient massive thermal generators to attack targets up to a square mile or larger. The cluster munitions can be delivered by aircraft of the Caribou, Mohawk and tactical fighter bombers type at the rate of two clusters per sortie. Target sizes visualized for use with these munitions are generally less than a square mile.

a. (C) Berlin-type actions: In the case of probable Berlin-type actions, it appears that the most likely situations requiring the use of riot-control and/or incapacitating agents are as follows;

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though both the military and civilian populace along the route are unfriendly, use of incapacitating agents, i.e., CS and EA 2277, is indicated in this situation due to political considerations and public opinion. It is visualized that road patrols would use CS and EA 2277 munitions to neutralize strong points for significant period of time. During the period of incapacitation direct action could be taken to remove these obstacles without or with little direct combat.

b. (C) Counter Guerrilla and Paramilitary Operations: French Army action in Algeria is a current example of mobile combat actions required to engage paramilitary force. Helicopter-borne assault forces were used to break up rebel bands sighted by reconnaissance aircraft. For 50 percent assurance of successful assault on the rebels, four hours was the maximum troop movement time allowable after sighting. Since nearly all the engagement required traveling beyond 40 miles through rugged mountain terrain air transport was the only way to achieve reasonable success. The employment of EA 2277 munitions from cargo aircraft of the C-130 type for target up to a square mile using air dropable thermal generators, tactical aircraft employing clustered bomblets or light aircraft carrying air dropable thermal generators, could engage rebel groups of this type after sighting and allow a longer reaction time and increase the assurance of a successful attack. After attack the rebel band can be expected to move from 2-4 hours before being incapacitated. Limited by foot mobility and tracked by surveillance aircraft the rebel force will remain in a confined area. In addition to increasing available reaction time attack, EA 2277 will increase the probability of taking prisoners.

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By MBJ NARA Date 8/2/00

Item 3960

Item 3978

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HEADQUARTERS
DEPARTMENT OF THE ARMY
Office of the Chief Chemical Officer
Washington 25, D. C.

CMLPE

5 April 1962

SUBJECT: Request for CCTC Action (TK Redesignated BZ) (U)

TO: Executive Secretary
Chemical Corps Technical Committee
Army Chemical Center
Maryland

It is directed that the records and all references thereto in CCTC
Item 3960 be changed to eliminate all reference to TK and substitute
therefor BZ.

FOR THE CHIEF CHEMICAL OFFICER:

/s/ D. G. GROTHAUS
Colonel, Cml C
Deputy Chief Chemical Officer