National Academy of Sciences, Engineering, and Medicine

Committee on
Alternatives for the Demilitarization of Conventional Munitions

Department of Defense Explosives Safety Board (DDESB)
Organization, Functions, and Approvals

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Purpose

Inform the National Academies of Sciences, Engineering, and Medicine committee investigating

Alternatives for the Demilitarization of Conventional Munitions on:

1) The organization and functions of, and

2) Approvals granted by the
   Department of Defense Explosives Safety Board

Contents

- **DDESB Organization and Functions**
  - DDESB Overview
  - DDESB Policy Framework
  - DoD Explosives Safety Policy
  - DDESB Organizational Placement
  - DDESB Functional Organization

- **DDESB Approvals**
  - Hazard Classification
  - Protective Construction Design
  - Site Plans
  - DDESB System Approvals

The DoD Explosives Safety Board (DDESB)


Flash of Shells in Night
Long Symphony of Terror

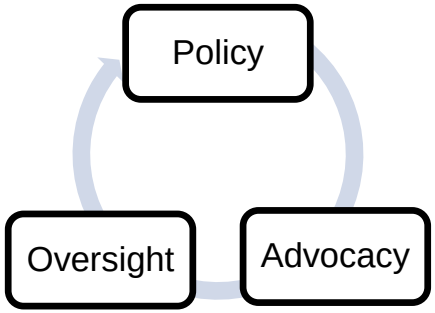
ORIGIN: Established in 1928 by Congress after a major disaster at the Naval Ammunition Depot, Lake Denmark, New Jersey in 1926. The accident virtually destroyed the depot, causing heavy damage to adjacent Picatinny Arsenal and the surrounding communities, killing 21 people, and seriously injuring 53 others.

MAJOR FUNCTIONS

- **Develop and maintain the DoD Explosives Safety Management Program**
- **Support Combatant Commanders' Mission where DoD Munitions are involved**
- **Support Multinational Organizations and Operations (NATO, UN, and State Dept)**
- **Support Joint Staff Assessments**
- **Develop and maintain DoD Explosives Safety Policy and Regulations**
- **Evaluate Military Services, Combatant Command and other DoD Explosives Safety Programs**
- **Perform explosives safety related R&D**

ORGANIZATION - 27

- **22 Civilians**
- **4 Military**
- **1 Contractor**



DDESB Policy Framework

DoD Directive 6055.09E, *"Explosives Safety Management"*

- Establishes the Department of Defense Explosives Safety Board
- Establishes Policy for DoD Explosives Safety Management
- Authorizes supporting and clarifying publications

DoD Instruction 6055.16, *"Explosives Safety Management Program"*

- Implements DoD Directive (DoDD) 6055.09E
- Prescribes procedures for the operation of the DoD Explosives Safety Management Program (ESMP)

Defense Explosives Safety Regulation 6055.09

(Replaces DoD Manual 6055.09, *"Explosives Safety Standards"*)

- Establishes explosives safety standards for the Department of Defense
- Standards are designed to provide minimum protection criteria to minimize serious injury, loss of life, and damage to property

Chairman of the Joint Chiefs of Staff Instruction 4360.01

"Explosives Safety and Munitions Risk Management for Joint Operations Planning, Training and Execution"

- Operationalizes explosives safety
- Clarifies chain of command for risk decisions

DoD Explosives Safety Policy

- Protect people and property from the intentional and unintentional, potentially-damaging effects of DoD military munitions from an **acute risk** perspective
- Expose the minimum number of people for the minimum time to the minimum amount of DoD military munitions required to safely and effectively execute the mission
- Provide for explosives safety of DoD military munitions throughout the munition's life cycle
- Require DoD Components to implement and maintain an effective ESM Program

DDESB Organizational Placement within DoD

James Mattis
Secretary of Defense

Ellen M. Lord
Under Secretary of Defense
(Acquisition, Technology & Logistics)

Lucian Niemeyer
Assistant Secretary of Defense
(Energy, Installations & Environment)

Maureen Sullivan
Deputy Assistant Secretary of Defense
(Environment, Safety & Occupational Health)

Thierry Chiapello
Executive Director
Department of Defense Explosives Safety Board

DDESB Functional Organization

Executive Director
- Directs DDESB staff
- Strategy (planning & implementation)
- Strategic Engagement
- Chairs Voting Board (per DoDD 6055.09E)

Policy

Oversight

Advocacy

Voting Board
- Votes on proposed explosives safety standards changes on behalf of their Service
- Communicates and advocates Service explosives safety issues and priorities
- Presents safety standard change proposals for Board consideration

Business Operations
- Financial Management
- Personnel Management
- General Administration
- Financial Planning
- Knowledge Management

Policy Development
- Technical Standards & Tools
- Explosives Safety RDT&E
- Protective Construction
- Mishap Analysis
- Hazard Classification
- Acquisition
- Strategic Partnering

Program Evaluation
- Evaluations
- DoD Explosives Safety Site Planning Oversight
- Munitions Response

Military Operations
- Service Liaison
- Joint Staff & COCOM Liaison
- Operational Support
- Future Operations

DDESB Approvals

- Address **Acute Risk**
- Limited to Aspects of Explosives and Chemical Agent Safety
  - Blast, Fragmentation, Thermal, Chemical Agent Lethality
- DDESB Approvals include:
  - Hazard Classification
  - Protective Construction Design
  - Site Plans (Operating Conditions, i.e., “License”)
    - Quantity-Distance Site Plan
    - Chemical Safety Submission (CSS)
      - System CSS, Operational CSS, Storage CSS
    - Munitions Response Safety Submission
      - Munitions Response Chemical Safety Submission,
      - Munitions Response Explosives Safety Submission
    - Risk Based Site Plan
    - Hybrid Safety Submission
  - DDESB System Approvals

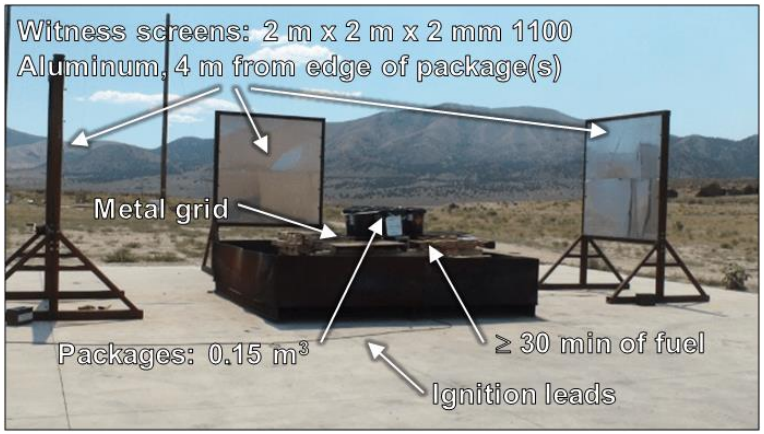
DoD management of hazardous operations and conditions involving military munitions

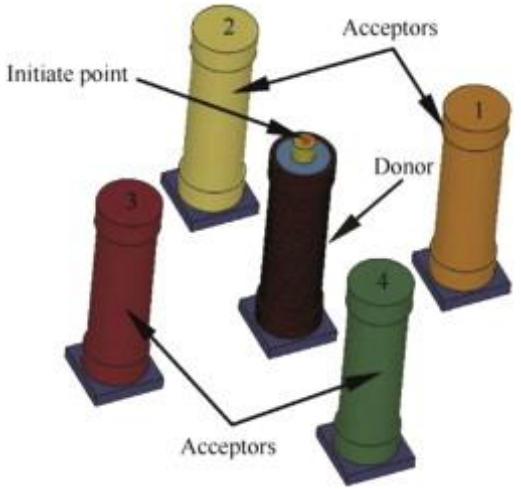
DDESB Approvals: Hazard Classification
(1 of 2)

- All munitions must be hazard classified prior to transportation and storage
- Hazard classification is the process of assigning one of the nine Department of Transportation classes and related subclasses to dangerous goods. Explosives are in Hazard Class 1, subclasses are:

1.1 Mass Explosion
1.2 Non-Mass Explosion, Fragment Producing
1.3 Mass Fire, Minor Blast or Fragment
1.4 Moderate Fire, No Significant Blast
1.5 Explosive Substance, Very Insensitive
1.6 Explosive Substance, Extremely Insensitive

- Hazard classification is based on a series of tests on the explosive material such as Single Package, Liquid Fuel/External Fire, Sympathetic Reaction, etc.





DDESB Approvals: Hazard Classification
(2 of 2)

- **Joint Technical Bulletin TB 700-2, DoD Ammunition and Explosives Hazard Classification Procedures**, implements the 49 CFR requirements and defines the DoD Hazard classification process for explosives
- **49 CFR § 173.56**, designates Chairman DDESB as the approval authority for DoD explosives hazard classification assignments

DDESB completes approx. 220 Hazard Classification Approvals per year

DDESB Approvals: Protective Construction

- DoD Explosives Safety Standards are typically satisfied by maintaining a minimum separation distance. If distance requirements can't be satisfied, protective construction may be used to provide an equivalent level of protection.

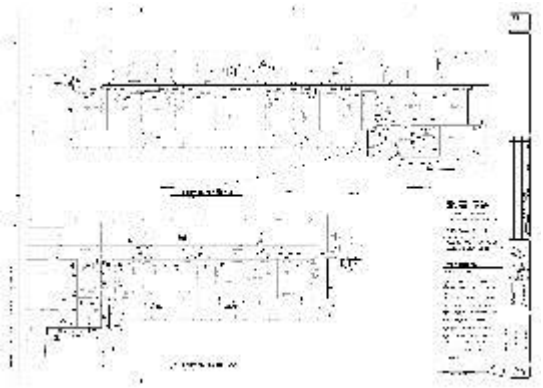
Protective Construction Approvals

Site plans that include protective construction in the facility design (e.g., laboratory)

Standard design approvals (e.g., Earth Covered Magazines)

"Special" full **containment vessels**

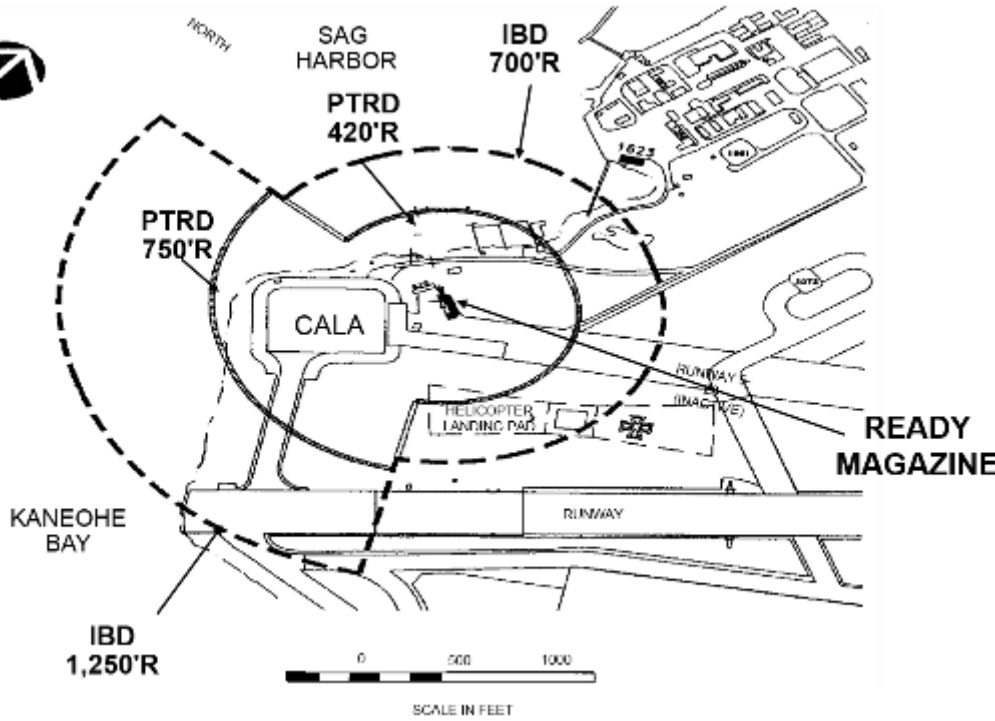
- Storage
- Demil



DDESB completes approx. 25 Protective Construction Approvals per year

DDESB Approvals: Site Plans
Quantity-Distance (QD) Site Plan

- **Evaluates relationships** between
  - "Potential Explosion Sites" (PES)
  - "Exposed Sites" (ES)
  - Operations
- Evaluation based on the deterministic quantity-distance (QD) criteria of DoD Explosives Safety Regulation for exposure, placement, and construction of the PESs and ESs.
- Application of QD criteria **does not provide for risk-free protection**, nor does it quantify the assumed risk
- Most site plans are QD Site Plans



DDESB approves approx. 400 QD Site Plans per year

DDESB Approvals: Site Plans Chemical Safety Submission (CSS)

- System CSS
  - Evaluates chemical agent and explosives containment capabilities of a system used in demilitarization operations
- Operational CSS (e.g., demilitarization, laboratory, etc.)
  - Evaluates the relationships between PESs and ESs based on chemical agent criteria and, if applicable, the QD criteria for exposure, placement, and construction of PESs and ESs
- Storage CSS
  - Evaluates the relationships between PESs and ESs based on chemical agent criteria and, if applicable, the QD criteria for exposure, placement, and construction of magazines, as well as containment and monitoring measures

DDESB approves approx. 1 – 4 Chemical Safety Submissions per year

DDESB Approvals: Site Plans
Munitions Response Safety Submission

- Munitions Response Explosives Safety Submission
  - Addresses explosives safety requirements for munitions responses that involve either the intentional physical contact with or the conduct of ground-disturbing or other intrusive activities in areas known or suspected to contain Munitions and Explosives of Concern (MEC)

- Munitions Response Chemical Safety Submission
  - Addresses the potential effects of an inadvertent release of chemical agent from a chemical munition during munitions response activities (e.g., intrusive field work)
  - May address both explosives and chemical agent safety

DDESB approves approx. 160 Munitions Response Safety Submissions per year

DDESB Approvals: Site Plans
Risk Based Site Plans & Hybrid Site Plans

- Risk Based Site Plans
  - Address PESs and ESs that do not meet QD criteria, but meet DDESB-approved, risk-based siting acceptance criteria
  - Risk based site plans are prepared using a DDESB-approved quantitative risk assessment method

- Hybrid Site Plans
  - Address facilities and operations that do not completely conform to QD criteria or meet the risk-based criteria
  - Once a DoD Component accepts the explosives or chemical agent safety risk for the nonconforming part of the hybrid site plan, it is forwarded to the DDESB for approval of the conforming QD portion

DDESB approves approx. 1 Risk Based Site Plan per year and approx. 25 Hybrid Site Plans per year

DDESB System Approvals

(Acute Risk / Blast, Fragmentation, Thermal, Chemical Agent Lethality)

1. Personnel Protection

- Blast containment and reduced QD
- Chemical containment

2. System effectiveness in processing “Material Potentially Presenting an Explosives Hazard” (MPPEH) to “material Documented as Safe (MDAS)

- DDESB **does not** evaluate systems for other types of feasibility (economic, environmental, etc.). These are covered by different processes.

DDESB completes approximately 2 System Approvals per year

DDESB Review of Systems for Personnel Protection

- Limited to explosives and chemical safety aspect of system
  - Entails review of component submitted "site plan" that includes demilitarization system
  - Approval based on meeting published explosives and chemical safety criteria for personnel protection from thermal, blast, fragmentation and chemical effects
    - NOTE: Criteria are established based on accidental or intentional detonations or burns of the material and the associated safety distances
- Adequacy of emissions governed by applicable local, state and federal regulating agencies and not addressed by DDESB approval

DDESB Review of Systems for MPPEH processing to MDAS

- DoD requires that “Material Potentially Presenting an Explosives Hazard” (MPPEH) be assessed and documented as Safe (MDAS) or
  - As having known or suspected explosives hazards (MDEH)
- To become MDAS, MPPEH must undergo one of the following:
  - 100 percent inspection and an independent 100 percent re-inspection
  - Processing by a DDESB-approved means with an appropriate post processing inspection
  - Expert Knowledge declaration
- DDESB Approval
  - DoD component submission with justification
  - Review to determine reliability of removing explosives hazard
  - Review of personnel protection aspects

DDESB Approved Systems with Demilitarization Applications

- **Limited to Explosives and Chemical Agent Safety**
  (Acute Risk / Blast, Fragmentation, Thermal, Chemical Agent Lethality)
- **Approval specific to system at a specific location**
  - System approval may be referenced for approval at a new location
  - Approval void if operational conditions change
- System approvals subject to **DDESB-approved explosives rating** (generally given as a TNT equivalent)
  - Explosives rating based on the maximum single detonation event plus a safety factor that equipment can withstand without catastrophic failure
  - Some approval submissions have established lesser ratings to allow for continued use following an accidental or intentional detonation
  - Unexpected detonation of full-rated amount can shut a process down while causes and damages are investigated

DDESB System Approvals – Part of a Larger Effort

- **1998 - OB/OD Optimization Report**
  - For nearly 30 years DoD has been exploring ways to reduce use of OB/OD
  - 1998 - DoD submitted 114 OB/OD permit applications
  - 2017 – DoD maintains approximately 40 permits
- **June 2017:** OSD AT&L, EI&E, DASD(ESOH) requested update to 1998 OB/OD Optimization study. Study will review:
  - Need to maintain existing OB/OD permits
  - Air monitoring literature and recommend way ahead
- Working with EPA to schedule DoD/EPA OB/OD meeting

Summary

- DDESB approvals include evaluation of munitions and munitions operations throughout their life cycle
- DDESB approvals of systems used for demilitarization:
  - **Are limited to explosives and chemical agent safety** (Acute Risk / Blast, Fragmentation, Thermal, Chemical Agent Lethality)
  - Initiated by Military Services
  - Associated (generally) with a site plan (license)
  - Do not constitute a blanket authority to operate
    - However, once complete, need not be repeated to use system as part of a new site plan
  - Do not address adequacy of demilitarization (PM-Demil) or characterization of emissions (Emissions permitting). These are covered by different processes.

DDESB Approved Systems

- Hot Gas Decontamination Facility (Hawthorne Army Depot, NV)
- Industrial Waste Processor (IWP) and Caffee Road Thermal Decontamination Area (CRTDA) (Indian Head, MD)
- Transportable Controlled Detonation Chamber
  - Models T-25, T-30 and T-60
- Ammunition Peculiar Equipment (APE)-1236 Rotary Kiln Incinerator (Deactivation Furnace) (Crane, Tooele, McAlester, Hawthorne)
  Not approved for MPPEH→ MDAS
- Static Detonation Chamber (SDC) 1200 CM (Anniston),
  1200 C (Blue Grass)
- Kobe Steel - Vacuum Integrated Chamber (DA VINCHTM DV -60)
- Explosives Destruction System (EDS) Phase 1 and Phase 2 Units
- Tactical Missile Demilitarization (TMD) (Letterkenny Army Depot)