



**GENERAL DYNAMICS**  
Ordnance and Tactical Systems

Prepared by

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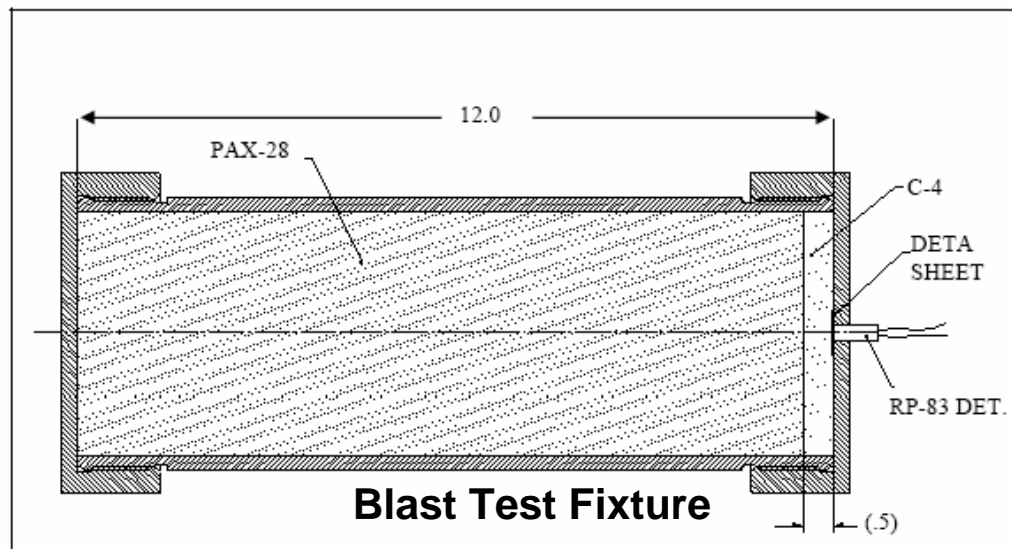
**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

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

October 17, 2007

- 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

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



- 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



**5 Gallon Melt Kettle**



**Transferring Molten PAX-28**

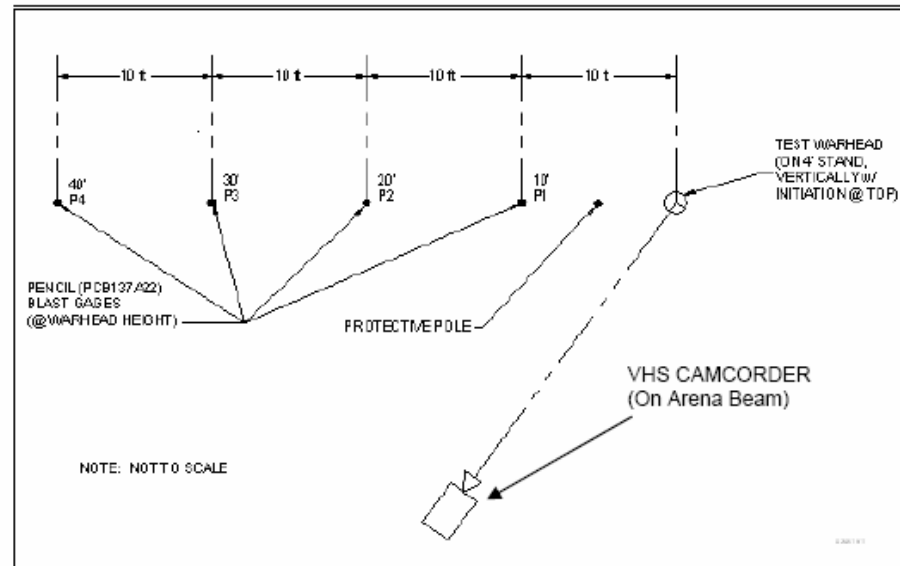


**Insulated Test Fixtures in Oven**



**Loading into Test Fixtures**

- 4" Inside diameter steel pipe
- 1/4" Case wall
- Initiated from the top using a C-4 booster
- Blast gages placed at 10' intervals



- Warhead mounted vertically

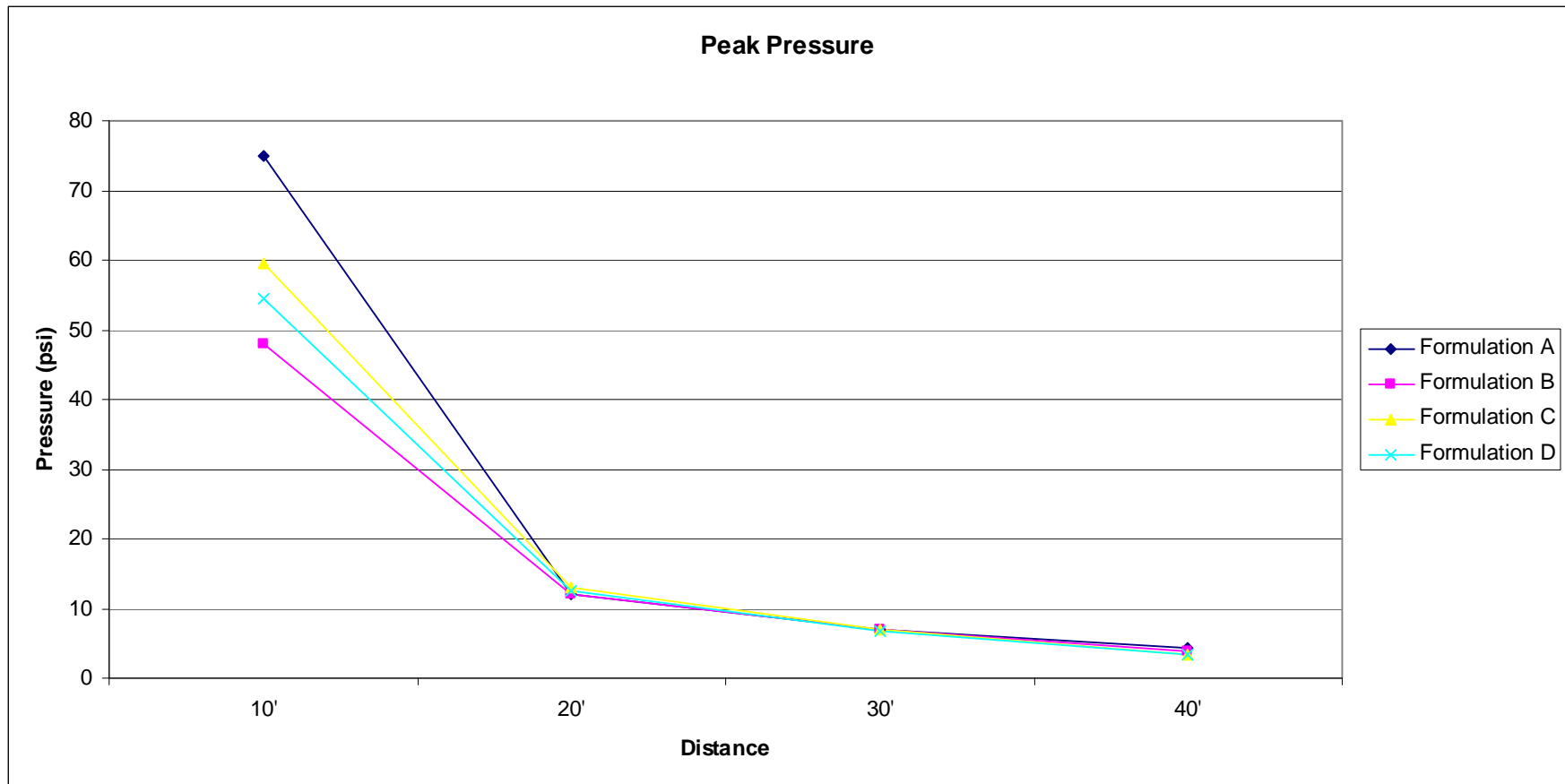


- Fragment performance
  - While not an objective – it was an outcome
  - Substantial damage to steel structures within the test arena

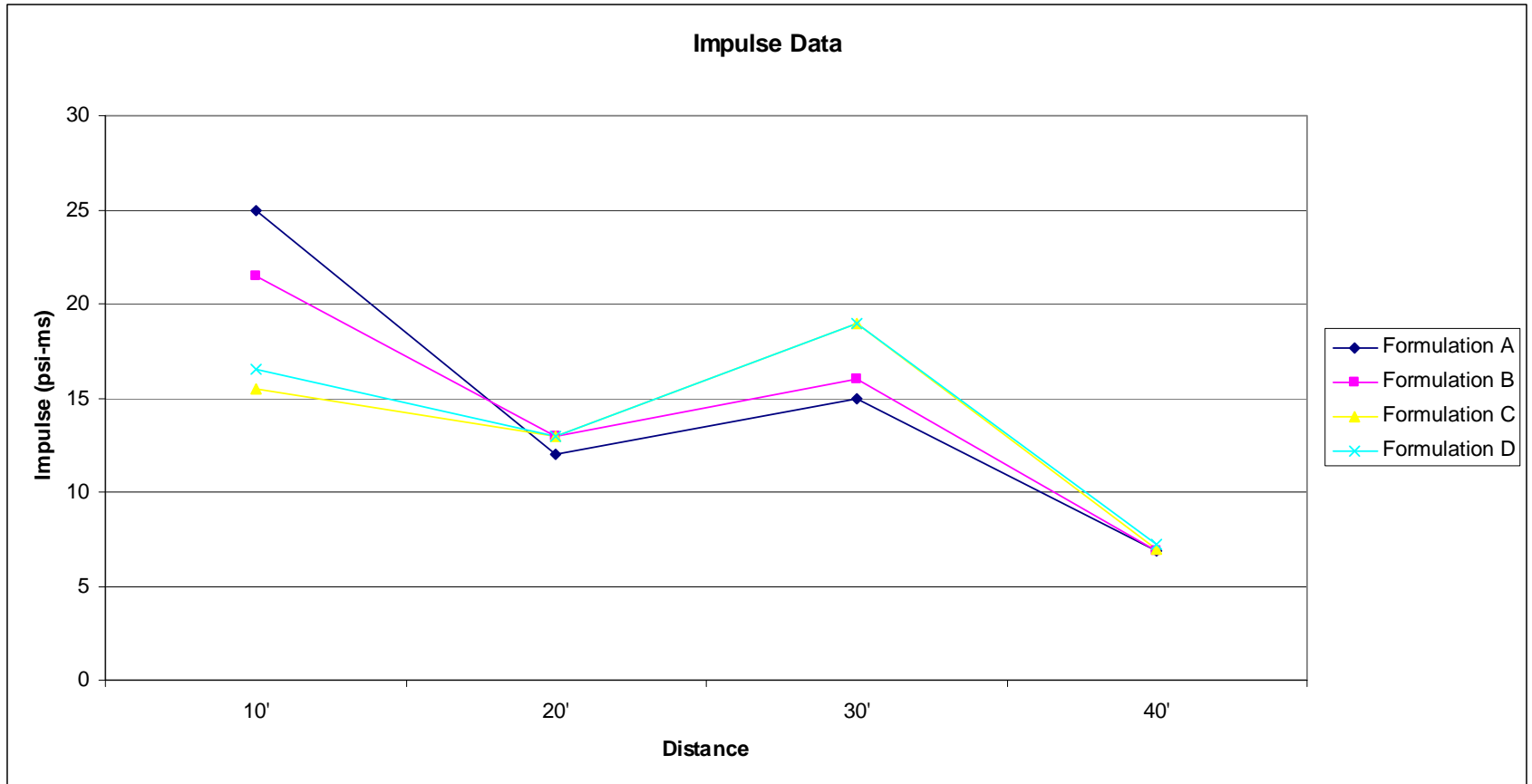




- Pressure

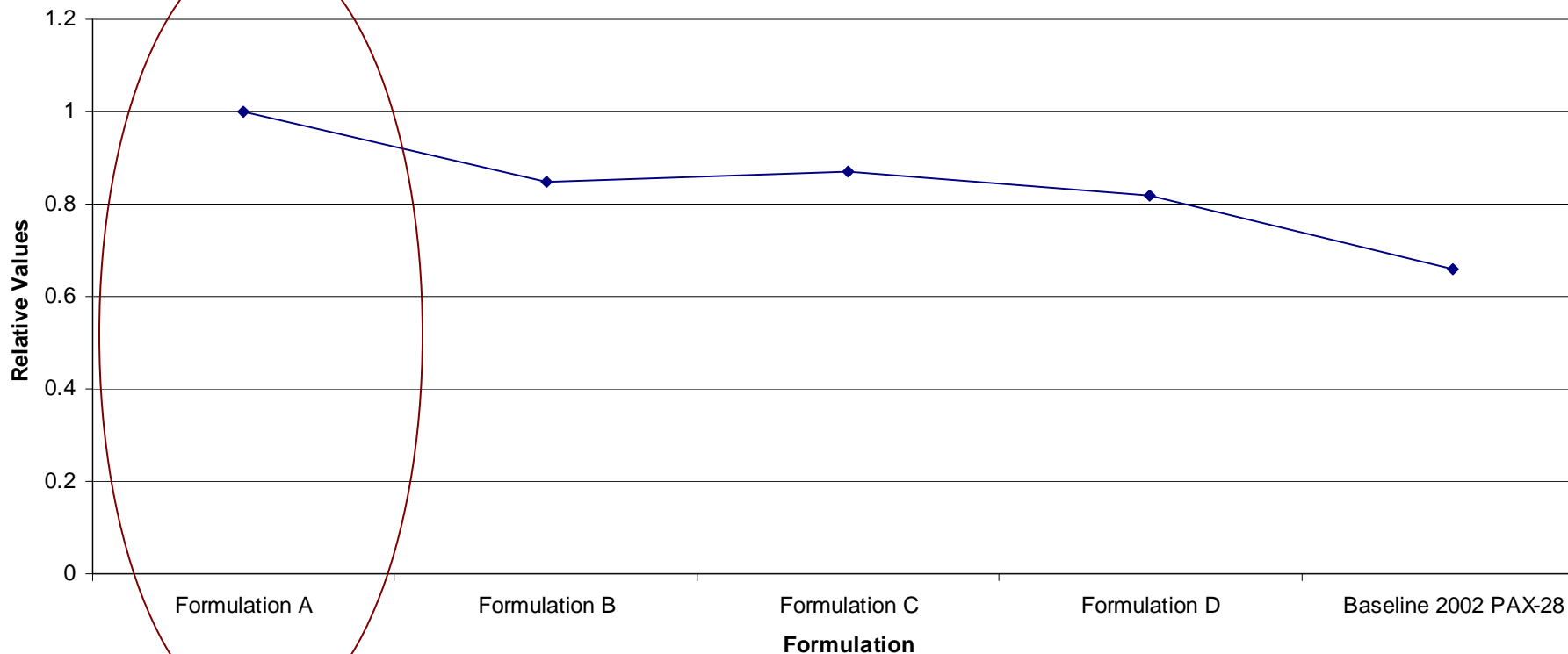


- Impulse



- 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

### Peak Pressure Evaluation Using Comp B Equivalent Weights



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





# Acknowledgements



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