



DoD Explosives Safety Board

Global EOD Conference and Exhibition



Colonel Leo Bradley
Director, Military Ops & EOD

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History and Background



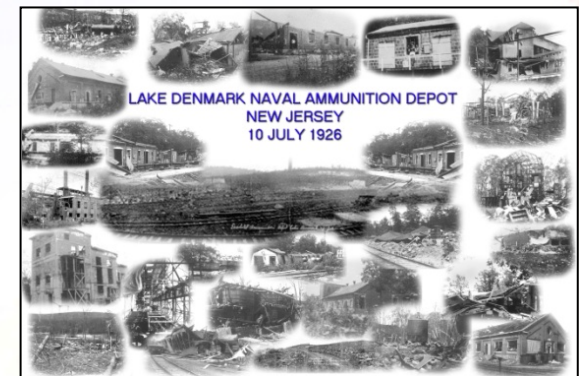
➤ Congressionally mandated in 1928

- Based on 1926 Lake Denmark explosives incident
- Joint Board of Officers appointed
 - ❖ Implement recommendations of House Report (No. 199) to Congress
 - ❖ Prevent endangerment to life/property
 - ❖ Ammunition storage focused



➤ DoDIG recommended changes in 2003

- Develop DoD ESM strategic plan
- Establish & oversee comprehensive DoD ESM
- Restructure DDESB to independent, objective full time body
- Update directive (DoDD 6055.9)



Mission, Vision, Goals, and Risk Management Strategy



- The DDESB is the senior organization within the Department of Defense (AT&L, DUSD I&E) for all explosives safety matters and:
 - Establishes explosives safety requirements and regulations for the military Services, Combatant Commands, contractors that manufacture military munitions for the DoD.
 - Oversees compliance through programmatic evaluations.
 - Enables the joint-warfighting mission by integrating explosives safety into planning and operations.



Mission, Vision, Goals, and Risk Management Strategy



- Provide the maximum possible protection to people and property from the damaging effects of DoD military munitions
- Make informed risk decisions at the appropriate level of leadership
- Provide tools to leaders and managers who are responsible for implementing effective explosives safety management (“operationalize”)
- Resulting in:
Responsible use of resources in identifying, evaluating, managing (preventing, controlling, mitigating) potential explosives and chemical agent safety risks.





DDESB Transformation

Significant Changes Since 2005



➤ Significant changes since 2005 include:

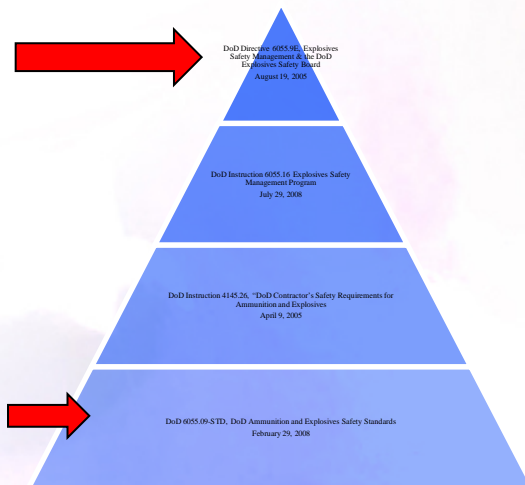
- 1) Improving Scientific Knowledge Base (Testing, Modeling, and Analysis)
- 2) Change from “Surveys” to Programmatic Evaluations
- 3) Knowledge Management
- 4) Munitions-Related Accident Data Management and Analysis
- 5) Deviation Management
- 6) Site Planning (Required Explosives Safety Submissions)
- 7) Operationalizing Explosives Safety





DDESB Transformation

Improving Scientific Knowledge Base



**RDT&E Program
is the foundation of
the DoD's ESMP**

➤ DDESB's RDT&E program addresses gaps and deficiencies in the science behind the explosives safety program and requirements and consists of the following:

- **SPIDER Program** addresses the protection provided by typical wall and roof materials to debris impact
- **ISO Studies** examining the protection provided by and the hazards from explosions inside ISO containers
- **SciPan program** examining the debris generated inside aboveground concrete structures at various loading densities
- **KLOTZ Group** explosion test program
- Development of a searchable data base for all data (electronic records, videos, photographs, etc.) obtained on DDESB-sponsored testing projects
- Data Mining of additional information (such as initial velocities, launch angles, impact angles, etc.) of both U.S. and U.K. debris data

...the future...



DDESB Transformation

From “Surveys” to Evaluations



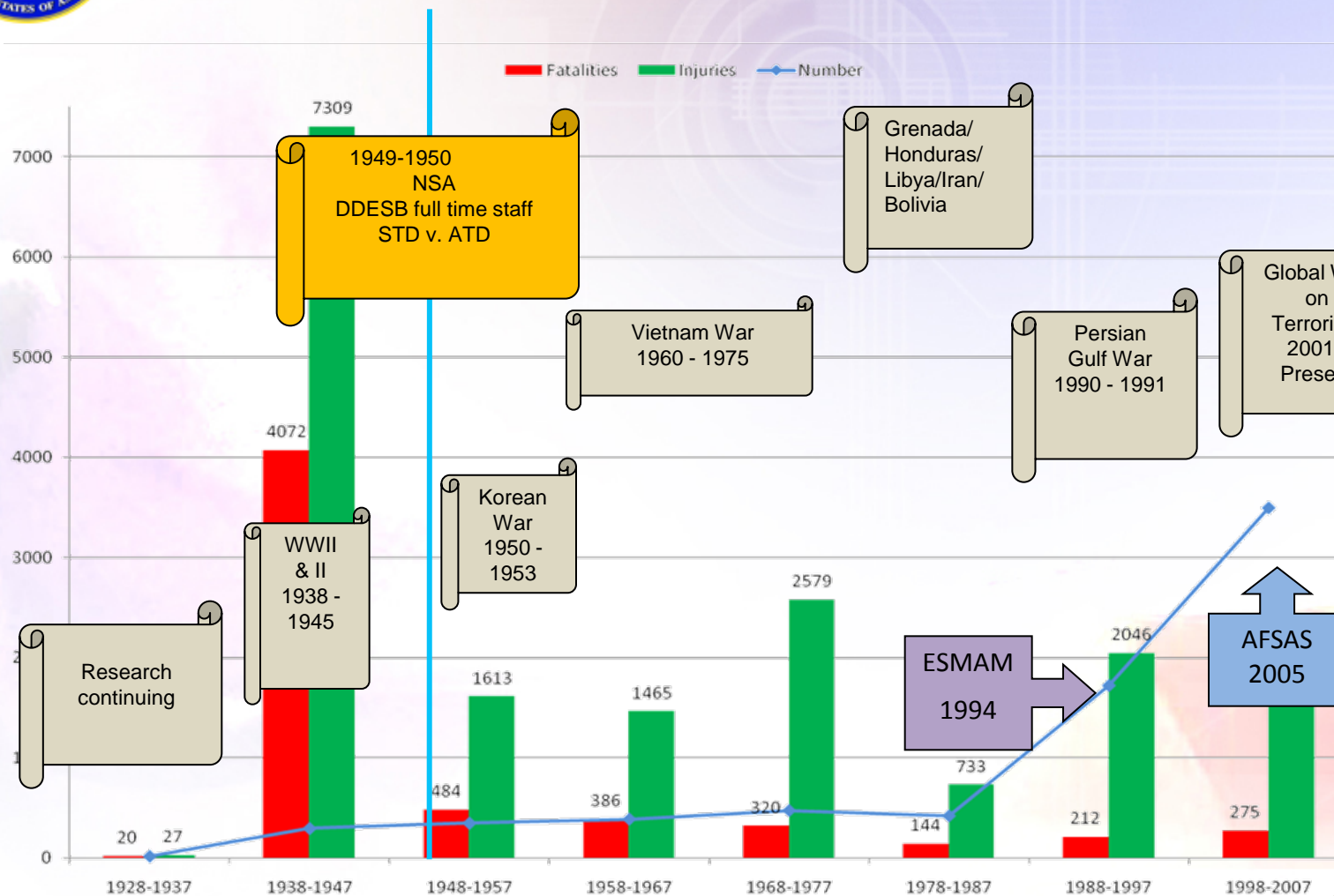
- **Problem.** Historically, the DDESB “*surveyed*” every installation in the DoD and did not leverage the data due to process inconsistencies.
Transition from “*Surveys*” to Programmatic Evaluations
 - Survey evolution and purpose (HR 199)
 - From 36 installations to ~900+

- **Solution.** DDESB in 2008 transitioned from surveys to Component Explosives Safety *Programmatic Evaluations*
 - Purpose, methodology, tools, and culture
 - Components evaluated approximately every 4 years
...feedback for improvement...

- 2009 first full year Programmatic Evaluations conducted



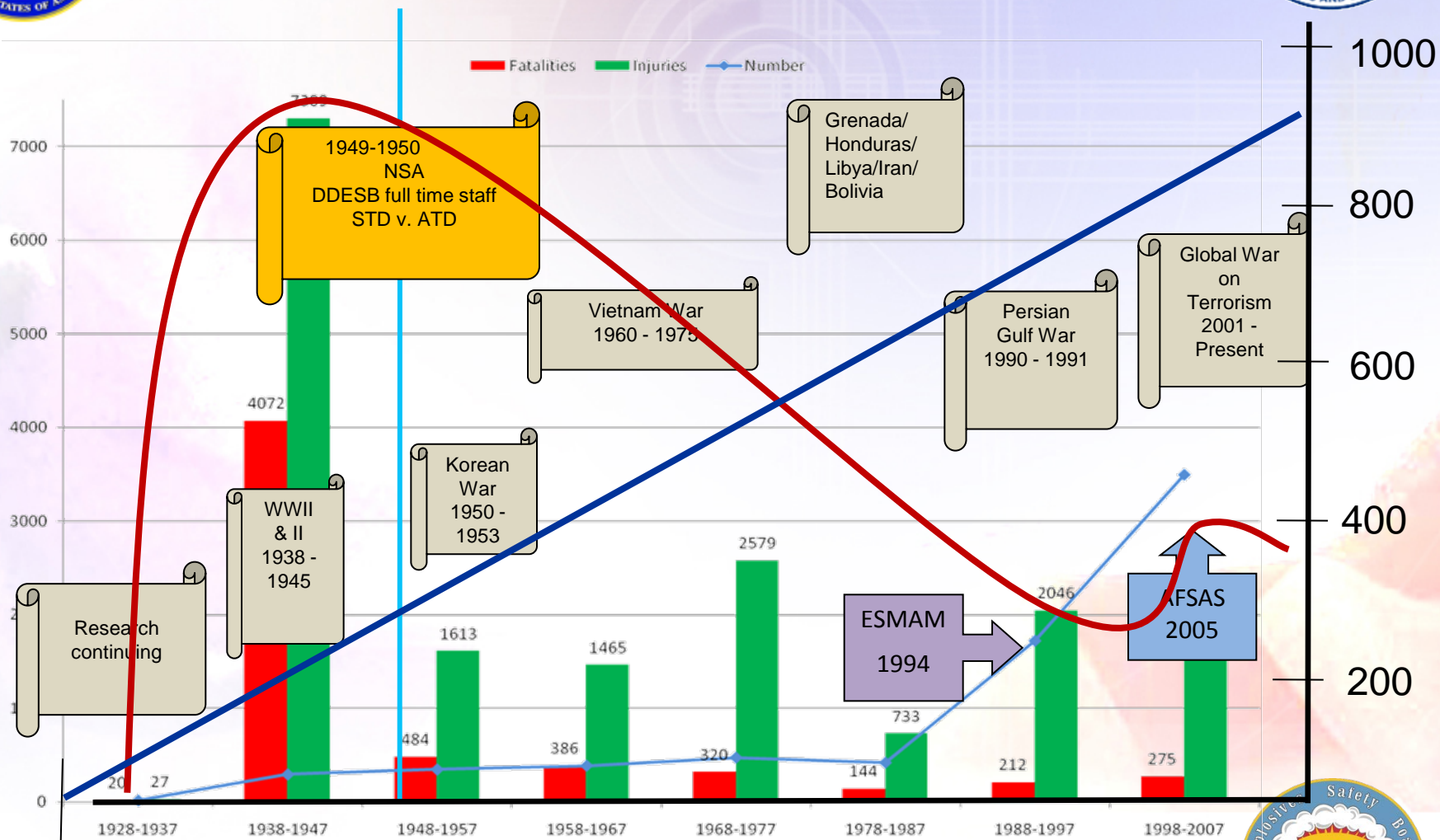
Significant Events in Relation to Mishap Totals (10FY)



Policy - R&D - Advocacy - Oversight

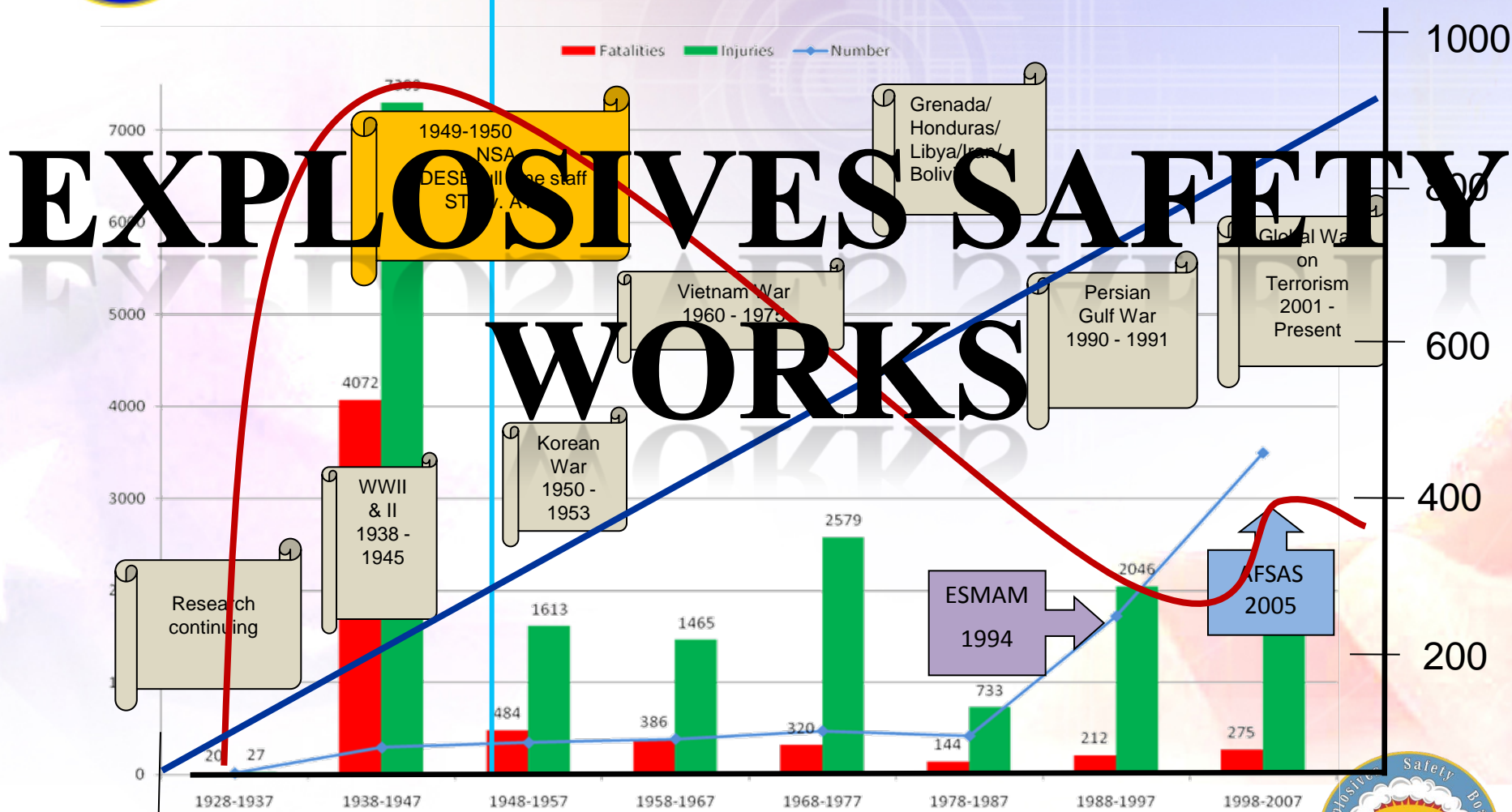


DoD Installation Growth in Relation to Munitions-Related Accidents 1928-2007





Proving the Null Set Hypothesis...



EXPLOSIVES SAFETY WORKS

36

Policy - R&D - Advocacy - Oversight



DDESB Transformation Deviation Management



Do the right people have the right information to make informed decisions and accept risk at the right level?

Problem. Before 2009 a standardized risk documentation process did not exist to identify and communicate munitions-related risks to appropriate levels of authority when deviating from explosives safety requirements.

Solution. Developed Technical Paper (TP) which provides a methodology for calculating explosives safety risk and presents a course of action and tool to standardize the deviation process for explosives risk decisions and hybrid site plan review.



DDESB Transformation

Site Planning and Approvals



- **Problem.** Inspector General documented that DDESB only reviewed site plans for munitions-related operations that met DoD Explosives Safety requirements.

- **Solution.** Revised approach to site planning in support of the Services' and Joint Warfighters' mission
 - Five types of Required Explosives Safety Submissions (ref: *DoDI 6055.16, July 29, 2008 Encl. 10 pages 33-34*)
 - 1) Quantity-Distance Safety Submission
 - 2) Munitions Response Chemical Safety Submission (MRCSS)
 - 3) Munitions Response Explosives Safety Submission (Former ESS)
 - 4) Risk-Based Safety Submission
 - 5) Hybrid Safety Submission (HSS)





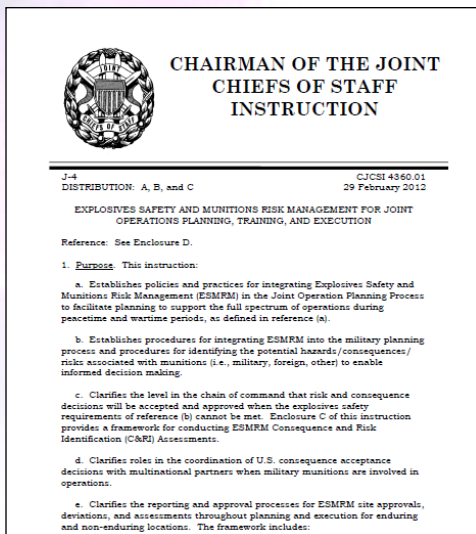
CJCSI 4360.01 Explosives Safety and Munitions Risk Management For Joint Operations Planning, Training, and Execution



- **CJCSI 4360.01 links ESMRM requirements to DoD joint warfighter by ensuring that munitions-related risks and risk-reduction options are consistently captured for the Combatant Commanders' decision.**

➤ Instruction Contains 3 Pages and 3 Separate Enclosures.

- Encl A. Roles and Responsibilities.
- Encl B. Site Planning, When to Use, and Site Planning Process.
- Encl. C. Standardizes approach for Consequence and Risk Identification Assessment process.





CJCSI 4360.01 Organization and Content



- Instruction Establishes procedures for integrating ESMRM into the military planning process for Combatant Commander risk acceptance.
- Clarifies the two separate and distinct approval processes for ES/MRM. The processes include:
 - Locations that can meet exp. safety requirements
 - Locations that cannot meet exp. safety requirements
- Emphasizes that there are two chains of command within the U.S. Department of Defense (Operational and Support) and how these two chains should inter-relate for ESMRM issues





DoD Explosives Hazard Classification System



- All DoD military munitions must be hazard classified prior to transportation or storage
- DDESB is the DoD military munitions hazard classification authority (Title 49, Code of Federal Regulations, Part 173.56)
- Functions:
 - Develops and maintains proponentcy over the Joint DoD military munitions hazard classification process/procedures
 - Develops and interprets hazard classification requirements and protocols
 - Adjudicates and recommends approval of hazard classification alternate test plans and the final hazard classification for DoD military munitions
 - Forwards DoD final hazard classification assignments to the Department of Transportation (DOT)
 - Provides the DOT with list of DoD personnel with signature authorities for issuing interim hazard classifications





Inter/Intra Agency Collaboration



- Munitions Response Committee (DoD, EPA, States and Federal Land Mangers)
- National Aeronautics and Space Administration (NASA)
- Interagency Committee on Explosives (ICE)
- Institute of Makers of Explosives
- Department of Energy (Technical Cooperation Program) and Safety reviews
- Technical Support Working Group (TSWG)- ATF, DoD, DHS, DTRA
- Department of Transportation
- National Research Council
- Joint Army Navy NASA Air Force (JANNAF)
- DDESB Working Groups





International Collaboration



- NATO AC/236 and AC/327
- The Technical Cooperation Program (Australia - Canada - New Zealand - United Kingdom - United States of America)
- Munitions Safety Information Analysis Center (MSIAC) – a NATO Project Office under the auspices of the Defense Investment Division
- Information Exchange Agreements/Memorandum of Understanding
 - Canada
 - Australia
 - United Kingdom
 - France
 - Israel
 - Singapore





Protective Construction Design



- Protective construction is a method of protecting people, assets, property, and the environment from the effects of an military munitions mishap
- Protective construction includes:
 - Potential Explosion Sites
 - Exposed Sites
 - Equipment
 - Process
 - Item design
- Goal: demonstrate equivalent protection at less than the minimum prescribed separation distances or to reduce the maximum credible event for military munitions siting
- The DDESB has oversight and approval responsibility for protective construction designs used to support reduced Explosives Safety Management distances in military munitions safety submissions





Advanced EOD Magazine



- **Approved 27 FEB 01**
- **This design was developed by NAWC Weapons Division, China Lake, for Air Force EOD, which had a need for a deployable explosives storage magazine with a minimal ESQD. This design uses a modified off-the-shelf ARMAG Corporation magazine to provide additional venting and 17 special pumice-lined containers (for storage of HD 1.1 and 1.3 AE) to limit the MCE in the magazine to 1.25 pounds NEW of C-4. HD 1.4 items are stored within metal containers on the internal expanded metal shelves. The maximum NEW permitted in the magazine is 128.24 pounds. An Air Force EOD kit contains approximately 254 pounds NEW, therefore two of these magazines are required to hold the EOD kit. A 10-foot clear area is required around the Advanced EOD Magazine, within which no permanent personnel are permitted. NAWS China Lake Test Report NAWCWD TM 8331 defines all conditions and modifications associated with use of the Advanced EOD Magazine.**





EOD RSL



- **Approved 27 MAR 98**
- **This design was developed by NAWC Weapons Division, China Lake. It uses a modified off-the-shelf Sam Nally magazine to provide additional venting and seven special pumice-lined containers to limit the MCE in the magazine to 0.625 pounds NEW. A 30-foot clear area is required around the EODRSL, within which no permanent personnel are permitted. NAWS China Lake Test Report NAWCWPNS TM 7979 defines all conditions and modifications associated with use of the EODRSL. On 25 Oct 2000, the DDESB approved the addition of an eighth pumice-lined container for the storage of no more than 10 explosives-loaded enhanced 1.5 liter Mineral Water Bottle (MWB) tubes and/or standard 1.2 liter MWB tubes. The MCE remains unchanged.**





EOD RSL Test Overview



- **USTCES Sponsored, Supported by the Corps of Engineers, DDESB, and NAVFAC**
- **3 Tests –**
 - 2 barricaded, 1 unbarricaded
 - 110 lbs C-4 per test
 - most common configurations tested
- **Geo-located all fragments, gathered pressure data, and recorded high speed video (8 cameras)**
- **Why?**
 - EOD with rapid response mission require quick access to munitions, munitions usually in compounds
 - Storage locations normally impact unrelated personnel
 - No pumice lined cells – unavailable for use but typically removed from unit
 - No way to quantify risk to equipment, personnel, and facilities



Test 1



• Setup

-3 foot thick HESCOs
abutting sides, 2 foot earth
cover, front barricade 6 feet
from door

• Results

-Furthest fragment was a
lifting ring found 54 feet
from GZ
-Lifting ring was located on
roof
-79 total fragments
recovered
-54 found within 20 feet of
ground zero





Test 2



• Setup

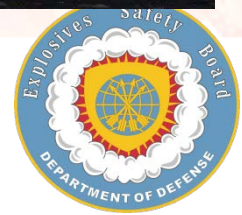
-4 foot standoff from sides and back, front barricade 6 foot from door, no over head cover

• Results

-Furthest fragment was the 3 lb lifting ring from the roof found at 1,432 feet

-Roof found 721 feet from GZ, Walls were found less than 27 feet of GZ, Furthest door fragment was found 57 feet from GZ

-729 fragments found, 472 found less than 200 feet from GZ



Test 3



•Setup

-No Barricades, no overhead cover

•Results

-3,058 fragment located

-Furthest fragment was upper vent cover on back wall, 31 lbs, 1,704 feet from GZ

-Left wall 867 feet, Right wall 549 feet, Back Wall 521 feet, Roof 780 feet, Door 790 feet





- **Analysis**
 - Current analysis ongoing (1 frag in 600 ft², pressure profiles, consequence/risk model)
- **Inhabited Building Distance – 110 lbs NEW**
 - Current Requirement – 6055.09M, V3.E3.T2 = 695 feet
 - K40 – Blast only = 192 feet
 - ARMAG w/ overhead cover = ??? feet
- **Path Forward**
 - TP 15 Protective Construction – Include ARMAG
 - Improve Trajectory Codes – Excellent data from test 3
 - ARMAG Technical Data Package?
 - Best Practices
 - Explosives Safety Bulletin



Questions?



Leo E. Bradley
Colonel, U.S. Army
Leo.bradley@us.army.mil