# Innovative Approaches for Recycling Munitions


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# Demil Enterprise Mission, Vision and Goals

## *Mission:*

**The Demil Enterprise performs end of life cycle management for conventional ammunition to include disposition, demilitarization, and disposal with an emphasis on closed disposal including *economically viable resource recovery and recycling for all DoD services*. Further the Enterprise performs demil R&D and influences ammunition design for demil to reduce ammunition total life cycle costs.**

## *Vision:*

***A seamless, effective joint enterprise of acquisition and functional expertise committed to efficient reduction of the U.S. conventional munitions demil stockpile that improves Warfighter readiness, and enhances safe operations while safeguarding the natural environment for the American People.***

## *Goals:*

1. **Reduce the demil stockpile**
2. **Emphasize closed disposal**
3. ***Implement resource recovery and recycling* when economically viable**
4. **Promote Design for Demil as policy and requirement for all new or modified conventional ammunition products**
5. **Match demil execution infrastructure capability and capacity to execution requirements**
6. **Use strategic planning to guide operational action**
7. **Pursue, transition, and integrate R&D technologies that close capability gaps and increase cost effectiveness**
8. **Safety and environmental stewardship**
9. **Enhance collaboration and communication within the Demil Enterprise**
10. **Strive for continuous improvement in all Demil Enterprise activities**

# Purpose

- **Enhance market interest in recyclable materials resulting from the demilitarization of munitions**
  - ✓ **Describe demil processes**
  - ✓ **Describe demil requirements**
  - ✓ **Characterize the demil stockpile**
  - ✓ **Describe opportunities for recycling materials**
  - ✓ **Provide a panel discussion forum for questions and comment**

# Current Demil Processes

## Hot Gas Decontamination Furnace

Low Temp Distortion-Free Process

## Deactivation Furnace

Generates 5X Scrap

# Current Demil Processes

## Contained Detonation

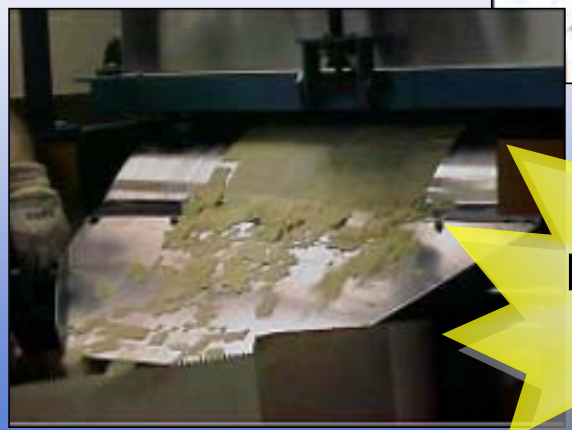
Similar to Range Scrap

## Autoclave Meltout

3X Decon

# Current Demil Processes

## Explosives Rework



**Bulk Explosives Available**

**Picric Acid**

## Explosive D Conversion

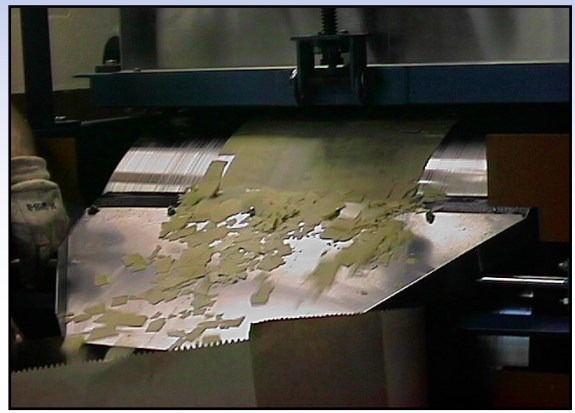

# Current Demil Processes as a Source of Supply

## TOW Missile Components:

- Missile Case (FMS & US Production - 15K)
- Operation Iraqi Freedom (Retrograde Use)
  - Foam Cushion
  - End Caps
- Potential Reuse:
  - Launch Motor Nozzle
  - Coated Launch Motor Case

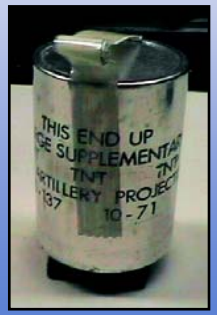
## TNT:

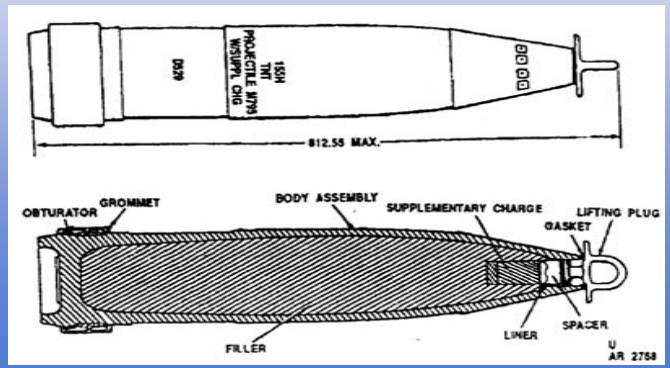
- 17M lb Dept of Defense requirement thru FY05
- As of March 05, 13.4M lbs used/available



## Supplementary Charges:

- 8” & 105mm ammo reused in new 155mm (M795 & M107) & 105mm (M927) projectiles




## Depleted Uranium Penetrators:

- Reused in new M829A3 120mm tank & M919 25mm cartridges
- Approximately 137K in Demil account

M829 120mm Armor Piercing, Fin Stabilized, Discarding Sabot-Tracer (APFSDS-T) cartridge with DU penetrator

# Current Demil Processes as a Source of Scrap

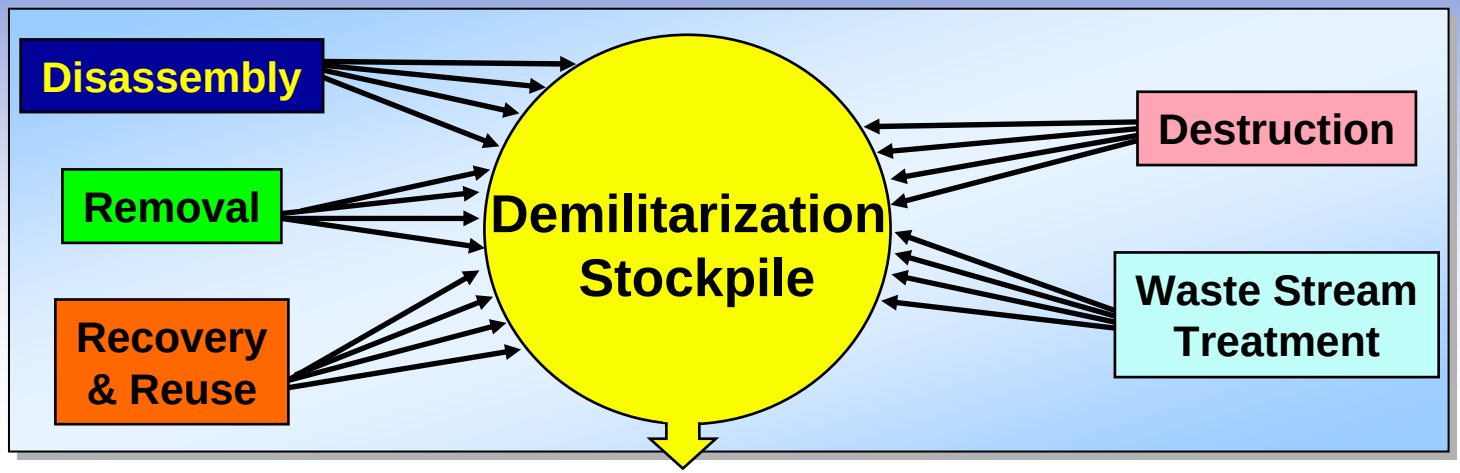
## Scrap Material Generated in a Typical Year by the Government's Munitions Demil Operations

| Material (in pounds) | Anniston | Blue Grass (1) | Crane | Hawthorne (2) | McAlester (3) (4) | Red River | Tooele | Total |
|---|---|---|---|---|---|---|---|---|
| **Aluminum** | 115,000 | | | | | | | **115,000** |
| **Aluminum Alloy** | 3,750 | 26,495 | 324,240 | 435,416 | 47,104 | 286,373 | 118,096 | **1,241,474** |
| **Brass** | | 2,457 | | 286,488 | 5,240 | | | **294,185** |
| **Copper** | 22,000 | | 103,293 | | | | | **125,293** |
| **Copper Alloy** | | 349,871 | | 398,095 | 79,820 | | | **827,786** |
| **Propellants** | | 264,605 | | 372,872 | 572,500 | 56,550 | 132,858 | **1,399,576** |
| **Explosives** | | 978,797 | 134,791 | 2,055,228 | 490,000 | | | **3,658,816** |
| **Lead Alloy** | | 1,059 | | 85.099 | 2,890 | | | **89,048** |
| **Phosphorus bronze** | | | | 9,305 | | | | **9,305** |
| **Stainless steel** | | | 68,252 | 67,172 | | 19,048 | | **154,472** |
| **Steel** | 130,000 | 1,587,238 | 1,598,040 | 5,795,450 | 3,021,000 | 248,422 | 404,489 | **12,784,639** |
| **Wood / Fiberglass** | 440,000 | | | | | | | **440,000** |
| **Zinc Alloy** | | 1,266 | | 25,000 | | | | **26,266** |

Note:
Propellants burn
Explosives detonate

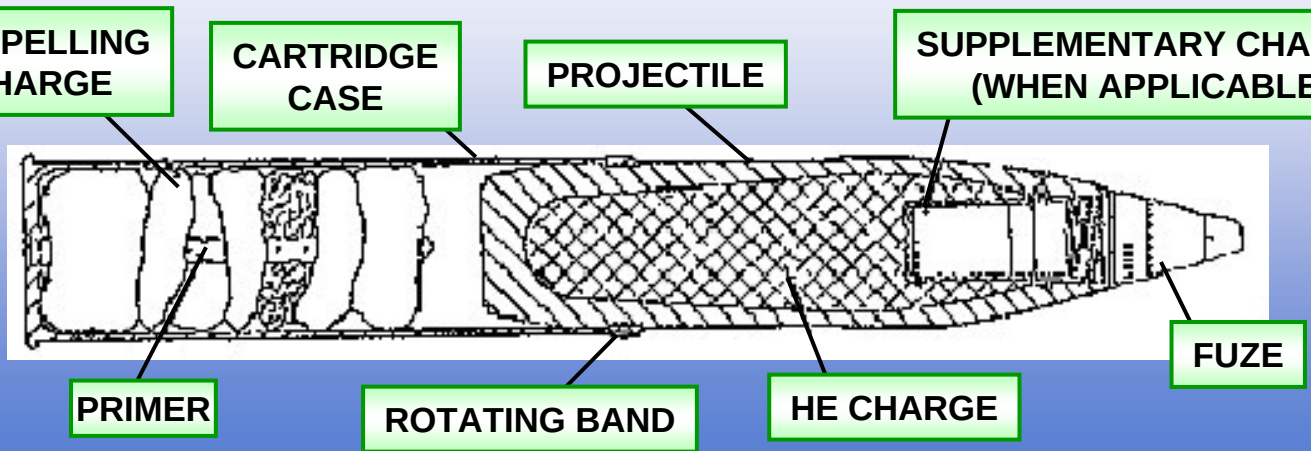
(1) Recovered Comp B available for commercial sale
(2) D&Z Inc takes title to all recovered matl; avail for resale through D&Z
(3) MCAAP takes title to Bomb bodies (750 bomb meltout)
(4) Tritonal from bomb autoclave process is GD-OTS property

# Technology Thrust Areas




***Focus: Developing Capabilities to Significantly Reduce the Stockpile in a safe, environmentally compliant manner***

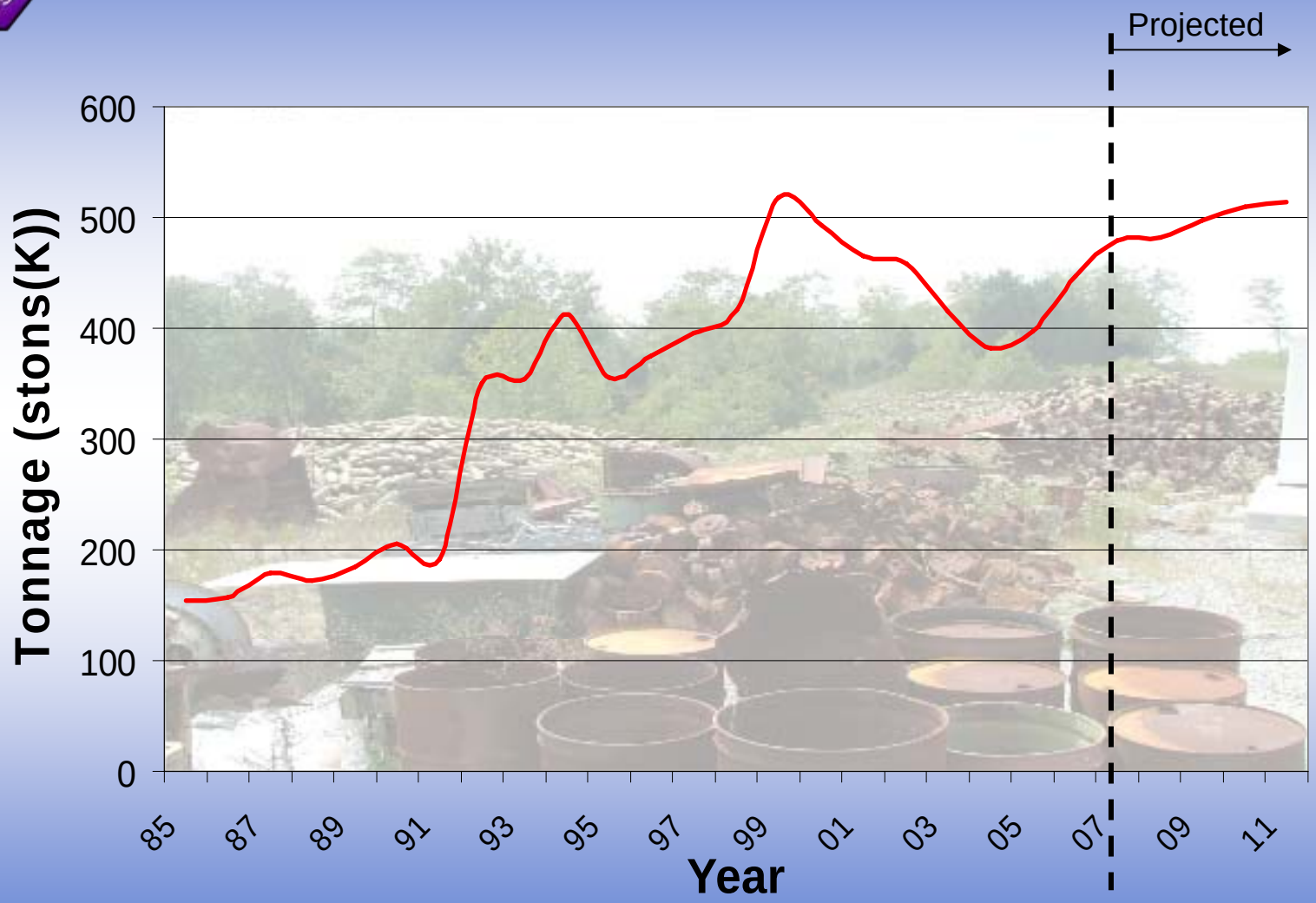
**HE Cartridge**



# Emerging Demil Processes by Location

| Emerging Demil Processes | LOCATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Anniston | Blue Grass | Crane | Hawthorne | Iowa | Letterkenny | McAlester | Red River | Tooele |
| Contained Burn of Rocket/Missile Motors | | | | X | | | | | |
| Missile Recycling Center | X | | | | | | | | |
| Plasma Ordnance Destruction System | | | | X | | | | | |
| Base Hydrorolysis | | | | | | | | | X |
| Cryofracture with Incineration | | | | | | | X | | |
| Propellant to Blasting Slurry Conversion | X | | | X | | | | | |
| Propellant to Fertilizer Conversion | | | X | | | X | | | |
| Detonation Chamber | X | X | X | | | | | | |
| Molten Salt Oxidation | | X | | | | | | | |
| CBU Cryofracture | | | | X | | | | | |
| Mobile Plasma Treatment System | | | X | | | | | | |
| MG Recovery | | | X | | | | | | |

# Demil Stockpile Growth

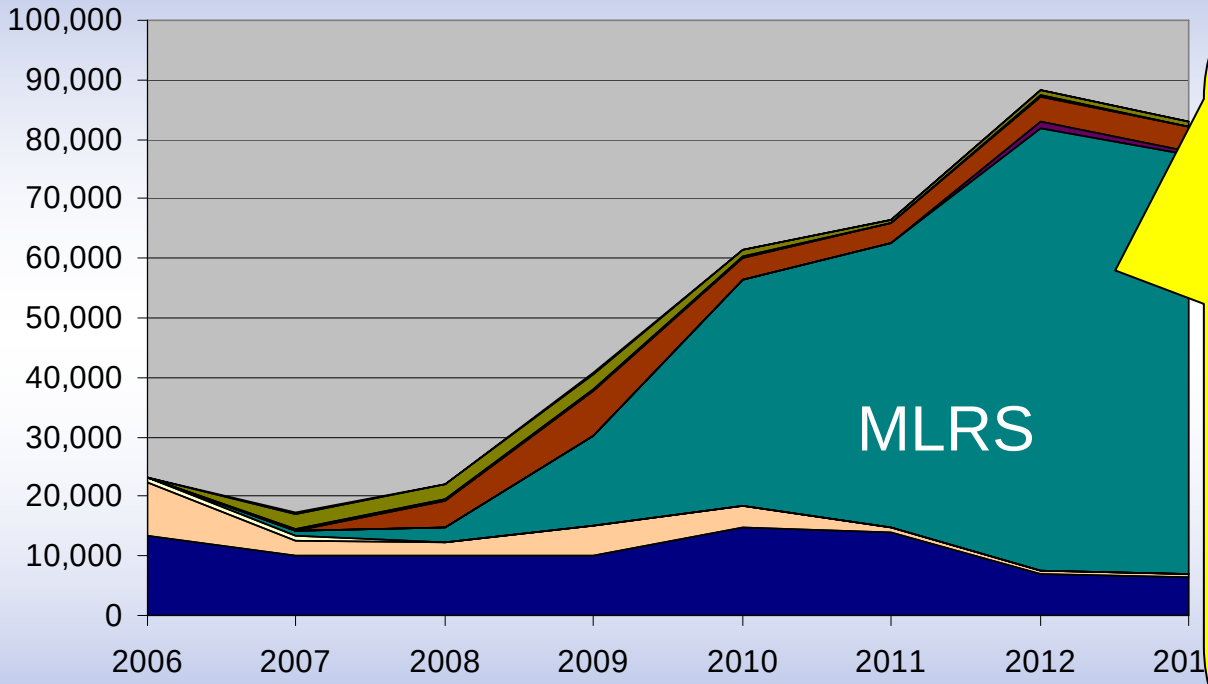


# Conventional Ammo Demil Stockpile Characterization

- **Conventional munitions: 436,802 short tons**
- **A current "snapshot" of the material content of all products that are categorized in the MIDAS database (70% of the stockpile by weight):**

| | Pounds | | Pounds |
|---|---|---|---|
| •Aluminum | 90,000 | •Nickel | 20,000 |
| •Aluminum Alloy | 44,082,000 | •Phosphorus Bronze | 18,000 |
| •Brass | 14,822,000 | •Plastic | 7,898,000 |
| •Bronze | 6,000 | •Rubber | 472,000 |
| •Copper | 686,000 | •Stainless Steel | 7,760,000 |
| •Copper Alloy | 46,250,000 | •Steel | 278,870,000 |
| •Fiberglass | 220,000 | •Wood | 920,000 |
| •Iron | 6,680,000 | •Zinc Alloy | 5,706,000 |
| •Lead | 254,000 | •High Explosives | 131,320,000 |
| •Lead Alloy | 9,800,000 | •Explosive Propellant | 90,598,000 |

# Tactical Missile Demil Stockpile

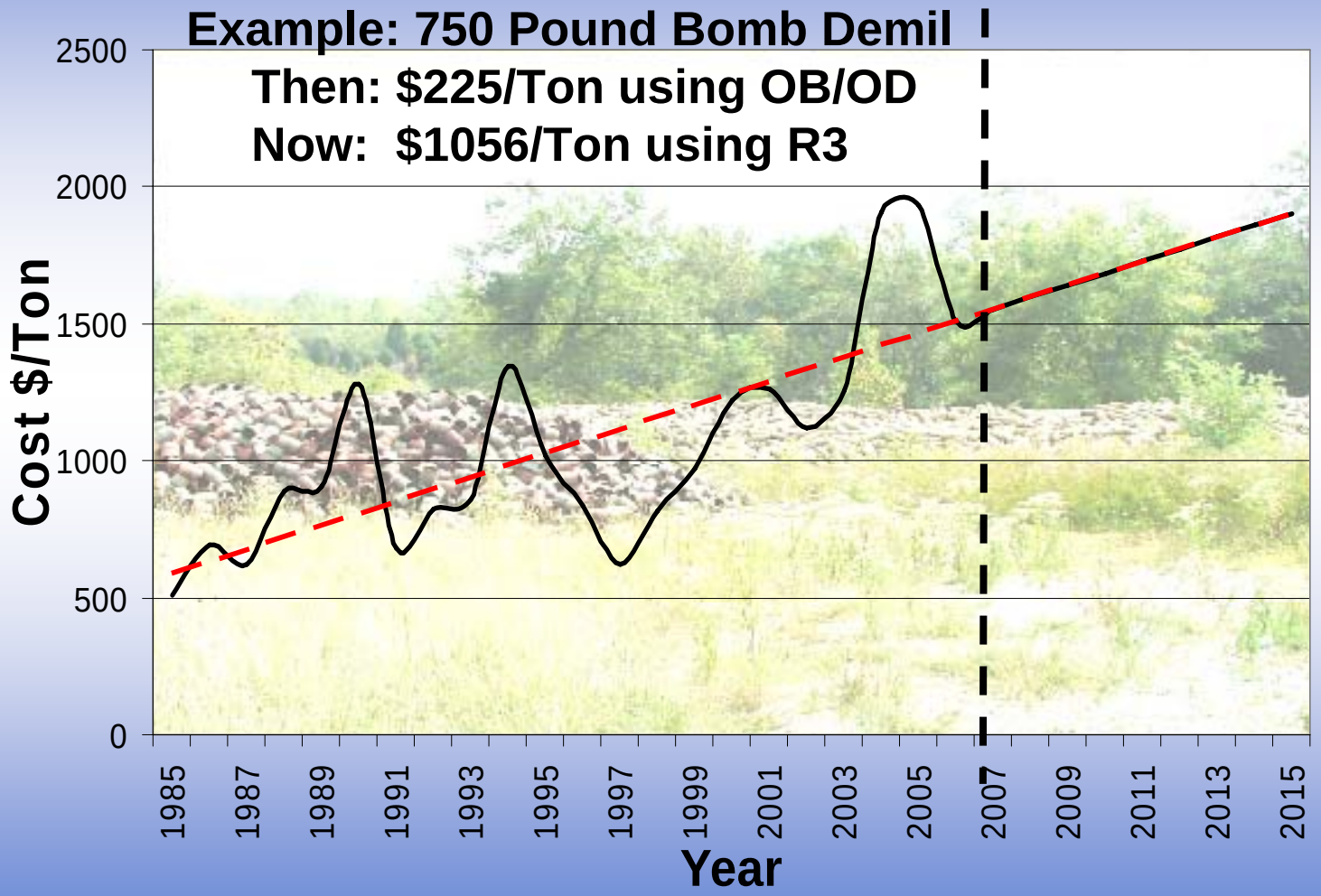



MLRS Stockpile Generates:

- 96M lbs Ammonium Perchlorate
- 500K lbs Energetics
- 38M lbs Fiberglass
- 20M lbs Aluminum Alloy
- 15M lbs Copper Alloy
- 10M lbs Stainless Steel
- 1M lbs Steel
- 1.3M lbs Zinc Alloy

Volume and New Environmental Regulations Will Force Use of R3

# Government's Cost for Demil



# New Demilitarization Law Effective FY2007
## Resource Recovery and Recycling (R3)

### BEFORE

1. Installations execute demilitarization.
2. Salvageable material sold.
3. Proceeds sent to US Treasury.

### AFTER

1. Installations execute demilitarization.
2. Salvageable material sold.
3. Proceeds reinvested into R3 Programs.

### THE LAW

The Law allows the Army to sell recyclable munitions materials resulting from demil and to reinvest the proceeds into demil Resource Recovery and Recycling

### THE BENEFIT

Return of revenue from recycling to support Demil R3 programs

# Outreach to Industry

- **Advertised RFI in Sep 06 (closed Nov 06)**
  - ✓ **Requested innovative approaches to achieving stockpile reduction**
  - ✓ **Received 11 Responses From Demil Stakeholders**
  - ✓ **Will use responses to help shape future Government competitive acquisition strategies for disposal of materials**
- **Conducted a "workshop" session at the Institute of Scrap Recycling Industries (ISRI) Convention in Apr 07**
  - ✓ **Described the demil process and resulting materials to stimulate interest from scrap recyclers**
  - ✓ **Reaction was cautious interest**
  - ✓ **Concerned with unreliable quality and non-continuous supply stream**
  - ✓ **Contracting and business relationship issues complicate their "financial sensibility" test**

# Opportunities for Industry

- **Direct sales of usable items (i.e. obsolete small caliber ammunition)**
- **Development of new customers for recyclable materials**
- **Suggest new approaches for the Government's contracting strategy**
- **Suggest new models for the business process**
  - ✓ **"In-Kind" exchanges**
  - ✓ **Partnerships**
  - ✓ **Co-Location**

# Summary

- We are facing the challenge of a growing demil stockpile in a fiscally constrained environment
- We must operate efficiently and execute quickly to maximize the effectiveness of our resources
- Demil has the potential to create operational efficiencies, however we must make an investment to do so
- We are pursuing non-traditional means of stockpile reduction to maximize the effectiveness of our resources
- We want to develop business processes that maximize our monetary return from the sale of scrap material

# Panel Discussion

- Following our break, I will host a panel discussion:
  - ✓ Provide the opportunity for panel members to present the perspectives of industry and operational units
  - ✓ Entertain questions
  - ✓ Elaborate on the points in my briefing

## Panel Participants

- LTC Brian Raftery, Panel Chair – PM Demil, Picatinny Arsenal
- Mr. Paul McDaniel – Marketing Specialist, MCAAP
- Mr. Barry Schaffer – President, Demil Metals, Inc.
- Mr. Bruce Peterson – Vice President, Purchasing, Ellwood Steels

# Requirements for Demilitarization

(Law and DoD Policy)

- **Documented "CHAIN OF CUSTODY" that can track and account for all material**
- **All material to be handled within EPA & OSHA rules and regulations**
- **Ability to conduct on site inspections of the recycling processes to ensure compliance with the demilitarization plan**
- **"END USE CERTIFICATE" certifying the recycling and destruction of the material to prevent future use as ordnance**

Note: applies to items needing demil not scrap items

# Government's Obligation Regarding Demil Scrap

- **Provide raw material feedstock rendered to a minimum of 3X condition**
- **Deliver homogeneous raw material feedstock that complies with the chemistry/size/shape requirements**
- **Offer ability to inspect and understand the demilitarization operation that rendered the ordnance to a minimum 3X condition**
- **Execute an uninterrupted program, once it commences, in order to maintain reliability of supply**

**Note:**
- **3X decon leaves a visible explosive film with no chunks**
- **5X is explosive free**