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Technical Report

CHEMICAL MUNITIONS/AIRFRAMES COMPATIBILITY

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Prepared by

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SECTION 1. INTRODUCTION

1.1 BACKGROUND

Planning for the employment of aerial-delivered chemical munitions is currently restricted by the limited certification and published compatibility of specific chemical munitions with specific aircraft. Expanding the capability to employ aerial-delivered chemical weapons would normally involve expensive and time consuming certification of additional munition/aircraft combinations. This study addresses the possibility of accelerating the certification process on the basis of testing that has already been accomplished (whether or not the testing was for the specific purpose of determining compatibility).

1.2 OBJECTIVES

This effort was tasked to summarize all currently available data and information pertinent to aerial-delivered chemical munitions and their compatibility with current delivery aircraft. To provide a basis for evaluating a possible expansion of aerial-delivered chemical munitions capabilities, current aircraft/chemical munition compatibility data is presented and discussed with recommendations for expanding aerial-delivered chemical munitions capabilities.

1.3 SCOPE

1.3.1 Study Coverage

The study covers aircraft/chemical munitions that are currently on hand and developmental munitions (e.g., BIGEYE, AERO-14B modification) that might be funded in the near future. Aircraft that were not considered reasonably appropriate for chemical delivery missions (e.g., helicopters and specialized fixed-wing types like the Army OV-1 MOHAWK, the Navy S-3 VIKING, and the Air Force SR-71 BLACKBIRD) were treated as beyond the scope of the study even though they can physically carry chemical stores. Also considered beyond the scope of the study were training and support, as well as all foreign aircraft and chemical munitions. It is noted, however, that inadequate training and support might reduce delivery capabilities significantly, and that cross-compatibility with foreign aircraft, especially in NATO, might increase chemical delivery capabilities.

1.4 APPROACH

A literature search was supplemented by talks with cognizant personnel at Headquarters, U.S. Air Force; the Office of the Chief of Naval Operations; Headquarters, U.S. Marine Corps; the Naval Air Systems Command; Eglin Air Force Base; and the Naval Surface Weapons Center, Dahlgren. This provided expert opinion and data that were used to determine and describe the munitions of interest, the aircraft considered appropriate for possible chemical roles, and the certification/compatibility of aircraft-weapon combinations.

SECTION 2. DETAILS OF STUDY

2.1 CATALOG OF MUNITIONS

2.1.1 Current Air Force Munitions

2.1.1.1 TMU-28B. This is a 2,000-lb (900 kg) class spray tank with 590 kg of persistent VX. At release, the delivery aircraft should be 150 m or less above ground level and should be traveling at a speed of not more than 555 km/hr (300 kt) for best coverage. The chemical agent is forced out of a rear nozzle by the air stream after front and rear caps have been blown off by electrically activated charges. The tank is supplied already filled with the chemical agent, is not reuseable, and will normally be jettisoned rather than returned to the base after use. The TMU-28B is shown in Figure 1.

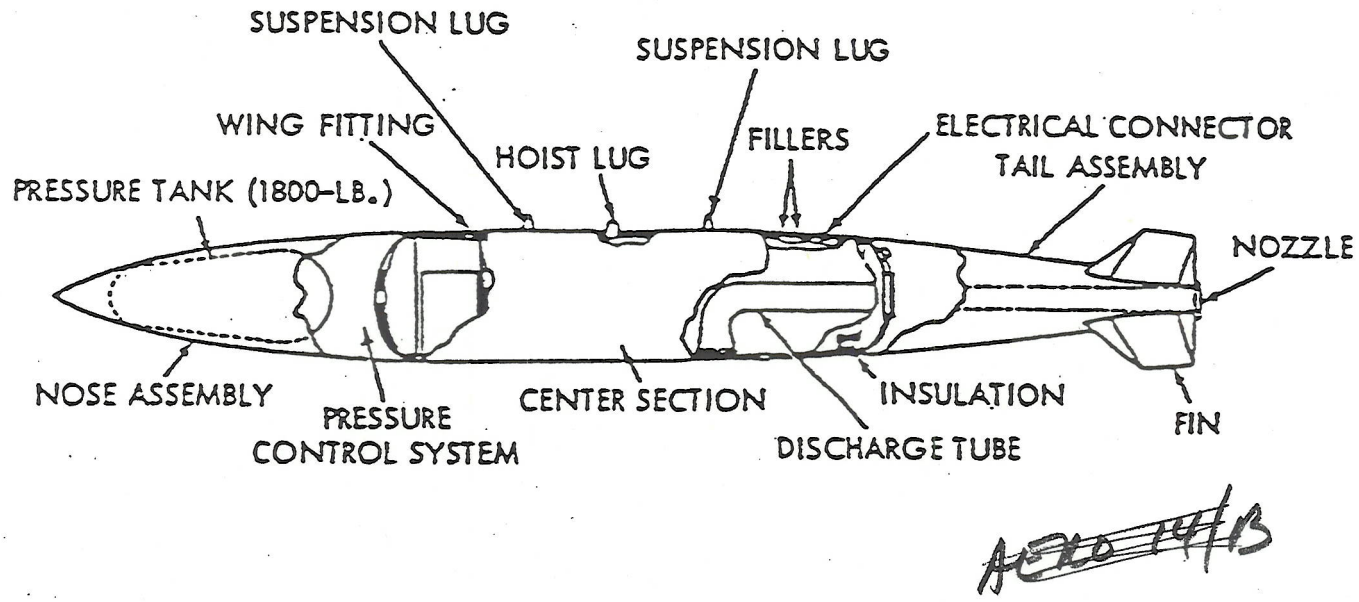


Figure 1. TMU-28B Chemical Spray Tank.

2.1.1.2 MC-1. The MC-1 is a standard 750-lb (340 kg) bomb modified to be filled with 100 kg of GB. The munition is supplied already filled and is currently certified only with a contact fuse (Reference 1). The MC-1 is shown in Figure 2.

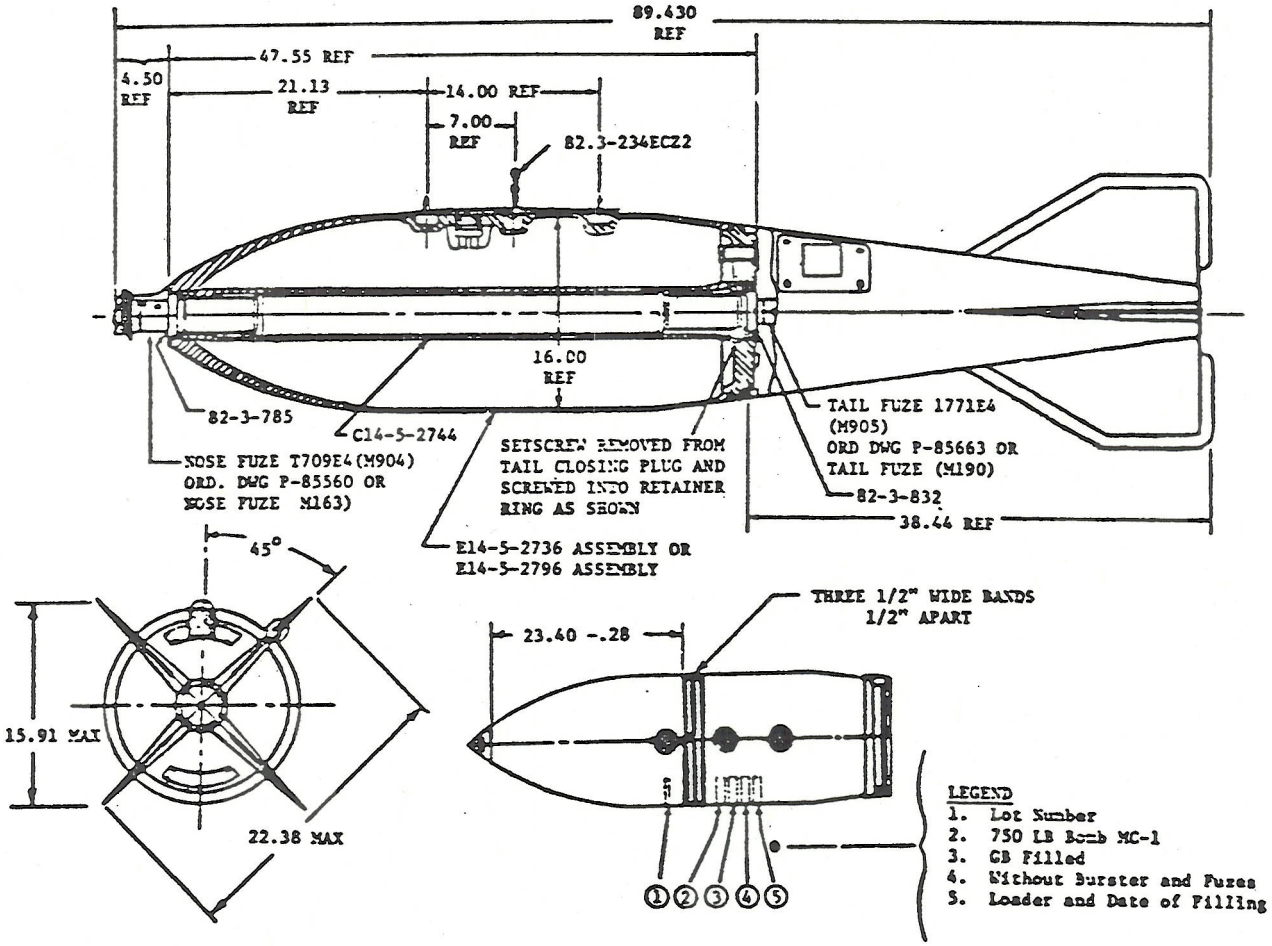


Figure 2. MC-1 Chemical Bomb.

2.1.2 Current Navy/Marine Munitions[1]

2.1.2.1 MK-94. The MK-94 is a 500-lb (225 kg) class bomb filled with 49 kg of GB. It is supplied already filled and is currently certified only with a contact fuze. The MK-94 is shown in Figure 3.

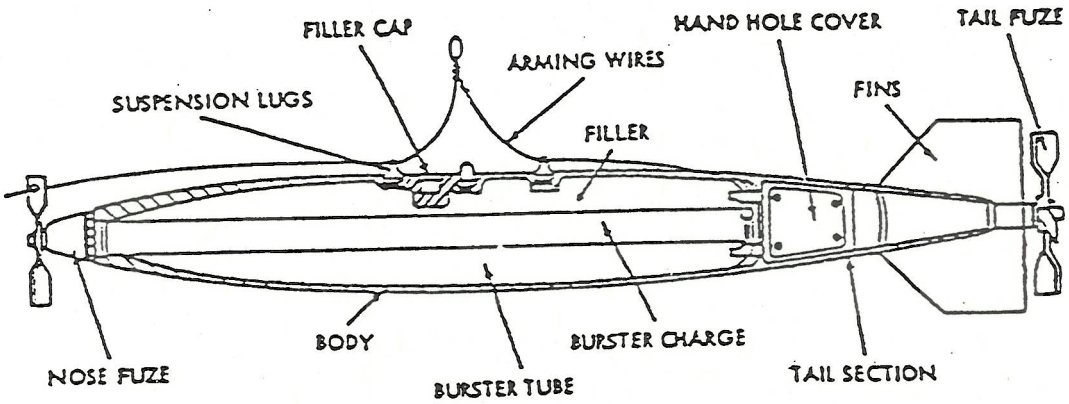


Figure 3. MK-94 Chemical Bomb.

2.1.2.2 MK-116 (WETEYE). This is a 500-lb (225 kg) class, high agent-to-weight bomb (Reference 2). The bomb's gross weight is 254.9 kg, and it is filled with 157.4 kg of GB agent. Four folded, spring-loaded fins are extended upon release from the aircraft. On impact, the fuze detonates four MK5 MOD-0 bomb bursters to explosively disseminate the chemical agent in the form of vapor and an aerosol cloud. The munition is supplied already filled with agent and is certified only for contact fuzing. The MK-116 is shown in Figure 4.

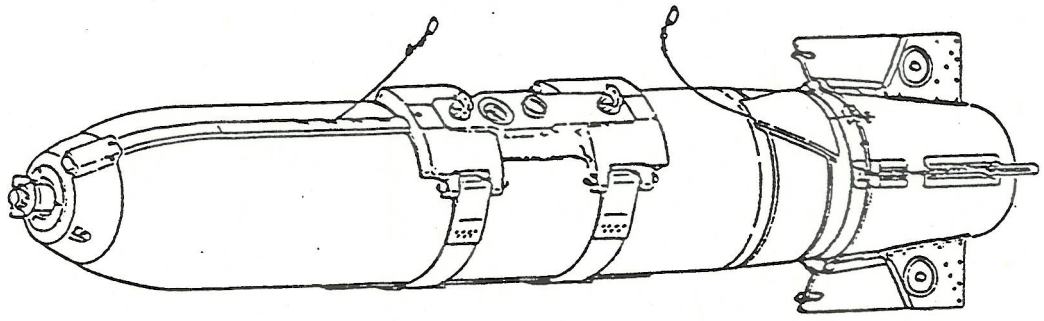
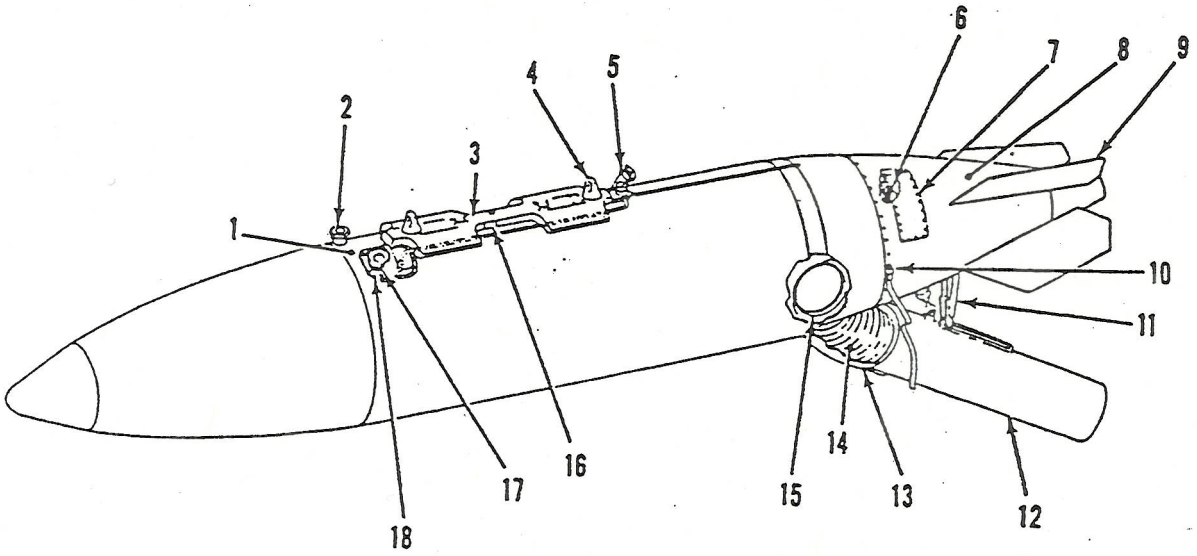


Figure 4. MK-116 (WETEYE) Chemical Bomb.

[1]Because of safety considerations aboard ship, the Navy tends to avoid current unitary air-delivered chemical munitions.

2.1.2.3 AERO 14B Airborne Chemical Spray Tank. This is an externally mounted, pneumatically controlled, combination agent storage and dissemination system. It weighs approximately 770 kg loaded and can be filled with 318 liters of chemical agent. It would primarily be used to spray VX or thickened GB chemical agents but can be filled with other agents in accordance with the needs of the tactical situation. Special wiring is required in the aircraft to use this tank but proposed changes would make it compatible with a number of aircraft. Flow rates can be varied from full flow to essentially zero using valve positions set prior to flight. Although the tank is reuseable, it can be jettisoned in flight. The MK 4 MOD 0 chemical tank filling unit is an air transportable 244 x 610 cm enclosed van, which when used with its ancillary equipment provides the means to handle, fill, and decontaminate the AERO 14B. The AERO 14B is shown in Figure 5.



1. Agent container
2. Filler boss
3. Hardback assembly
4. Suspension lugs (typical)
5. Umbilical cable
6. Actuator
7. Access door
8. Tail cone
9. Tail cone fin
10. Arming pin
11. Sway brace
12. Dissemination nozzle (extended)
13. Connector duct shield
14. Connector duct
15. Outlet cutter
16. Nameplate
17. Inlet cutter
18. Airscoop

Figure 5. AERO-14B Chemical Spray Tank.

2.1.3 Multi-Service Developmental Munition

2.1.3.1 BLU-80/B (BIGEYE). This is a binary-type bomb that generates persistent nerve agent VX2 from two relatively nontoxic chemicals. Weapon components are shipped and stored separately, eliminating the possibility of inadvertent nerve agent formation. The weapon components are assembled just prior to loading; during the flight to the target, the components remain

separated by a 0.508 mm stainless steel diaphragm. Only after release from the aircraft are the components combined to form the toxic nerve agent VX2. After release, the MK 339 fuze initiates the dissemination system at a preset time, allowing the freshly made agent to stream from the weapon creating an elevated line source. The BLU-80/B can be jettisoned without mixing, but is armed so that one of the chemical components is disseminated thus preventing a mixing of the components even on impact. The bomb is a 500-lb (225 kg) class munition with spring loaded folding fins that are activated after release. It is compatible with primary and multiple carriage racks, and is loaded on an aircraft in a manner similar to that used with the conventional ROCKEYE bomb. The BLU-80/B is shown in Figure 6 (Reference 3).

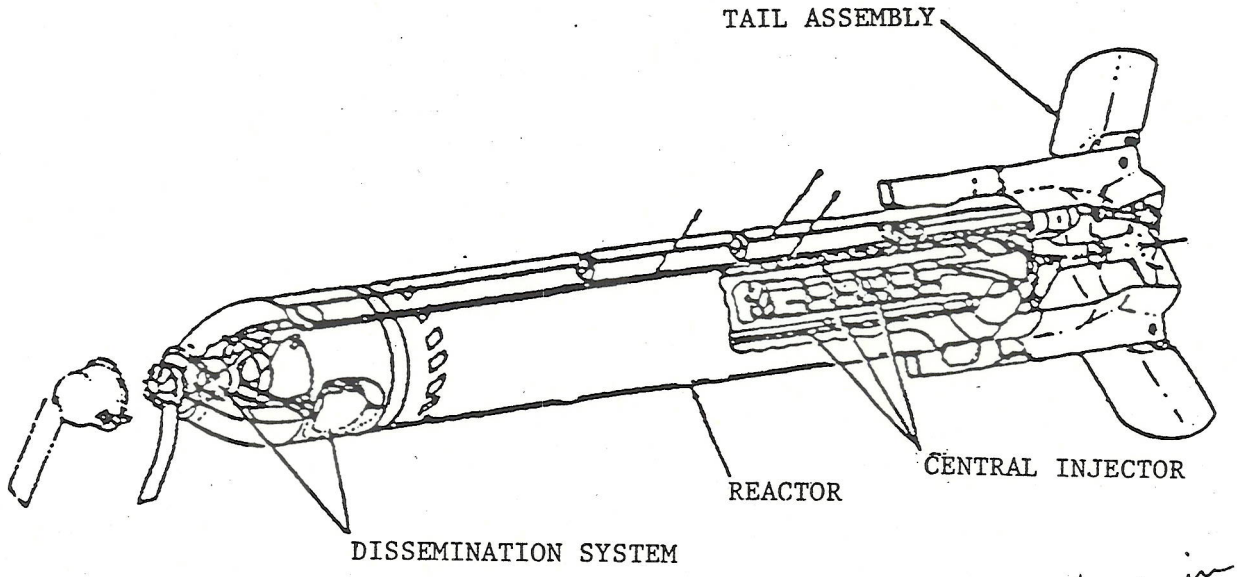


Figure 6. BLU-80B (BIGEYE) Chemical Bomb.

None in stockpile

2.2 CATALOG OF DELIVERY AIRCRAFT

2.2.1 Air Force

2.2.1.1 F-4D/E/G PHANTOM IIs. These are Mach 2+ class fighter bombers. The basic F-4 has been in service for more than 25 years, and it has served the Navy, the Marine Corps, and many foreign countries as well as the USAF. The F-4 is being replaced by the F-15 and F-16, but many can still be found in the Tactical Air Command (TAC) and the Air National Guard (ANG). The F-4 is a supersonic, twin-engine, two-place aircraft with air-to-air and air-to-

APPENDIX A. REFERENCES

1. One Time Safety Study of the MC-1 GB 750 Pound Bomb, A US Army Chemical Agent and Munitions Safety Committee Report, 7 January 1980. (CONFIDENTIAL)

2. Chemical Bomb MK-116 Mod0 (WETEYE) Design and Development History, Naval Weapons Center TP 6074, China Lake, California 93555, November 1978. (UNCLASSIFIED)

3. System Safety Program Plan for BIGEYE (BLU-80/B) Binary Chemical Weapon, Naval Weapons Center, China Lake, California 93555, December 1983. (UNCLASSIFIED)

4. Secretary of the Navy Instruction (SECNAVINST) S5430.86, 28SEP70. (SECRET)

5. Chief of Naval Operations Instruction (OPNAVINST) S3400.10D, 6 July 82 (Navy/Marine Corps aerial delivery of Chemical Weapons). (SECRET)

6. Memorandum for the Assistant Deputy CNO (Marine Aviation) (OP-52), Marine Aviation Chemical Warfare Capability, 18 April 1983. (UNCLASSIFIED)

7. Summary of Lethal Agent Field Test Program at Dugway Proving Ground, Utah, July 1971. (UNCLASSIFIED)

8. Commandant of the Marine Corps (CMC) Position Paper, Subject: Offensive Chemical Mission Support of Unified and Specified Commanders, ASL-22-blm, 28 Dec 1982 (Presents USMC position for continued support of the Department of the Navy Chemical Weapons Delivery Mission). (SECRET)

9. Marine Corps Order 5440.2F, Marine Wing Weapons Unit (MWWU); Mission, Tasks, Training and Assignment of Personnel, HQMC, Washington, DC 20380, 28 July 1983. (UNCLASSIFIED)

10. Joint Strategic Capabilities Plan, Annex F Chemical Warfare; Nuclear, Biological and Chemical Defense; Riot Control Agents and Herbicides, JCS, Washington, DC 20301. (SECRET)