Prepared by
Wendy Balas: US ARMY ARDEC
David Hunter, Rich Wallace & Melissa Hobbs: GD-OTS

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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Comparison of Blast Performance of the IM Explosive PAX-28 Variations

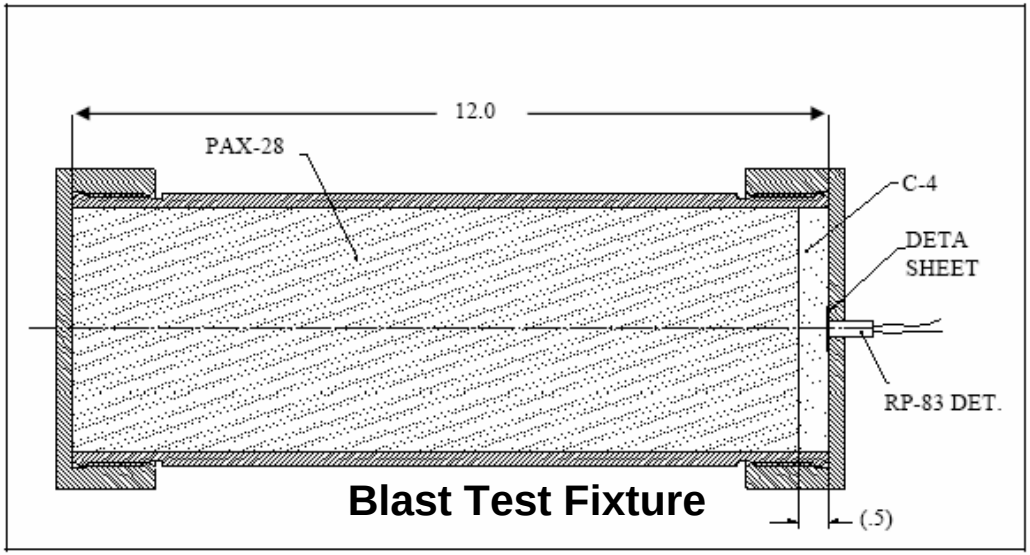
October 17, 2007

Overview

- Objective
  - Conduct a series of tests to compare blast performance of modified PAX-28 formulations
  - Compare results against baseline PAX-28
- PAX-28 is a candidate fill for cannon launched munitions
  - Developed as an IM replacement for traditional Comp B / TNT melt pour fills
  - Targeted for high blast applications
  - Formulation optimization studies performed by ATK
  - Manufacturing optimization studies performed by BAE Systems
- Composition
  - Dinitroanisole (DNAN)
  - Aluminum powder
  - RDX
  - Ammonium perchlorate (AP)
- Formulation
  - Composition remained constant
  - Size of aluminum and AP was varied

Test Description

- 2 Tests per each formulation variant
- 8 Total tests completed
- Test fixtures contain 10.5 lbs of PAX-28



Blast Test Fixture

Explosives Testing

- Test items tested at the GD-OTS Rock Hill Experimental Test Facility

- **1.25 sq miles**
- **200 meter rocket sled track**
- **Fully instrumented test arenas**
- **Phantom high speed video cameras**
- **Qualification test capability**
- **Gun test capability**
- **250 meter to 1500 meter ballistic range**
- **IM Testing**

Explosives Loading

5 Gallon Melt Kettle

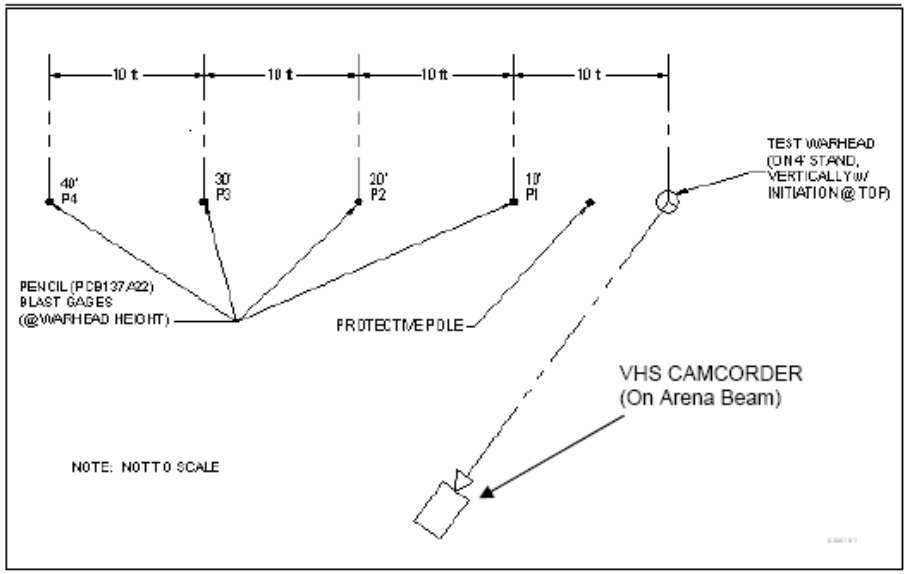
Transferring Molten PAX-28

Insulated Test Fixtures in Oven

Loading into Test Fixtures

Test Setup

- 4” Inside diameter steel pipe
- ¼” Case wall
- Initiated from the top using a C-4 booster
- Blast gages placed at 10’ intervals



Test Set-up cont.

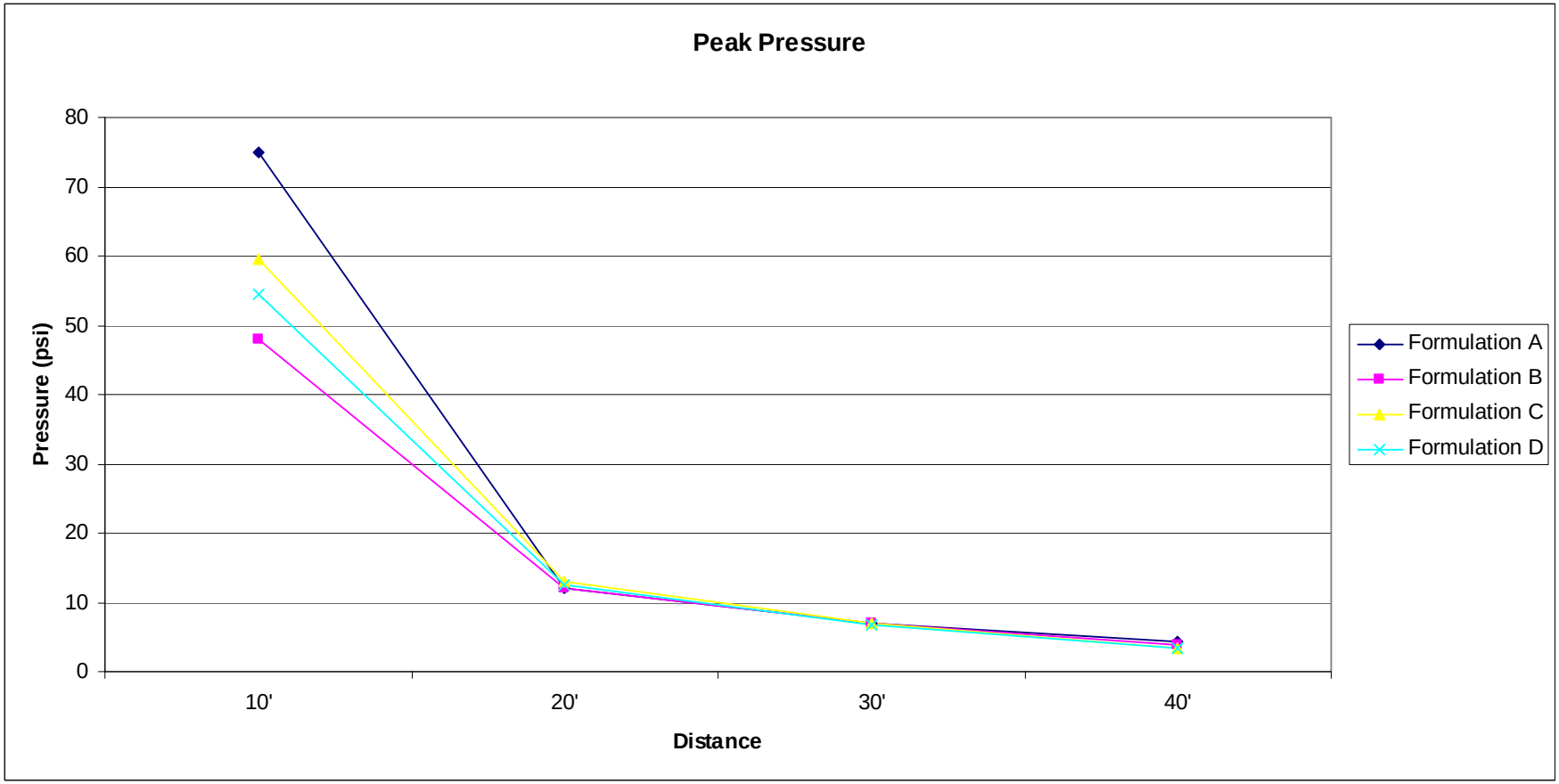
- Warhead mounted vertically

Fragmentation

- Fragment performance
  - While not an objective – it was an outcome
  - Substantial damage to steel structures within the test arena

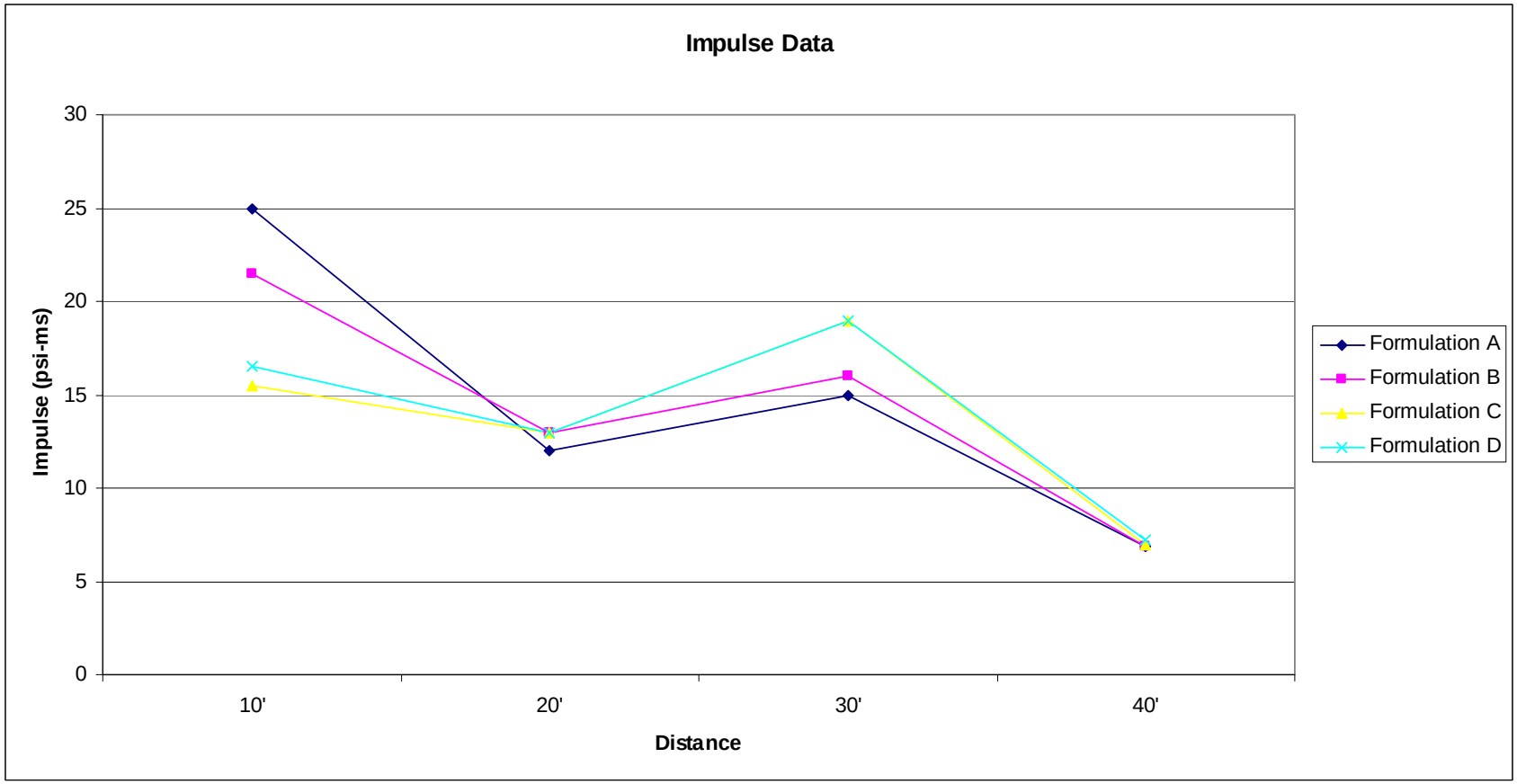
Test Results

- Pressure



Test Results

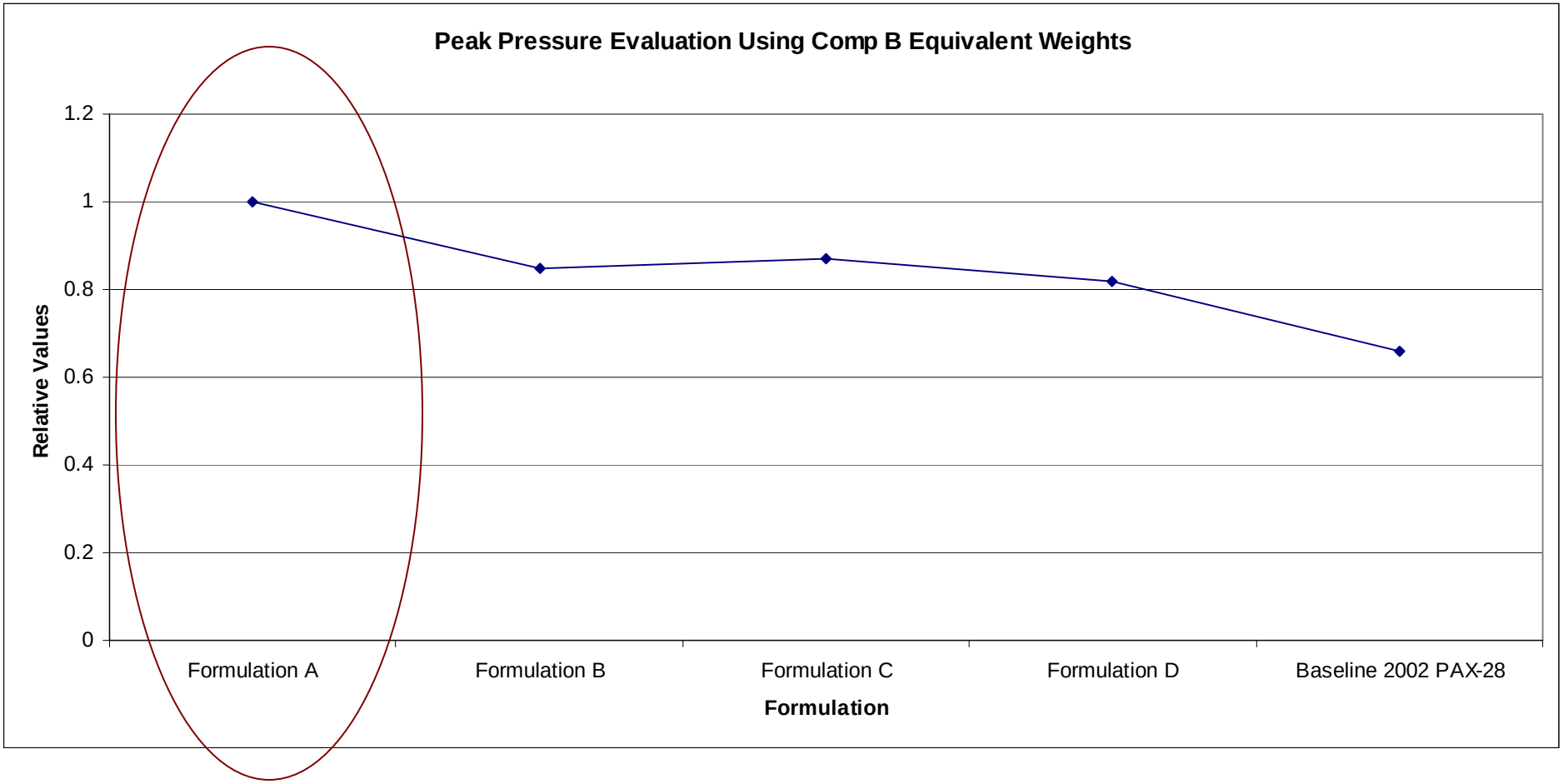
- Impulse



Evaluation

- Equalize data
  - Variation in fill heights resulted in different fill weights
  - Fano calculation to determine mass to charge ratio for bare charge comparison with bare charge Comp-B
- Generate pressure data for bare Comp-B charges
  - BlastX calculations performed at the appropriate distances
  - Establishes a common means for comparison of PAX-28 data
- Establish equivalency factors
  - Convert PAX-28 pressures into Comp-B equivalent weights
  - Average equivalency was used to establish relative equivalency values
  - Formulation A was used to normalize the remaining values

Evaluation


Peak Pressure Evaluation Using Comp B Equivalent Weights
1.2
1
0.8
0.6
0.4
0.2
0
Relative Values
Formulation A
Formulation B
Formulation C
Formulation D
Baseline 2002 PAX-28
Formulation

Summary

- PAX-28 variants out-performed original PAX-28
- PAX-28 produced significant fragmentation
- Formulation containing relatively small AP and aluminum produced best peak pressure

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