

# Explosive Destruction Technologies Consideration Review



**September 13, 2011**

**Presented to:**

**Kentucky Chemical Demilitarization Citizens' Advisory Commission and  
Chemical Destruction Community Advisory Board**

**Presented by:**

**Jeff Brubaker**

**Site Project Manager**

**Blue Grass Chemical Agent-Destruction Pilot Plant**

**A PARTNERSHIP FOR SAFE  
CHEMICAL WEAPONS DESTRUCTION**

[www.pmacwa.army.mil](http://www.pmacwa.army.mil)



**U.S. Army Element, Assembled  
Chemical Weapons Alternatives**



# Background

## A Partnership for Safe Chemical Weapons Destruction

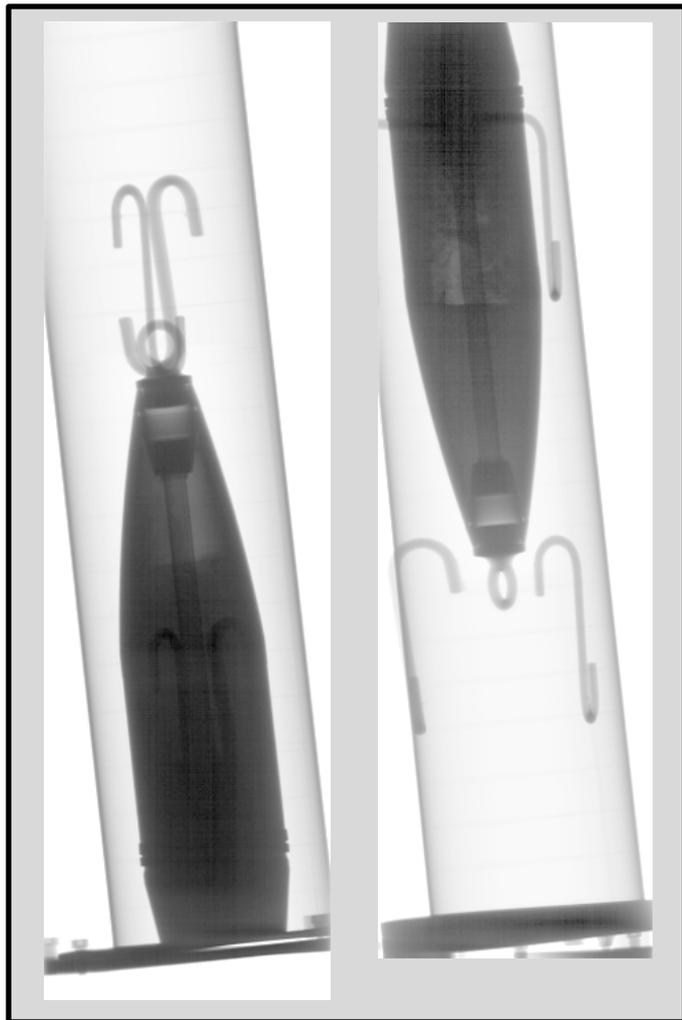
- **Problems processing mustard agent-filled 155 mm projectiles at the Tooele Chemical Agent Disposal Facility led the U.S. Army Element, Assembled Chemical Weapons Alternatives (ACWA) program to request the National Research Council (NRC) to conduct an assessment to analyze Explosive Destruction Technologies (EDT) use at Blue Grass and Pueblo**
  - Tooele projectiles had a high rate of agent solidification, which complicates removal of the mustard agent from the projectile; and stuck bursters, which required human interaction with the problematic munitions
  - Blue Grass has a high number of same-lot problematic munitions as Tooele (20 EA Lot Numbers Common to both sites)
- **ACWA is working with the U.S. Army Chemical Materials Agency (CMA) to incorporate lessons learned from Tooele problems**
- **The use of EDT was originally considered at Blue Grass to safely destroy non-contaminated rocket motors**



Blue Grass Chemical Agent-  
Destruction Pilot Plant

# Background (cont.)

## A Partnership for Safe Chemical Weapons Destruction



- **Tooele Chemical Agent-Disposal Facility problems led to concerns about effect of solidification on Blue Grass destruction timeline and worker safety**
- **ACWA and the Blue Grass Chemical Activity conducted an X-ray assessment to learn about extent of solidification problem at Blue Grass**
- **The X-ray assessment was performed from May to June 2011, and was conducted to a 95 percent confidence level**

*Images taken May 25, 2011, courtesy Blue Grass Chemical Activity*



# National Research Council Assessment – Requirements & Results

## A Partnership for Safe Chemical Weapons Destruction

- **ACWA sought assistance from the National Research Council (NRC) in exploring Explosive Destruction Technology (EDT)**
  - NRC Mission: Improve government decision making and public policy, increase public education and understanding, and promote the acquisition and dissemination of knowledge in matters involving science, engineering, technology and health
- **Requirements of the NRC assessment pertaining to Blue Grass**
  - BG-1: Destruction of approximately 70,000 non-contaminated rocket motors
  - BG-2: Destruction of approximately 15,000 mustard agent-filled 155-mm projectiles
  - BG-3: Combination of both of the above
- **The NRC evaluated five technologies**
  - The Transportable Detonation Chamber (TDC)
  - The Non-Transportable Detonation Chamber (D100)
  - The Detonation of Ammunition in a Vacuum-Integrated Chamber (DAVINCH)
  - The Static Detonation Chamber (SDC)
  - The Army's Explosive Destruction System (EDS)

# National Research Council Assessment – Requirements & Results

## A Partnership for Safe Chemical Weapons Destruction

### ■ Acceptable to NRC

- BG-1: Non-transportable Detonation Chamber, followed by the DAVINCH and Static Detonation Chamber (SDC)
- BG-2: DAVINCH or SDC, followed by the Transportable Detonation Chamber (TDC)
- BG-3: Explosive Destruction System or DAVINCH, followed by the SDC and TDC



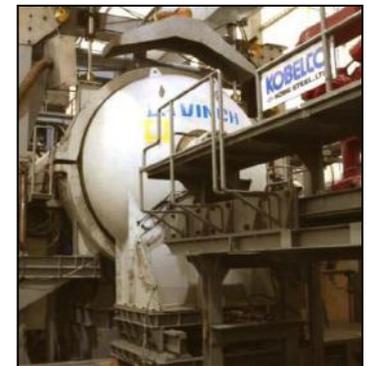
SDC



TDC



EDS



DAVINCH



# Community Involvement

## A Partnership for Safe Chemical Weapons Destruction

- **ACWA formally introduced the Explosive Destruction Technology (EDT) concept to the Kentucky Chemical Demilitarization Citizens' Advisory Commission (CAC) and Chemical Destruction Community Advisory Board (CDCAB) in March 2009**
- **The EDT Working Group (EDTWG) was formed following the March 2009 CAC/CDCAB meeting, and met three times that year**
- **National Research Council (NRC) representatives met with the EDTWG to present the NRC assessment**
  - Discussion focused on the three Blue Grass-acceptable EDTs
  - The group concluded the three potential EDTs would need to show additional testing to meet United States' environmental and safety standards
- **Blue Grass officials explained the X-ray assessment project in an April 2011 meeting with stakeholders**
- **A media roundtable was held in May 2011 to discuss the X-ray assessment**



# Community Involvement (cont.)

## A Partnership for Safe Chemical Weapons Destruction

- **December 2009 CAC/CDCAB recommendation letter to Program Manager Assembled Chemical Weapons Alternatives**
  - 1) Not opposed to use of Explosive Destruction Technology (EDT) to dispose of “problem” mustard agent munitions
  - 2) Reserves endorsement of EDT for adequate demonstration of technical capability and environmental compliance
  - 3) If above criteria are met, will make recommendations on EDT selection criteria
  - 4) May consider EDT use for disposal of other mustard agent munitions and non-contaminated rocket motors
  - 5) Opposes use of EDT for processing of nerve agent munitions or nerve agent-contaminated materials
  - 6) Reserves final recommendation for EDT use for overpacked or “problematic” munitions until more technical and environmental data is presented
  - 7) Does not find the Army’s Explosive Destruction System appropriate at Blue Grass for anything other than possibly #1 and #6, above
  - 8) Feels adequate public participation should be allowed in the permitting process
  - 9) Recognizes EDT reuse capability for depot



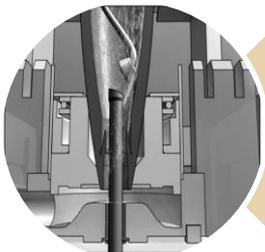
# BGCAPP Mustard Projectile Destruction Process

A Partnership for Safe Chemical Weapons Destruction



## Linear Projectile Mortar Disassembly Machine

Robots and machines that remove projectile nose closures, fuze-well cups and bursters (energetics)



## Munitions Washout System

Robots and machines that combine agent access, draining, and washout into a single automated operation



## Energetics and Agent Neutralization systems

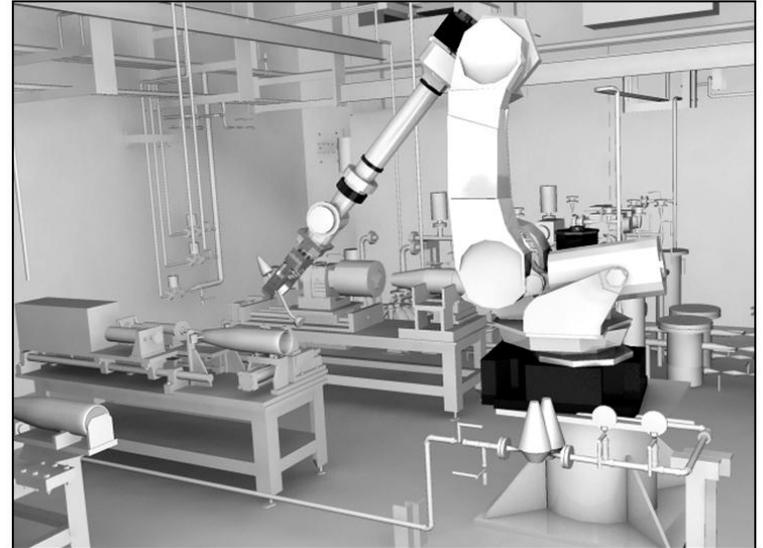
Batch processing that neutralizes energetics and agent



# BGCAPP Mustard Projectile Destruction Process (cont.)

A Partnership for Safe Chemical Weapons Destruction

- **Linear Projectile Mortar Disassembly (LPMD) Machine purpose—removes nose closures, fuze-well cups and bursters (energetics)**
- **Potential impacts of corroded or stuck projectile bursters**
  - Method still needed to remove burster otherwise projectiles cannot proceed to Munitions Washout System
  - Workers having to perform manual operations (reject-cutter operations)
  - Operations schedule delays
  - Reject-cutter operations at Tooele Chemical Agent Disposal Facility revealed some problems with broken bursters

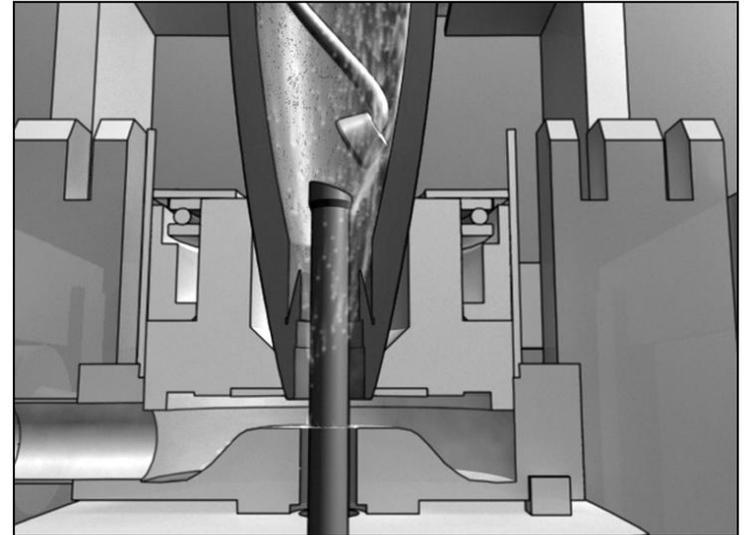


Once the LPMD removes the projectile nose closure, fuze-well cup and burster (energetics), the extracted parts are transferred to the Energetics Batch Hydrolyzer.

# BGCAPP Mustard Projectile Destruction Process (cont.)

## A Partnership for Safe Chemical Weapons Destruction

- **Munitions Washout System (MWS) purpose—combines agent access, draining and washout into single automated operation**
- **Cavity Access Machines—a component of MWS designed to access and drain agent from projectiles**
- **Potential impacts of solidified agent**
  - Longer washout times; and not all solidified agent may be removed
  - Generates more waste to process through the hydrolysis reactors and Supercritical Water Oxidation Building
  - Operational delays or potential reject items



Cavity Access Machines —the projectile nose is inserted into a fixture and held into place. A ram driven into the burster cavity collapses the burster well and allows the agent to drain. High pressure water then flushes agent liquids and residues from the munitions body. The drained agent and wash water are transferred to the Agent Neutralization System for processing.



# Looking Forward

## A Partnership for Safe Chemical Weapons Destruction

- **Analysis of final X-ray assessment data will be part of the basis for Explosive Destruction Technology (EDT) recommendation at Blue Grass**
- **ACWA will:**
  - Inform stakeholders throughout the process
  - Provide final X-ray assessment analysis by end of October
  - Recommend reformation of EDT Working Group (now)
  - Brief stakeholders on U.S. Army Chemical Materials Agency (CMA) experience with EDT (December 2011)
  - Brief stakeholders on concept to integrate EDT into destruction plan for Blue Grass (December 2011)



*Images taken May 2011, courtesy of Non-Stockpile Chemical Materiel Project*



# Blue Grass Site Project Managers Insights for EDT

## A Partnership for Safe Chemical Weapons Destruction

- **Several factors are important to destruction process selection**
  - Worker safety
  - Environmental compliance
  - Process efficiency
  - Cost and schedule
- **Current design has limitations or unknown capability**
  - Ability to remove stuck bursters without manual processing
  - Ability to washout solidified agent
  - Maintenance concern with transfer of solids past drain step
  - Not able to process large heels in metal part treater
- **ACWA to work with EDT Working Group to receive stakeholder input on considerations for final decision**



Blue Grass Chemical Agent-  
Destruction Pilot Plant

**A Partnership for Safe Chemical Weapons Destruction**

# Questions?

For more information about the Blue Grass Chemical Agent-Destruction Pilot Plant project, please contact the Blue Grass Chemical Stockpile Outreach Office at (859) 626-8944