



# US ARMY CHEMICAL MATERIALS AGENCY

## Blue Grass Chemical Activity X-ray Assessment in Support of ACWA

September 2011

Presented To: Citizens' Advisory Commission/Chemical Destruction Community Advisory Board  
Presented By: Mr. Rusty Fendick, System Operations Team  
Non-Stockpile Chemical Materiel Project



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- Assessment in support of ACWA's BGCAPP design and potential use of EDT
- Provide x-ray data and interpretation regarding the amount of liquid and solid inside a sample size of ninety-six (96) 155mm H-filled projectiles
- Provide information regarding eighty (80) 155mm leakers already overpacked and in storage



# X-Ray Assessment Basic Details

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- X-Ray Assessment conducted 9 May 2011 - 14 Jun 2011
- Assessed 96 Stockpile “non-leakers” with x-ray
- Assessed 80 Stockpile “leakers” with x-ray



# X-Ray Assessment Command Post

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# Digital Radiography/Computed Tomography (DRCT)

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# Projectile with Overpack Photos

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- Polyethylene foam insert designed to protect the projectile during movement and keep the projectile in place while inverting the overpack





# X-Ray Assessment: Temperature Data

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- Tracking temperature was important due to freezing point of mustard and temperature inside the igloo being relatively close in the May timeframe
- A temperature logger was used to track the temperature at four (4) locations within the igloo
- Temperature probes placed on SETH 155mm projectiles
- SETH projectiles overpacked in same configuration
- Temperature probes located at the rear, middle, and front of igloo
- During assessment of 96 sample projectiles, temperature increased from 62° to 77° F on SETH projectile probes (freezing point of H is ~58° F)



# Sample Selection Strategy for Non-Leakers

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- Minimize risk to workers and public
- 4 pallets selected from each of the three (3) storage igloos
  - Each igloo represents a BGCA designated munition lot
  - Each lot has several sub-lots from original filling in 1940s
- Selected pallets from all three lots; rear, middle, front of igloo; top, middle, and bottom of pallet stack
- Many of the BGCAPP sub-lots are the same as the TOCDF lots that had high solids and stuck bursters



- Non-leaker sample size considered MIL-STD 105E and MIL-STD 1916 methodology and minimizing risk to workers and public by keeping number of pallets moved to a minimum
- Binomial based sampling [significant heel (>50%) or no significant heel]
- Sample size of 96 provides 95% confidence with +/-10% accuracy



# X-Ray Assessment Preliminary Results

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- All projectiles had heel material on a side wall
  - Projectiles may have been stored in the horizontal position
- Fill levels ranged from approximately 80-90%
  - Original fill level important because it factors into estimated heel amount
- X-rays indicate that most of the 96 non-leaker projectiles had significant heel formation
- Unable to identify whether stuck burster would be an issue (Note: 19 non-leaker projectiles had apparent residue in the fuze well)
- Eight projectiles reassessed at the end of the project
  - No Significant Difference



# COMPARISON OF TOCDF and BGCAPP BURSTERS

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TOCDF 155mm  
Projectile



BGCAAP 155mm  
Projectile





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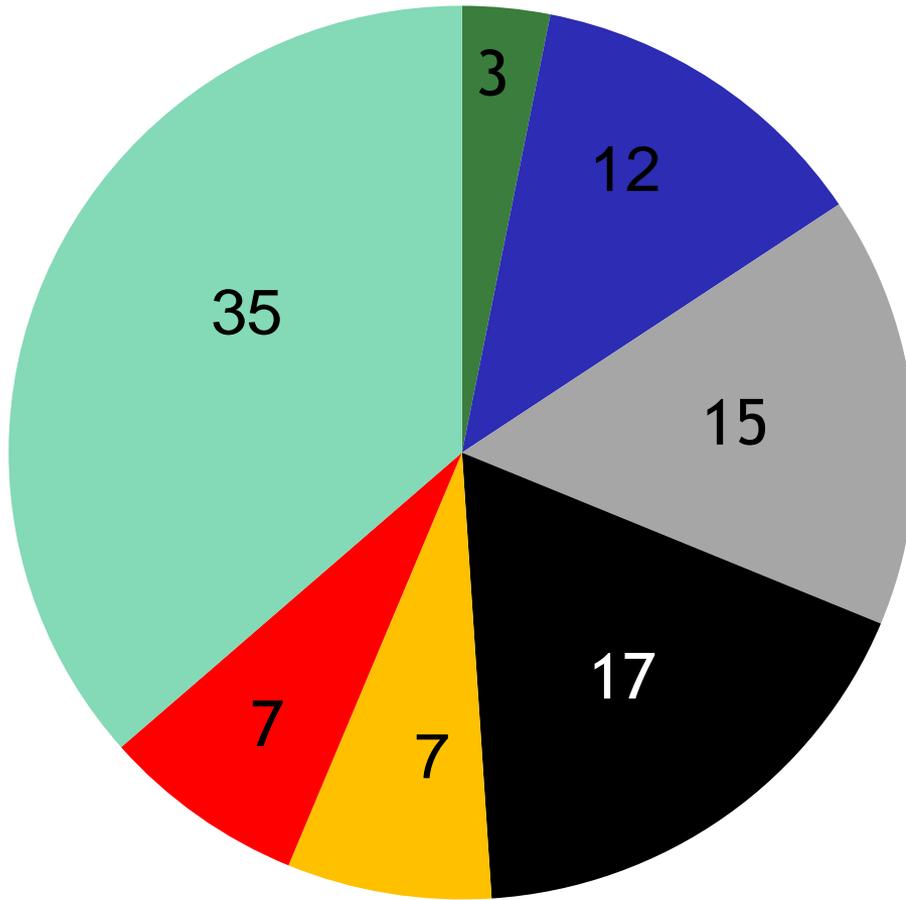
## BGCA Non-leaker 155mm Projectiles

Assumed Original Fill Amount (% of available volume)	# of Projectiles with > 50% Heel	# of Projectiles with > 30% Heel
80	50 /96 (52%)	82/96 (85%)
85	61/96 (64%)	91/96 (95%)
90	66 /96 (69%)	93/96 (97%)



# X-Ray Assessment Results

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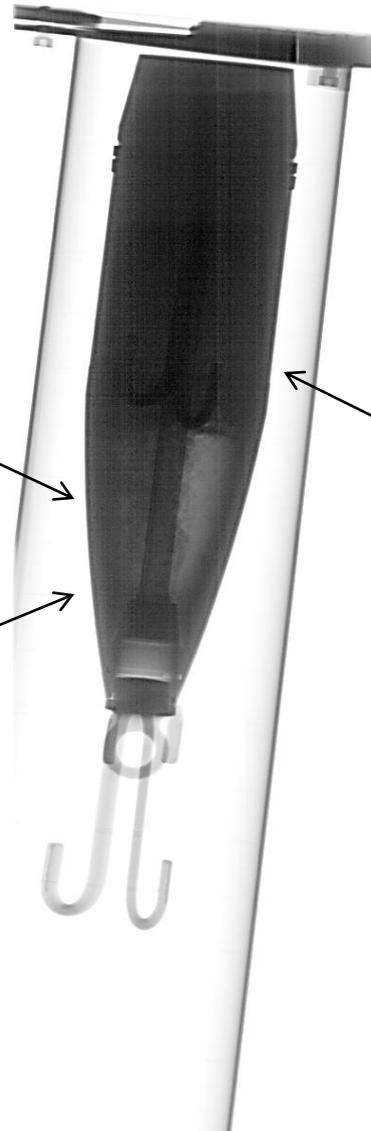
- # of Items with < 20% heel
- # of Items with 20-30% heel
- # of Items with 30-40% heel
- # of Items with 40-50% heel
- # of Items with 50-60% heel
- # of Items with 60-70% heel
- # of Items with 70-80% heel



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Additional heel along side

No liquid line visible

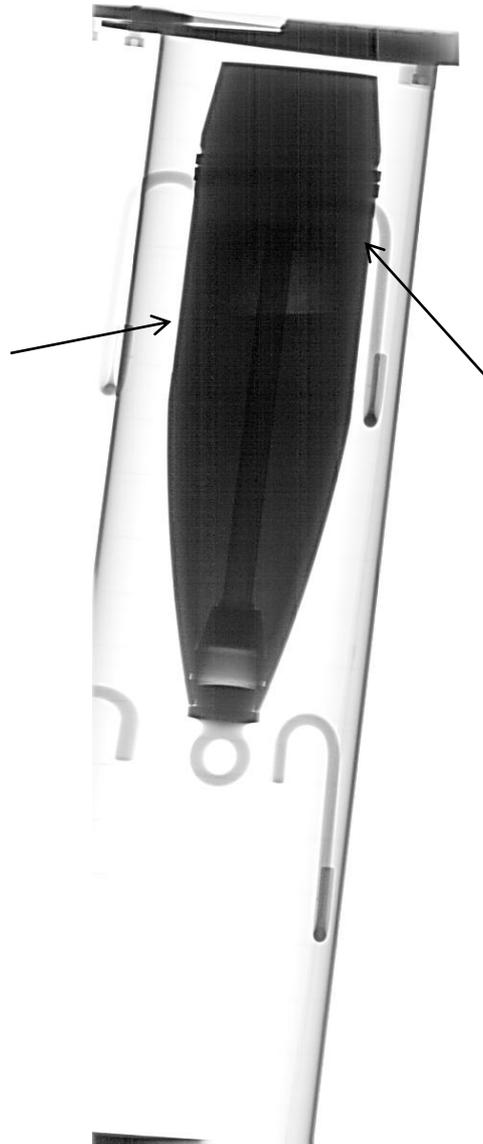


Clearly visible heel



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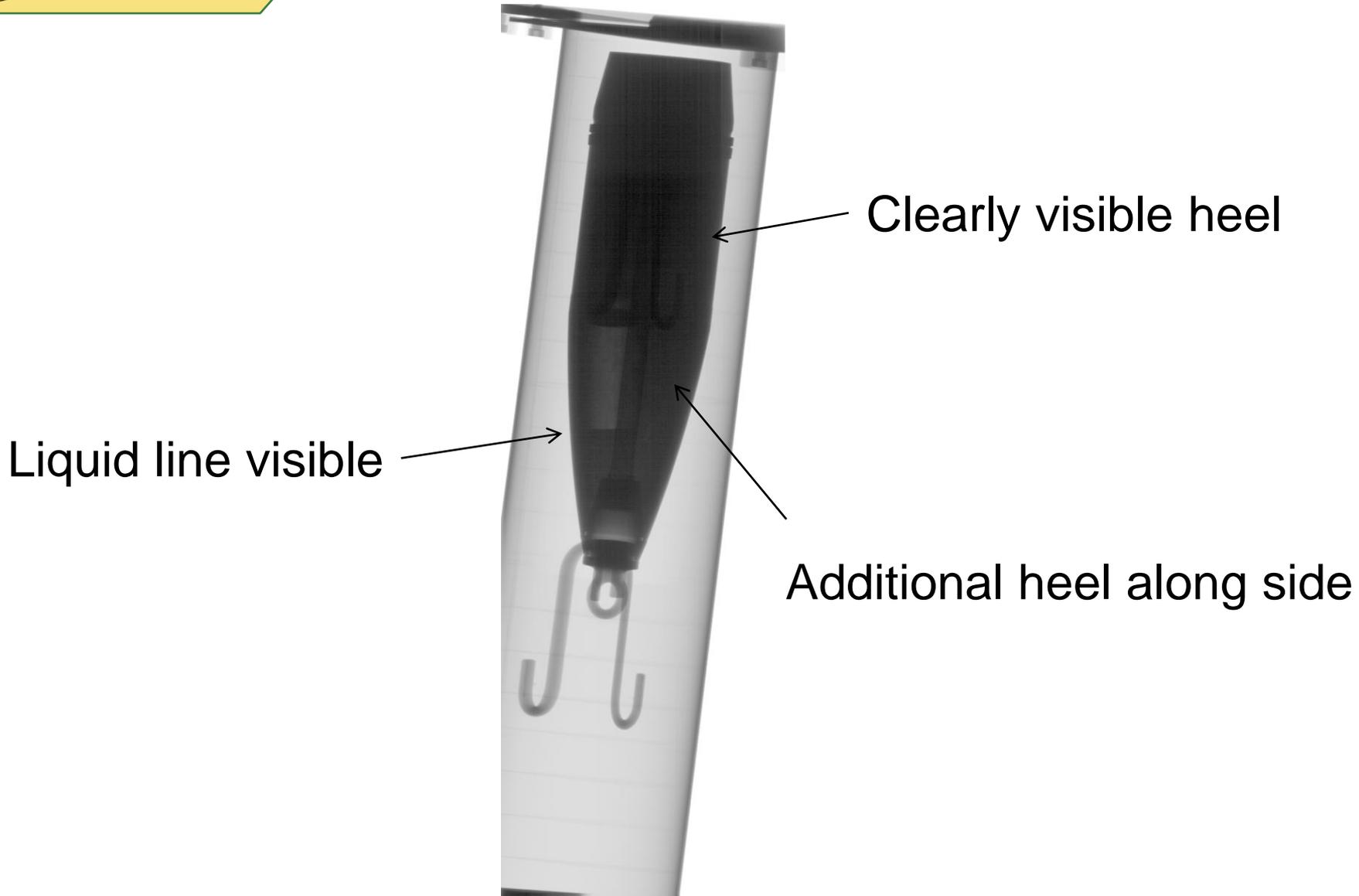
Liquid line visible



Clearly visible heel



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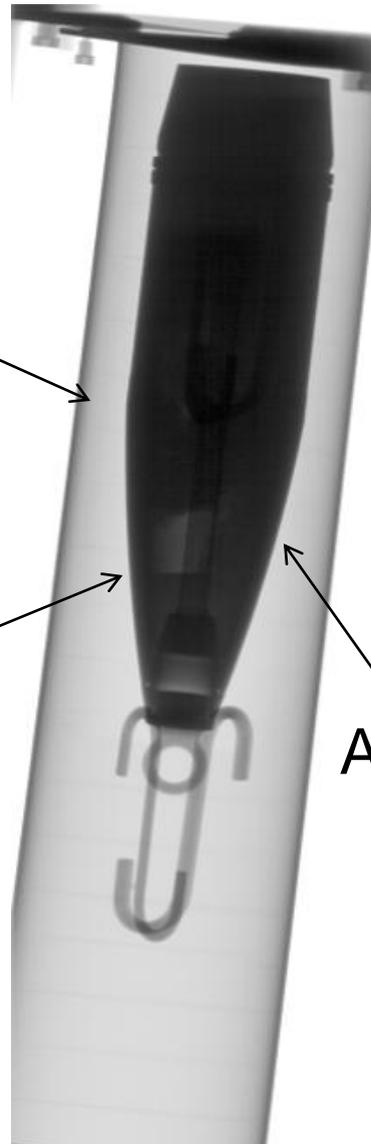


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Clearly visible heel

Liquid line visible

Additional heel along side





# X-Ray Assessment of “Leakers”

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- Assessed 80 Stockpile “leakers”
- Assessment indicated heel along side wall above the liquid line
- Small number of items had liquid in the overpack
- Over half had some residue or liquid in the fuze well



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- X-rays indicate significant heel formation
- Initial review of the data does not indicate significant trends by storage location, considering small sample size
- No evidence of damage to bursters seen in the x-rays
- Final Report completed by end of October 2011