Bluegrass Lessons Learned: Implementing Explosive Destruction Technology at BGCAPP

Blue Grass Chemical Agent-Destruction Pilot Plant

4 June 2015

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Assistant Project Manager (EDT)
Agenda

- Explosive Destruction Technology (EDT) Differences from the Anniston Unit
- Lessons Learned Incorporation
- EDT Facility / Components
- EDT Schedule and Milestones
- Summary and Questions
More History

- Request for Proposal was sent to pre-qualified bidders in October 2012
- Proposals were received in December 2012
- Record of Decision in October 2013
- Contract awarded after completion of commercial and technical evaluations in November 2013
Static Detonation Chamber (SDC):

- Hot Detonation Chamber
- A double-walled steel detonation chamber
- Off-gas treatment system
- No donor explosives required, minimal handling and minimal exposure to explosives
- System heats the projectile’s energetic above its auto-ignition temperature to destroy the munitions
### Explosive Destruction Technology Unit Differences (Anniston vs. Blue Grass Chemical Agent-Destruction Pilot Plant)

<table>
<thead>
<tr>
<th></th>
<th><strong>Anniston</strong></th>
<th><strong>BGCAPP</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location:</strong></td>
<td><a href="#">Blue Grass Chemical Agent-Destruction Pilot Plant</a></td>
<td></td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>SDC 1200 CM (Chemical Mobile) Transportable unit</td>
<td>SDC 1200 C (Chemical) Fix Facility unit</td>
</tr>
<tr>
<td><strong>CW Net Explosive Wt. (NEW)</strong></td>
<td>2.2 lb High Explosive (1.0 kg) Hazard Class 1.1</td>
<td>6.63 lb HE (3.0 kg) HC 1.1</td>
</tr>
<tr>
<td><strong>Fragment Shield:</strong></td>
<td>Tube Shaped (sides only)</td>
<td>Bowl Shaped (sides with a bottom)</td>
</tr>
<tr>
<td><strong>Detonation Chamber (DC) Heater:</strong></td>
<td>3 on the bottom of the DC</td>
<td>3 on the bottom plus additional on sides</td>
</tr>
<tr>
<td><strong>Cooling Fan for Locking Ring:</strong></td>
<td>None</td>
<td>Yes (added to minimize binding at high temps.)</td>
</tr>
<tr>
<td><strong>Loading Chamber (LC1 and LC2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vents to THO:</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(to minimize/prevent agent migration to the Process Ventilation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bypass valve around off-gas orifice:</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(to minimize press in the chamber to minimize agent migration to LC2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Off-Gas Treatment System (OTS):</strong></td>
<td>Has a SDC 1200 sized OTS</td>
<td>Has a larger SDC 2000 OTS (75% larger)</td>
</tr>
<tr>
<td><strong>Thermal Oxidizer (THO):</strong></td>
<td>162 ft³</td>
<td>321 ft³ (98% larger)</td>
</tr>
<tr>
<td><strong>Bleed Water Tank:</strong></td>
<td>No</td>
<td>Yes (added to support 24/7 operations)</td>
</tr>
</tbody>
</table>
### EDT Unit Differences (Anniston vs. BGCAPP) cont’d

<table>
<thead>
<tr>
<th>Feature</th>
<th>Anniston</th>
<th>BGCAPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiller to remove Condensate</td>
<td>No (collection pump to recycle H2O)</td>
<td>Yes (added after the Neutral Scrubber)</td>
</tr>
<tr>
<td>Re-Heater after Chiller</td>
<td>None initially – installed later</td>
<td>Included</td>
</tr>
<tr>
<td>Carbon Filter System</td>
<td>IONEX CD2000</td>
<td>IONEX CD4000</td>
</tr>
<tr>
<td>Building Type</td>
<td>Sprung Structure</td>
<td>Steel Building</td>
</tr>
<tr>
<td>Building HVAC</td>
<td>No - Portable AC unit added</td>
<td>Yes</td>
</tr>
<tr>
<td>Cascading Ventilation System</td>
<td>No- Vapor containment only</td>
<td>Yes (with Category A, B, C, and D areas)</td>
</tr>
<tr>
<td>Number of Mustard Projectiles</td>
<td>2,737 CW munitions processed</td>
<td>Approx. 16,000 munitions to be processed</td>
</tr>
<tr>
<td>Agent Types</td>
<td>HD and HT Mustard</td>
<td>H Mustard (with solids)</td>
</tr>
<tr>
<td>DOT Bottles</td>
<td>None processed</td>
<td>Two (2) are planned</td>
</tr>
</tbody>
</table>

Blue Grass Chemical Agent-Destruction Pilot Plant
Key Design Elements in the BGCAPP EDT Design

• Over 130 Lessons Learned from the Anniston unit reviewed and incorporated (design and into Standard Operating Procedures):
  
  - Motor Over-load Protection
  - Testing of Feed Process Indicators (FPI)
  - Improvement in Maintenance practices
  - Adding Bag House Shaker
  - Adding a Mass Flow Assembly
  - Spray Dryer Nozzle Clogging
  - Buffer Tank Knife Valve Leakage
  - Process Water Strainers
  - Removal of LC 2 Cover (decon)
  - SDC Chamber Seals
  - Condensate Control
  - Piping Inspections
  - Rapid depletion of IONEX carbon filters
  - Bag House Lid Redesign
  - Install a Process Bleed Water Tank
  - Pressure equalized between Loading Chamber (LC) 1 & LC2
  - Agent Migration from LC2
  - Additional Closed-Circuit TV (CCTV) Cameras
  - Cleaning and Inspection Off-Gas Piping
  - SDC Gate Seals

• Building Design:
  – Heating Ventilating and Air-Conditioning System
  – Vapor Containment Areas (A / B / C / D areas)
  – Cascading Ventilation System

• Chiller to remove condensate followed by a Re-Heater to reduce moisture to the process Carbon Filter unit and to the Stack
The Explosive Destruction Technology (EDT) Enclosure Building consists of a 77 X 120 foot building (approx.).

The building has an A, B, C, D Agent Areas with a Cascading Ventilation System and a Munitions Delivery Vestibule.

The Static Detonation Chamber consists of:
- Loading Conveyor and Elevator Lift
- Loading Chamber #1 and #2
- The Detonation Chamber (DC)
- A Buffer Tank
- A Scrap Chute, Scrap Cooling Conveyor, Belt Conveyor, and a Scrap Bin

The Off-Gas Treatment System (OTS) consists of:
- Thermal Oxidizer
- Spray Dryer
- Bag House Filter
- Quench
- Acid & Neutral Scrubber
- ID Fans
- Heat Exchanger and Cooler

The building has a 16,000 CFM IONEX Filter Unit and the OTS has a 4,000 CFM unit.
EDT Enclosure Building (EEB)
EDT Enclosure Building (EEB)

- SDC
- OTS
- Airlock
- Monitoring House
- IONEX 4000
EDT Enclosure Building (EEB) Layout

Updated EEB exterior design (view from the SW side)
Detonation Chamber (DC)- Key Design Elements

- Additional Heaters on the Sides of the Detonation Chamber
- Liner has a Fully Closed Bottom (bowl type vs. open tube type)
EDT Process Equipment Layout
EDT Process Equipment
EDT Process Equipment
EDT Process Equipment

Scrap Inspection

Scrap Box

Scrap Belt Conveyor

Scrap Conveyor 2

Scrap Conveyor 1

Scrap Funnel
Off-Gas Treatment System (OTS) - Key Design Elements

- **Upgraded / Larger Thermal Oxidizer (THO) & OTS**
  - Limiting Throughput (Pacing Station) for the Anniston unit

- **The THO is 98% larger:**
  - Anniston unit is: 162 ft³
  - BGCAPP unit will be: 321 ft³

- **The OTS is 75% larger**

- **Closed Loop Process Water System**
Off-Gas Treatment System Process Equipment Layout
BGCAPP EDT system in Dynasafe workshops (Current)
EDT Working Schedule and Key Milestones

EDT Technical Readiness Review (TRR)  
- May 2015

Factory Acceptance Test (FAT)  
- May - June 2015

SDC Disassembled/Shipped  
- July - August 2015

Delivery of SDC Unit  
- August 2015

Site Acceptance Test (SAT)  
- May 2016

EDT Construction Complete  
- November 2016

EDT CW Operations  
- March – December 2017

EDT Closure and Turn-Over  
- December 2017 - June 2018
Summary

• The proposed action is to deploy and operate specialized EDT equipment for the safe and timely destruction of all the mustard-filled 155mm projectiles and two 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 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?