



Demilitarization as a Systems Engineering Requirement

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*Performs end of lifecycle management for conventional ammunition
to include disposition and demilitarization*



Outline



- **The Demil & Disposal Requirement**
- **Demil Challenges**
- **Design for Demil (DFD)**
- **DFD Design Considerations**
- **Summary**
- **POCs**



The Demil & Disposal Requirement

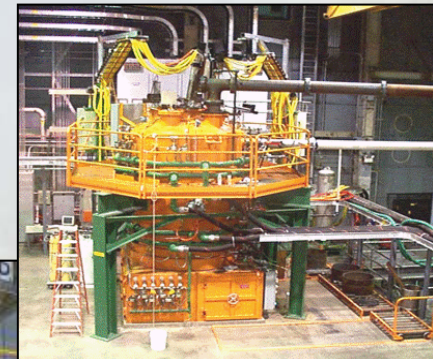


- “At the end of its useful life, a system shall be demilitarized and disposed ...” DoDI 5000.02
- Demil is “... destroying the military offensive or defensive advantages ... to prevent the further use ...” DoD 4160.12-M-1
- Responsibility for demil of all Services’ conventional ammunition is assigned to the Army as the Single Manager for Conventional Ammunition (SMCA)
- The Army Product Manager for Demilitarization (PM Demil) executes the SMCA demil mission through the “Demilitarization Enterprise”





Demil Execution: Then/Now/Future





Demil Challenges

Growing
Stockpile

Increasing
Cost

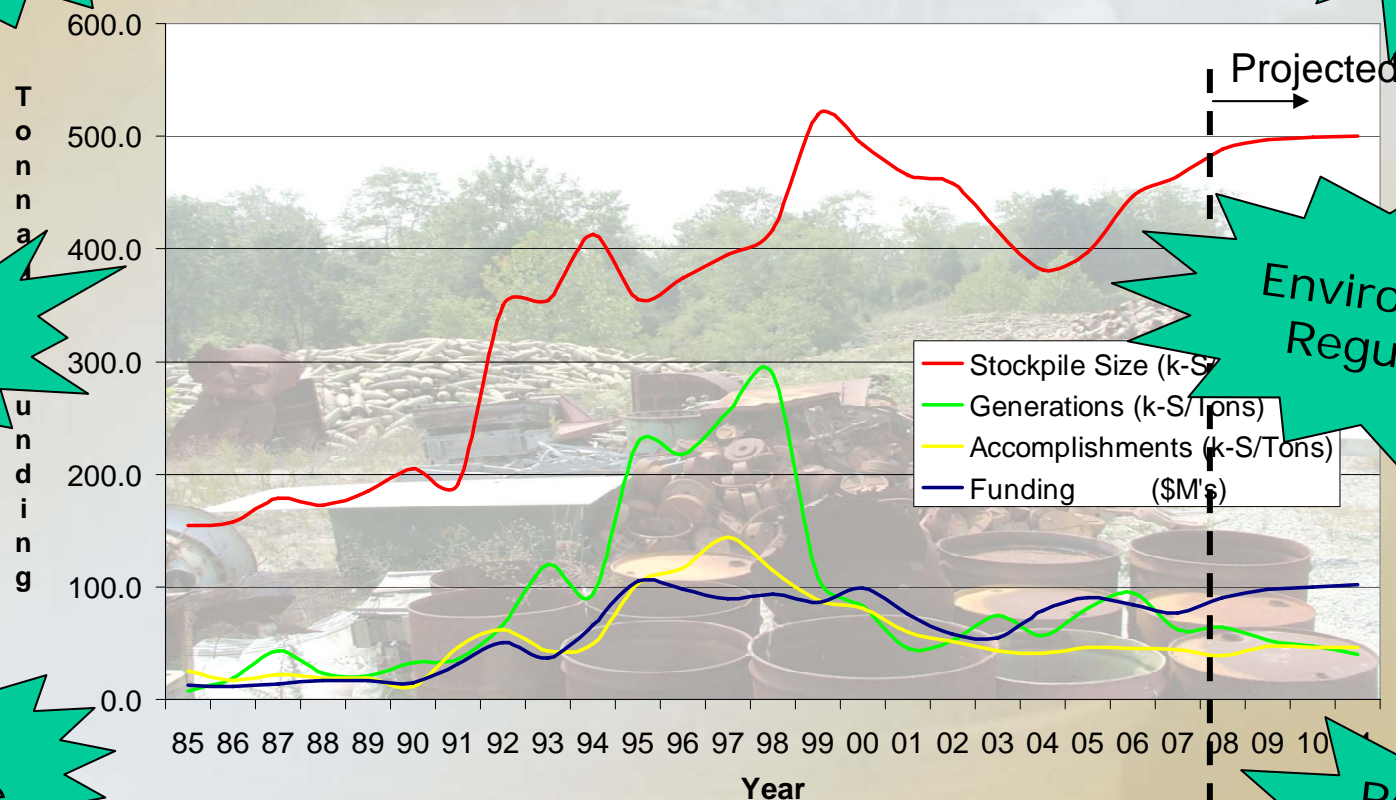
Limited
Funding

Environmental
Regulations

Limited
Storage

Recycle
& Reuse

Demil Stockpile History

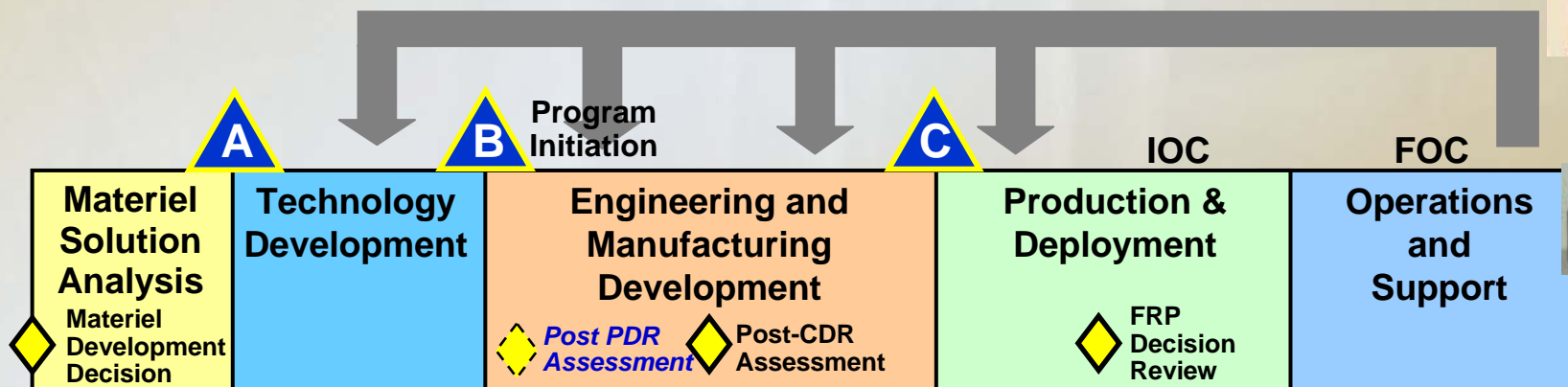




Design for Demil (DFD)



- Demil is a life cycle requirement that must be adequately addressed in design phase
- Goal: Include demil as a systems engineering requirement early to influence the design & positively impact future Demil execution

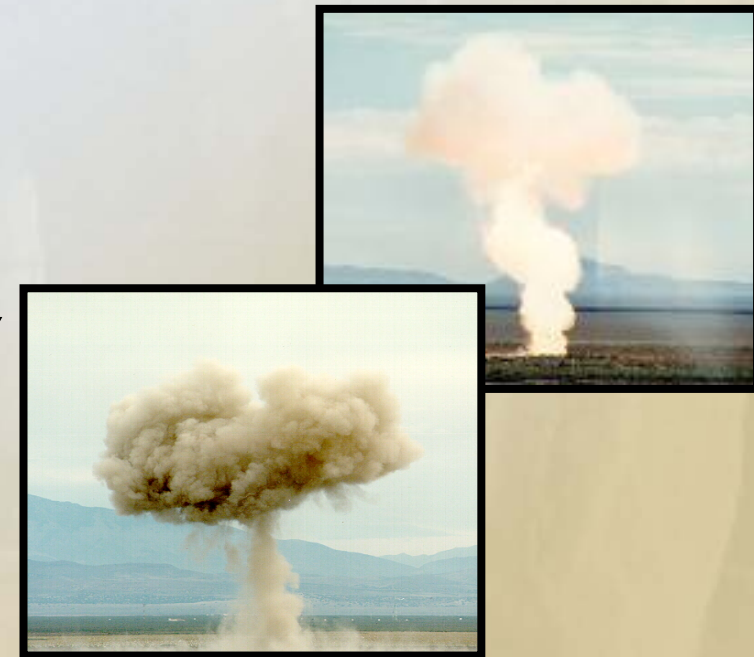




Why Design for Demil?



- Traditionally, munition designers focus on item performance & may not be aware that design decisions can lead to difficult demil problems at the end of the item's life cycle
- In the past, OB/OD "took care of the problem"
- *Munition design historically had little impact on the ability to conduct effective and efficient demil (OB/OD)*
- But things have changed ...





Design decisions made early in the life cycle have a significant impact on end of life cycle Demil operations!



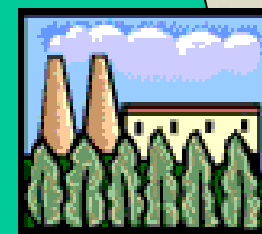
Reduced OB/OD,
Advanced Demil Tech.



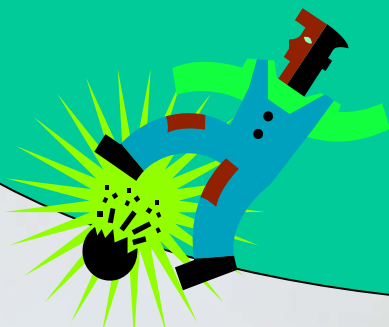
Life Cycle Cost

Systems
Engineering

Why DFD?



Environment



Safety



Resource, Recovery, &
Recycling (R3)



Readiness

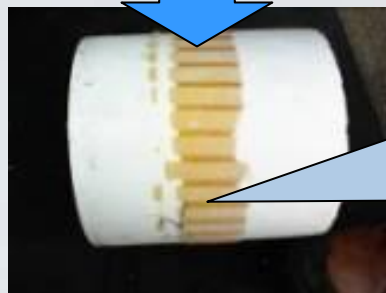
DFD is a proactive approach to addressing future Demil challenges.



Design Impact on Demil

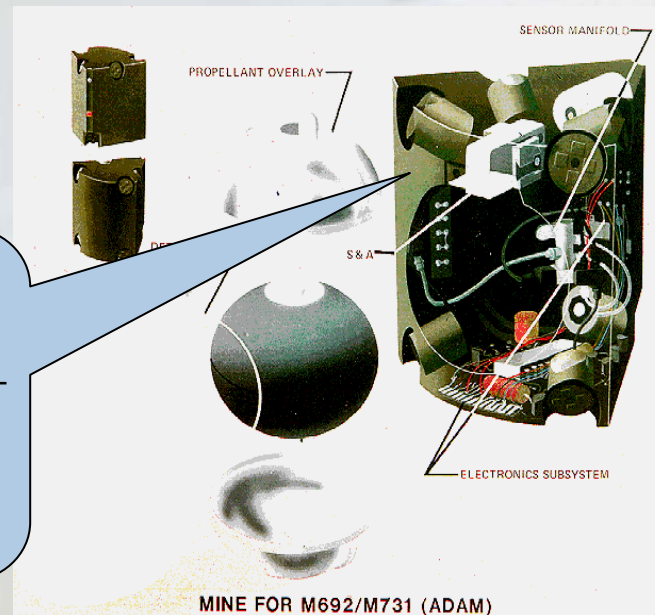


SPARROW 17A/B WARHEAD

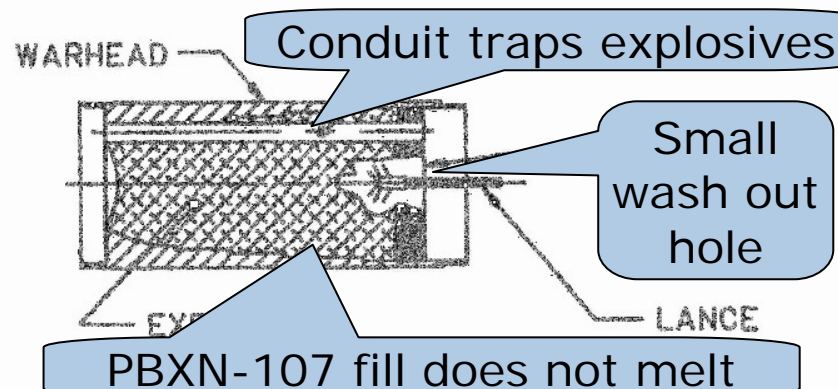


ADAM MINE

Depleted Uranium Salt requiring \$1M+ additional demil equipment





HARM WDU-21B NAVY





DFD Policy

- DFD policy signed 4 Aug 08 by Mr. John Young, Undersecretary of Defense for Acquisition, Technology & Logistics

 <p>THE UNDER SECRETARY OF DEFENSE 3010 DEFENSE PENTAGON WASHINGTON, DC 20301-3010</p> <p>Aug 14 2008</p> <p>MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS CHAIRMAN OF THE JOINT CHIEFS OF STAFF COMMANDER, U.S. SPECIAL OPERATIONS COMMAND DIRECTOR, OPERATIONAL TEST & EVALUATION DIRECTORS OF THE DEFENSE AGENCIES</p> <p>SUBJECT: Design for Demilitarization of Conventional Ammunition</p> <p>Demilitarization is an ever-present problem in the Department – especially for conventional ammunition due to the inherent safety hazards and environmental classification as a hazardous material. Conventional ammunition, for the purposes of this memorandum, is defined as (in DoD Directive 5180.65, Single Manager for Conventional Ammunition) encompassing any item containing propellants, explosives, or pyrotechnics.</p> <p>The current U.S. military-based demilitarization stockpile of conventional ammunition is approximately 500 thousand short tons, and growing. This represents a cost to the Department not only in dollars, but also in operational readiness. Conventional ammunition systems that do not incorporate demilitarization considerations into their design are prone to present a variety of challenges at the end of the life cycle during demilitarization operations. These systems increase life cycle costs and create safety and environmental issues. They also create missed opportunities to recover value through reclamation and reuse of conventional ammunition materials and components. The Acquisition Community has an opportunity to address proactively these problems for future conventional ammunition.</p> <p>Good systems engineering addresses all aspects of the life cycle, including systems' demilitarization and disposal. During systems design, conventional ammunition designers can facilitate optimal demilitarization methods and resource reclamation and reuse by implementing Design for Demilitarization. This includes designs for conventional ammunition that: facilitate disassembly and access to energetic materials; use energetic materials and components having reclamation or reuse potential; efficiently accommodate existing demilitarization processes; reduce the use of environmentally sensitive materials; and enhance safety for demilitarization operators.</p> <p>To implement Design for Demilitarization, the Military Departments, Defense Agencies, and the U.S. Special Operations Command will include in their acquisition documentation for all pending (i.e., pre-Milestone A) and future conventional</p>	<p>ammunition programs how they intend to address demilitarization design requirements throughout system design. Specific requirements for Design for Demilitarization of conventional ammunition are attached.</p> <p>This policy supports the Department's objectives in Total Life Cycle Management. While this effort focuses primarily on conventional ammunition, Design for Demilitarization is a good systems engineering practice that should be applied to all defense programs.</p> <p>My point of contact is Mr. Jose Gonzalez at 703-693-9203. Additional assistance can also be obtained from Mr. Gary Mescavage, with the Armament Research, Development, and Engineering Center, at 973-724-3349.</p> <p> John F. Young, Jr.</p> <p>Attachment: As stated</p> <p><i>“Good systems engineering addresses all aspects of the life cycle, including systems’ demilitarization and disposal.”</i></p> <p>2</p>
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DFD Policy



- DoD I 5000.02 (Dec 8, 2008) amended (para. 8.c.(2)) to increase emphasis on demil consideration during design ...

(2) Disposal. At the end of its useful life, a system shall be demilitarized and disposed of in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment.

During the design process, PMs shall document hazardous materials contained in the system in the Programmatic Environment, Safety, and Occupational Health Evaluation (PESHE) (see Section 6 in Enclosure 12), and shall **estimate and plan for the system's demilitarization and safe disposal.**

The demilitarization of conventional ammunition (including any item containing propellants, explosives, or pyrotechnics) shall be considered during system design.



Demil Plan vs Design for Demil



Demil Plan



Design for Demil

- Typically done late in the design
- Prescribes a procedure for demil
- Afterthought
- Reactive

- Done throughout design
- Influences the design for efficient demil
- Forethought
- Proactive

Demil Plans can encourage but do not assure design for demil!



Item Performance



- Design for Demil is not intended to detract from achieving item performance
- Design trade offs will be handled by the Item PM
- Low cost design changes that do not impact performance could be made ... if demil is included up front and early as a requirement





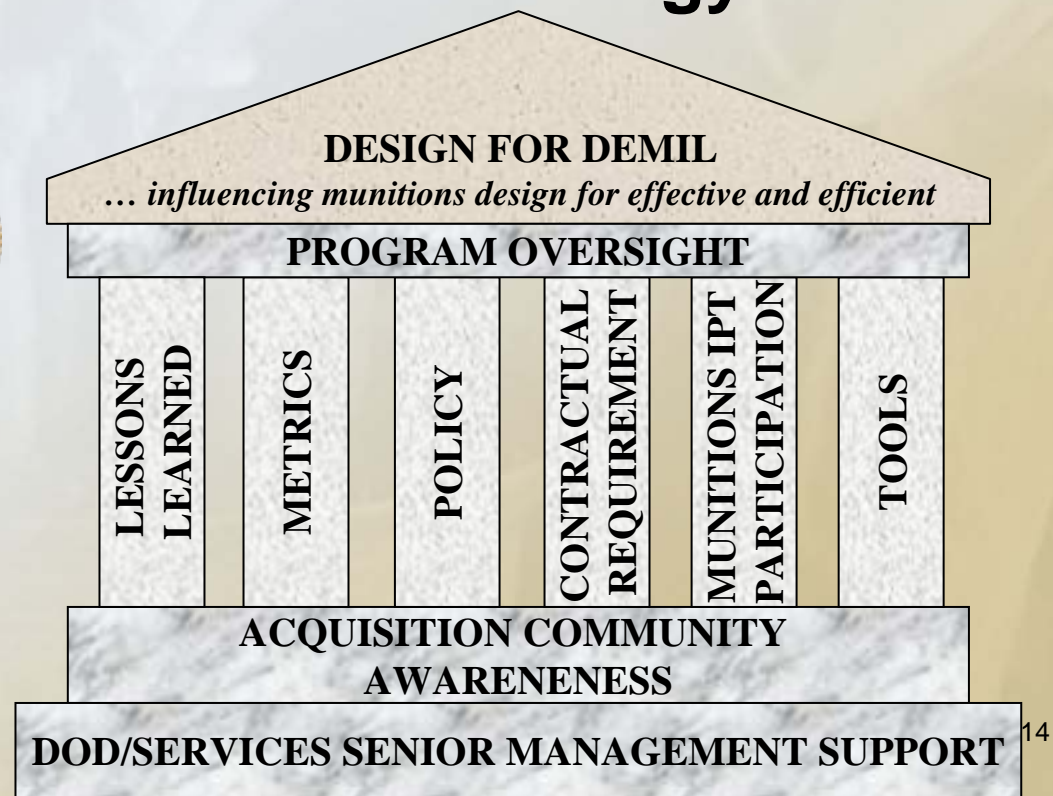
Design for Demil IPT & Implementation



- DFD is a key strategic goal of the PEO Ammo approved Demil Enterprise Strategic Plan
- Multi-Service DFD Integrated Process Team (IPT) chartered to establish DFD strategy and approach



- Multi-faceted approach is being pursued to implement DFD





DFD Policy Requirements



“... include in acquisition documentation how (you) intend to address demilitarization design requirements throughout system design.”

- **Define a demilitarization design requirement**
 - ✓ Include in acquisition documentation
 - ✓ Include throughout systems engineering process
- **Address DFD activities in program reviews**
- **Include valid estimates of demilitarization in Life Cycle Cost/affordability estimates**
- **Develop a demil plan demonstrating DFD features**
- **Include in Developmental Testing**



DFD Design Considerations



- Easy disassembly
- Easy access to and removal of energetics
- Materials & components that are reusable, recyclable, and non-hazardous
- Accommodates existing Demil capabilities and avoids special tools
- Consider demil operator involvement

Key: Incorporate DFD considerations early to mitigate Demil impact and cost while not affecting mission capability



Summary



- **Demil is a life cycle requirement that must be included early in the systems engineering process**
- **Early ammunition design decisions impact Demilitarization operations**
- **DFD is a policy requirement and a proactive way to mitigate future Demil challenges**
- **Forethought during early development will reduce the cost associated with end of life cycle management, with little impact to development cost**



DFD POCs



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<https://www.pica.army.mil/pmdemil>