Purpose and Need: Explosive Destruction Technology at Blue Grass Chemical Agent-Destruction Pilot Plant

July 16, 2013
Presented to:
Kentucky Community Stakeholders

Presented by:
Jeff Brubaker
Site Project Manager
Blue Grass Chemical Agent-Destruction Pilot Plant

www.peoacwa.army.mil
A Partnership for Safe Chemical Weapons Destruction

Agenda

- Blue Grass 155mm M110 Projectiles Review
- Background on Mustard (H) 155mm M110 Projectiles
  - Problematic rounds
- X-ray Assessment and Findings
- Feasibility Study
- Environmental Assessment Proposed Action
- Environmental Assessment Purpose and Need
- Explosive Destruction Technology
- Summary
Blue Grass Mustard (H) Projectiles

- Mustard filled projectiles are the oldest component of the Blue Grass Army Depot (BGAD) stockpile

- Manufactured between 1941 and 1943 at Edgewood Arsenal Maryland, today part of Aberdeen Proving Ground

- Mustard filled projectiles are the only projectiles at BGAD that have an explosive charge referred to as a burster

- Mustard 155mm M110 Projectiles
  - Agent: Levinstein Mustard
  - Burster Explosive: Tetrytol
  - Percentage of Munition Inventory: 15.2 percent
  - Percentage of Agent Inventory: 17.3 percent
Background

- Problems processing mustard-agent filled 155mm projectiles at the Tooele Chemical Agent Disposal Facility led the Program Executive Office, Assembled Chemical Weapons Alternatives (ACWA) program to request the National Research Council to conduct an assessment to analyze Explosive Destruction Technology (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 require human interaction to remove the explosives from 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 worked closely with the U.S. Army Chemical Materials Activity (CMA) to incorporate lessons learned from processing problematic mustard projectiles at Tooele
### Blue Grass/Tooele Common Inventory

#### A Partnership for Safe Chemical Weapons Destruction

**BGCAPP 155mm M110 H Lots**

<table>
<thead>
<tr>
<th>LOT</th>
<th>LOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EA-4-1</td>
</tr>
<tr>
<td>2</td>
<td>EA-4-3</td>
</tr>
<tr>
<td>3</td>
<td>EA-4-6</td>
</tr>
<tr>
<td>4</td>
<td>EA-4-7</td>
</tr>
<tr>
<td>5</td>
<td>EA-4-8</td>
</tr>
<tr>
<td>6</td>
<td>EA-4-9</td>
</tr>
<tr>
<td>7</td>
<td>EA-4-10</td>
</tr>
<tr>
<td>8</td>
<td>EA-4-12</td>
</tr>
<tr>
<td>9</td>
<td>EA-4-13</td>
</tr>
<tr>
<td>10</td>
<td>EA-4-15</td>
</tr>
<tr>
<td>11</td>
<td>EA-4-19</td>
</tr>
<tr>
<td>12</td>
<td>EA-4-20</td>
</tr>
<tr>
<td>13</td>
<td>EA-4-21</td>
</tr>
<tr>
<td>14</td>
<td>EA-4-23</td>
</tr>
<tr>
<td>15</td>
<td>EA-4-24</td>
</tr>
<tr>
<td>16</td>
<td>EA-4-25</td>
</tr>
</tbody>
</table>
Video: Tooele Chemical Demilitarization Operators

A Partnership for Safe Chemical Weapons Destruction
X-ray Assessment

- 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.
X-ray Assessment Final Findings

- All 96 H-filled munitions in sample contained heel
  - Average heel – 54.8 percent
  - Minimum heel – 15 percent
  - Some weapons were completely solidified

- 36 overpacked munitions had liquid in the fuze well
  - Two showed liquid inside overpack

- Estimated average heel for entire stockpile estimated to be between 50.6 and 59 percent

- Approximately 6,100 munitions estimated to have greater than 59 percent heel
Three Options Considered

A Partnership for Safe Chemical Weapons Destruction

1) Process problematic projectiles with current BGCAPP design/facility
   - Pros: No changes to existing equipment, no additional equipment expenditure, no permit modification required
   - Cons: Manual intervention required, worker safety risk increased, strain on equipment, extends H destruction schedule

2) Make design modifications to BGCAPP facility
   - Pros: No new permit required
   - Cons: Difficult to incorporate changes after construction, some manual intervention still likely, potential increase to worker safety risk, effect on schedule unknown (facility modification and H destruction)

3) Use an EDT to process mustard projectiles
   - Pros: Worker safety improved, provides H destruction schedule stability
   - Cons: New permit required, additional facility required

Images taken May 25, 2011, courtesy Blue Grass Chemical Activity.
Community Involvement

- ACWA works with citizens’ groups to receive stakeholder input on considerations for final decision.
- ACWA formally introduced the 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.
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.

January 2012 CAC/CDCAB letter to ACWA recommending an EDT system to dispose of all mustard munitions at Blue Grass Army Depot.
Environmental Assessment (EA) Proposed Action

- **EA complete with draft “Finding of No Significant Impact”**

- **As provided in the EA:**
  - The proposed action is to deploy and operate specialized EDT equipment for the safe and timely destruction of the mustard-filled chemical munitions (i.e., 155mm projectiles) and DOT bottles currently being stored at the BGAD in an environmentally acceptable and cost effective manner. The Army proposes to construct and operate an EDT facility within the boundaries of the BGAD to augment the planned operation of the BGCAPP and to address the issues expected to be encountered during the processing of the mustard-filled munitions.
As stated in the EA:

- The purpose of the proposed action is to provide for the destruction of the mustard-filled munitions (i.e., 155mm projectiles) and containers (i.e., two DOT bottles) that are currently being stored at the BGAD. The equipment designed and undergoing fabrication for installation at the BGCAPP will not be able to accomplish the draining of the mustard agent from the problematic munitions due to overpacked leaking rounds, stuck bursters, or solidified mustard agent as described in Section 1.1.1. Surveillance studies have proven a high probability that these problematic munitions exist in the BGAD stockpile. Unless the mustard agent can be successfully accessed, drained, and fully removed from the munitions, the BGCAPP cannot complete the destruction of the mustard agent through its chemical neutralization processes. The proposed action would thus provide a solution for the processing and destruction of the mustard-filled munitions at the BGAD without the need to design, install, and conduct prove-out tests on any modifications to the BGCAPP design.
Explosive Destruction Technologies

A Partnership for Safe Chemical Weapons Destruction

Explosive Destruction System (EDS). A trailer-mounted mobile system consisting of a sealed, stainless steel vessel. Cutting charges are used to explosively access chemical munitions, eliminating their explosive capacity before the chemical agent is neutralized.

Static Detonation Chamber (SDC). A nearly spherical, armored, high-alloy stainless steel vessel that uses thermal destruction methods to destroy chemical munitions. The electric heat generated in this containment vessel detonates the munitions in order to destroy the agent and the energetics.
Explosive Destruction Technologies (cont.)

Transportable Detonation Chamber (TDC). A self-contained system consisting of a detonation chamber, an expansion chamber and an emission control system. Chemical munitions are destroyed in the fully enclosed chamber by detonation of donor explosives in which each munition is wrapped.

DAVINCH (Detonation of Ammunition in a Vacuum-Integrated Chamber). A double-walled steel vacuum detonation chamber with an off-gas system. Donor explosives within the near-vacuum chamber are used to detonate and destroy chemical munitions through shock and heat.
Summary

The proposed action is to deploy and operate specialized EDT equipment for the safe and timely destruction of the mustard-filled 155mm projectiles and DOT bottles currently being stored at BGAD in an environmentally acceptable and cost effective manner.

The Army proposes to construct and operate an EDT facility within the boundaries of BGAD to augment the planned operation of BGCAPP and to address the agent solidification issues expected to be encountered during the processing of the mustard-filled munitions.

Before the first nerve agent destruction operations begin at BGCAPP, it is planned that the proposed EDT facility will process all of the mustard-filled items.

The BGCAPP project is committed to continuing our partnership with the local stakeholder community to ensure safe destruction of the entire chemical weapons stockpile.
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