DEFENSE EXPLOSIVES SAFETY BOARD'S (DDESB) ROLE IN APPROVING DEMILITARIZATION TECHNOLOGY FOR AMMUNITION AND EXPLOSIVES (AE) INFORMATION PAPER

DDESB January 23, 2015

1. Purpose

a. This paper responds to a telephone inquiry from Mr. Tom Fox, Senior Counsel (D) to the U.S. Senate Committee on Environment and Public Works. Mr. Fox requested information on systems the DDESB has reviewed or approved for the demilitarization of military munitions, specifically systems that could be used for the demilitarization of propellants.

b. Describes the DDESB's role in approval of certain aspects of a proposed demilitarization system for AE.

c. Provides (enclosure 1) the DDESB review and approval process and a list of DDESB-approved systems (enclosure 2) that have demilitarization applications for AE.

2. Background

a. The DDESB's role in the review of AE demilitarization systems is defined by DoD policy and limited to validating that:

(1) Personal protection criteria are met; and

(2) A system may be used in lieu of 100-percent independent dual inspections to determine whether material to be demilitarized may be documented as safe prior to its transfer within or release from DoD control.

b. The DDESB does not evaluate systems for other types of feasibility (economic, environmental, etc.).

3. The DDESB's point of contact is Mr. Luke Robertson, at 571-372-6776; e-mail at william.l.robertson3.civ@mail.mil.

ENCLOSURE 1: DDESB REVIEW AND APPROVAL PROCESS

A. Review of Demilitarization Systems for Personnel Protection

The DDESB's role in the review of systems that may be used to support AE demilitarization operations is limited to the explosives safety aspects of those systems (vice an evaluation of whether the system will ensure an item has been adequately demilitarized). For a given quantity of AE to be processed in a system at a given time, the DDESB reviews and approves safety distances and compensatory measures associated with the system.

The DDESB will review U.S. Military Component submissions of AE demilitarization systems in accordance with DoDI 6055.16[1] that meet the requirements of DoDM 6055.09[2] for personnel protection from thermal, blast and fragmentation effects. Criteria are established based on accidental or intentional detonations or burns of the AE and the associated safety distances. A DoD Component may submit for review and approval systems that have demonstrated (e.g., by testing) that the proposed system meets DoD criteria for personnel protection.

B. DDESB Review of Systems for Material Documented as Safe (MDAS)

DoDI 4140.62[3] requires that material to be transferred within or released from DoD control must be assessed and documented as either safe or as having a known or suspected explosive hazards based on the following two conditions:

(1) After 100-percent inspection and an independent 100-percent reinspection.

(2) After processing by a DDESB-approved means with an appropriate post-processing inspection.

A DoD Component may propose a system to the DDESB, with appropriate justification, to indicate material processed through the system does not require the inspections specified in (1) above. The justification must show that over its lifetime the system will achieve a commensurate level of safety without the need for costly or potentially hazardous 100-percent inspection and independent reinspection. This type of approval would apply to, among other materials, AE where energetic material (e.g., the explosive fill) is removed from the material

[1] Department of Defense Instruction (DoDI) 6055.16, "Explosives Safety Management Program", July 29, 2008, Incorporating Change 1, December 8, 2011
[2] Department of Defense Manual (DoDM) 6055.09, "DoD Ammunition and Explosives Safety Standards", date varies by volume.
[3] Department of Defense Instruction (DoDI) 4140.62, "Material Potentially Presenting an Explosives Hazard", November 25, 2008, Incorporating Change 1, February 19, 2014

(e.g., a metal casing). In addition to reviewing such systems for personnel protection as described above, the DDESB will also review these systems to determine if they provide a reliable means of removing the explosives hazard from the item as required by either (1) or (2) above.

C. DDESB Approved Systems with Demilitarization Applications

The DDESB has approved the systems listed at enclosure 2 for AE demilitarization. Enclosure 2 provides a summary of each system's application and general information. The specific applicability of a given system for handling a specific type of AE and required throughput requires careful evaluation by the responsible Defense Component or Agency.

Actual AE demilitarization procedures are established by the Defense Logistics Agency, the DoD Components, or the Single Manager for Conventional Ammunition (SMCA)[4].

As previously indicated, DDESB approval covers either personnel protection from explosives hazards during operation of the system and/or validation that the system removes the explosives hazards from the material being processed.

Systems approvals are subject to the DDESB-approved explosives rating (generally given as a TNT equivalent quantity) for the system. The DDESB-approved explosives rating is based on the maximum single detonation event, plus a safety factor, that the equipment can withstand without catastrophic failure occurring. Many of these types of equipment have established lesser ratings to allow for continued use following an accidental or intentional detonation. An unexpected detonation of the full-rated amount can shut a process down while the causes and damage are investigated.

[4] The Secretary of the U.S. Army is the assigned the SMCA mission per Department of Defense Directive (DoDD) 5160.65, "Single Manager for Conventional Ammunition", August 1, 2008

ENCLOSURE 2: DDESB-APPROVED SYSTEMS

- **Hot Gas Decontamination Facility:**

  - Located at Hawthorne Army Depot, Nevada.
  - Processes explosives contaminated materials from an initial "trace explosives-contaminated" to a final "releasable to the public" condition.
  - Each item is to be inspected prior to storage and processing at the facility to ensure only trace amounts (or less) of explosives are present.
  - The explosives limit for the decontamination chamber itself is 5 lbs Net Explosive Weight (NEW) of Hazard Division (HD) 1 .1. This limit is based solely on available distance, not on the most probable NEW expected at the decontamination chamber.

- **Industrial Waste Processor (IWP) and Caffee Road Thermal Decontamination Area (CRTDA)**:

  - Located at Indian Head, MD
  - Processes explosives contaminated materials from an initial "trace explosives-contaminated" to a final "releasable to the public" condition.
  - NEW for the IWP is 2 lbs of HD 1.1 or 10 lbs of HD 1.3
  - NEW for the CRTDA is 1 lb of HD 1.1 or 1 lb of HD 1.3.

- **Transportable Controlled Detonation Chamber-Models T-25, T-30 and T-60:**

  Chambers of various NEW ratings for conducting intentional detonations.

- **Ammunition Peculiar Equipment (APE)-1236 Rotary Kiln Incinerator (Deactivation Furnace):**

  - Located at CAAA(Crane), TEAD (Tooele), MCAAP (McAlester), and HWAD (Hawthorne)
  - Feed rates up to 600 lbs/hour for burning certain Propellants, Explosives, and Pyrotechnics (PEP) (Bulk High Explosives – Comp B, TNT, Tetryl, Octyl, Black Powder, etc.; Bulk Single & double based propellants and composites; Bulk Pyrotechnics - signal flares, illuminating candles).
  - The weight of the material processed is not limited to the net explosives weight (i.e., it includes other materials, such as metal parts.)
  - The type material determines the actual feed rate.

- On average the feed rate approximates 250 lbs/hour. However, a heavily modified kiln, which is not the current APE 1236 system configuration, could potentially maintain a feed rate of 400 lbs/hour hour maximum (3.2M lbs maximum per year).
- Developed specifically for conventional end-item munitions.
- An explosive waste incinerator with burner located at the discharge end.

- **Static Detonation Chamber (SDC) 1200 CM:**

  - Located at Anniston, Alabama
  - Designed for thermal decomposition/controlled deflagration and burning reactions of high explosives and propellants. Has very limited throughput because the maximum detonable quantity allowed inside at any one time is 5.29 lbs of TNT equivalent material.

- **Kobe Steel - Vacuum Integrated Chamber (DA VINCH™ DV -60):**

  Designed for fragmenting munitions and solid rocket motors; method used for destruction by detonation.

- **Explosives Destruction System (EDS) Phase 1 and Phase 2 Units:**

  Designed for chemical munitions destruction by external (implosion) detonation.

- **Tactical Missile Demilitarization (TMD):**

  - Located at Letterkenny Army Depot
  - System used to section and destroy large tactical missiles.