Extremely Insensitive Explosive DDT Results during SLSGT

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Outline

- Intro & Background
- Test Setup
- Typical Results
- Unique Reaction
  - Photos and video
- Test Series Results
- Discussion
- Conclusion

Intro & Background

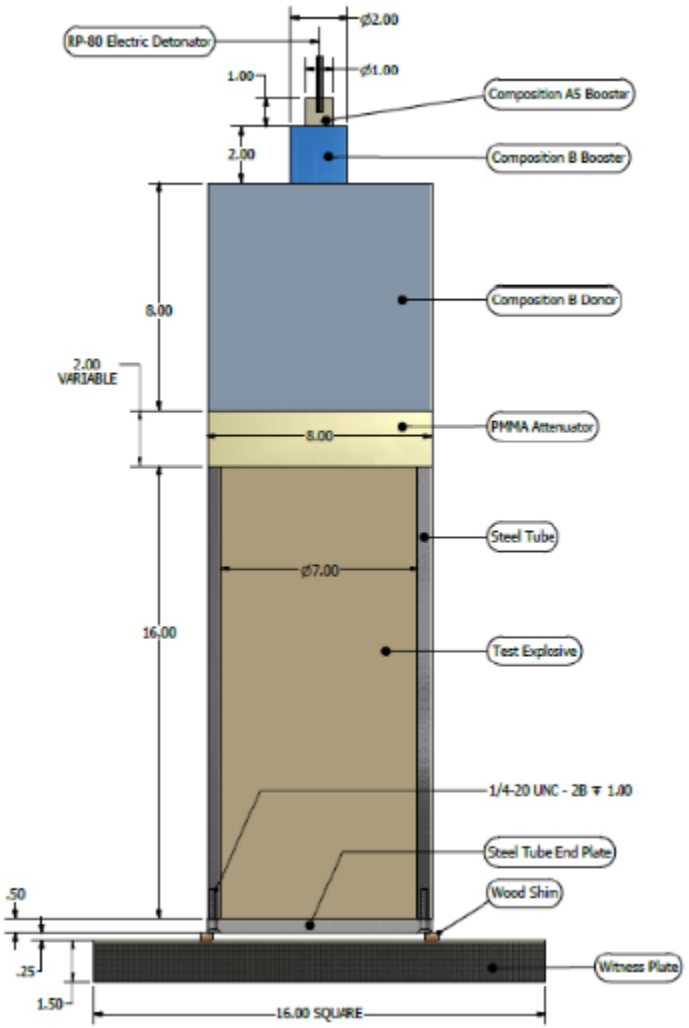
- Air Force – IM & Legacy Weapons Improvement
- Down-selected 2 explosive fill candidates
- Large series of shock characterization and detonation transfer tests on new formulations
  - High blast
  - Extremely insensitive formulations
- Performed SLSGT on both formulations
  - 10-shot series each

Explosive Candidate

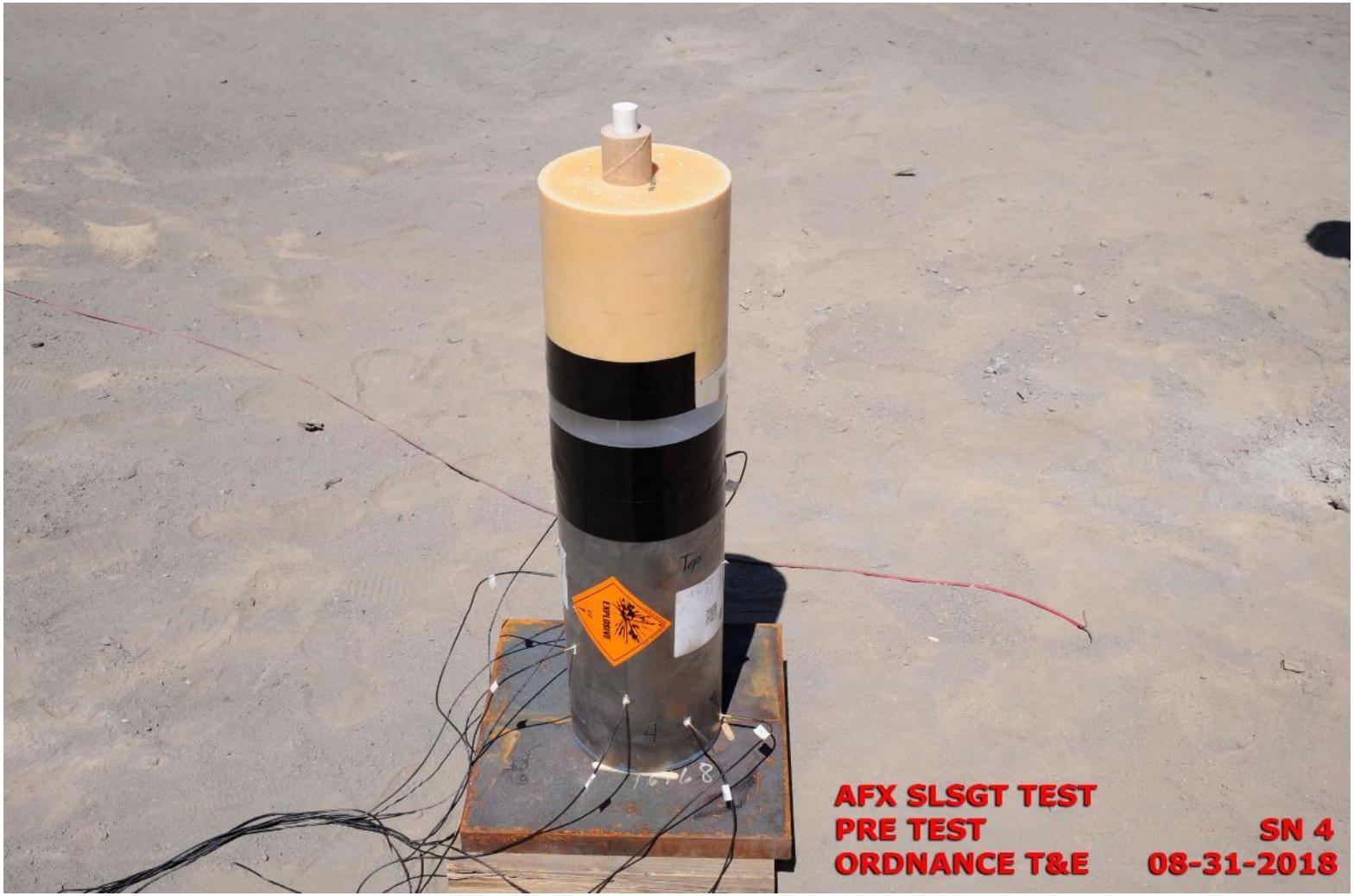
- “Better penetration-survivable high blast formulation”
- Similar insensitivity to legacy Air Force Explosive
  - Shock and impact
- Higher blast than legacy Air Force Explosive
  - Peak pressure
  - Impulse
  - Heave

Test Setup

- Typical SLSGT setup
  - 8” OD
  - 0.5” steel case
  - 16” long
  - 8” x 8” primary donor
- Deviations:
  - Added qty-8 Piezoelectric Pins
- HE cast
- Machined in/out surfaces



Pre-Test



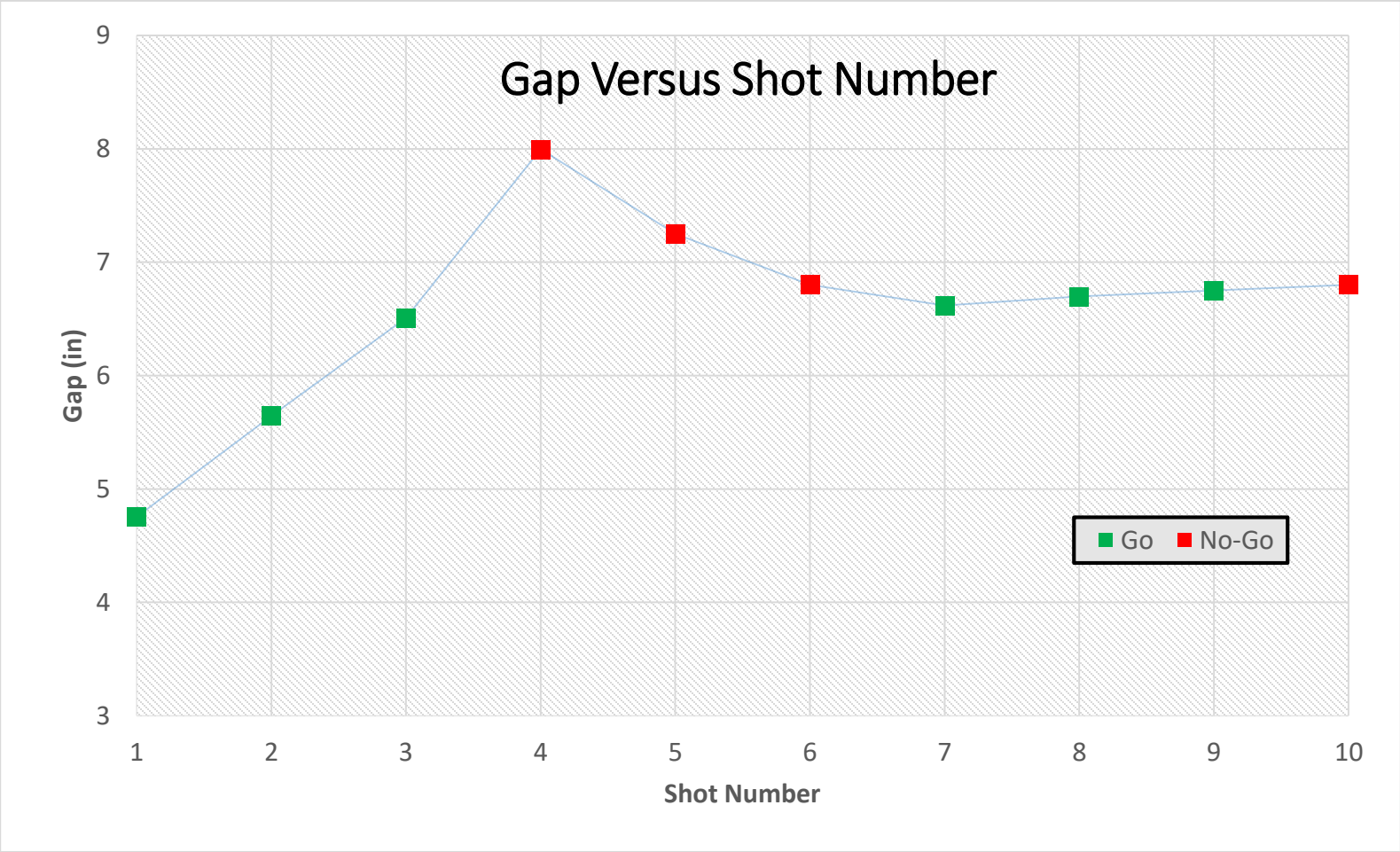
Typical GO & NO GO

- Hole ≥ 7” (explosive column diameter)
- Neatly punched (shear failure) with spall ring on back
- Velocity from pins ≥ 80% published det. velocity

Typical ‘GO’

Typical ‘NO GO’

Test Results

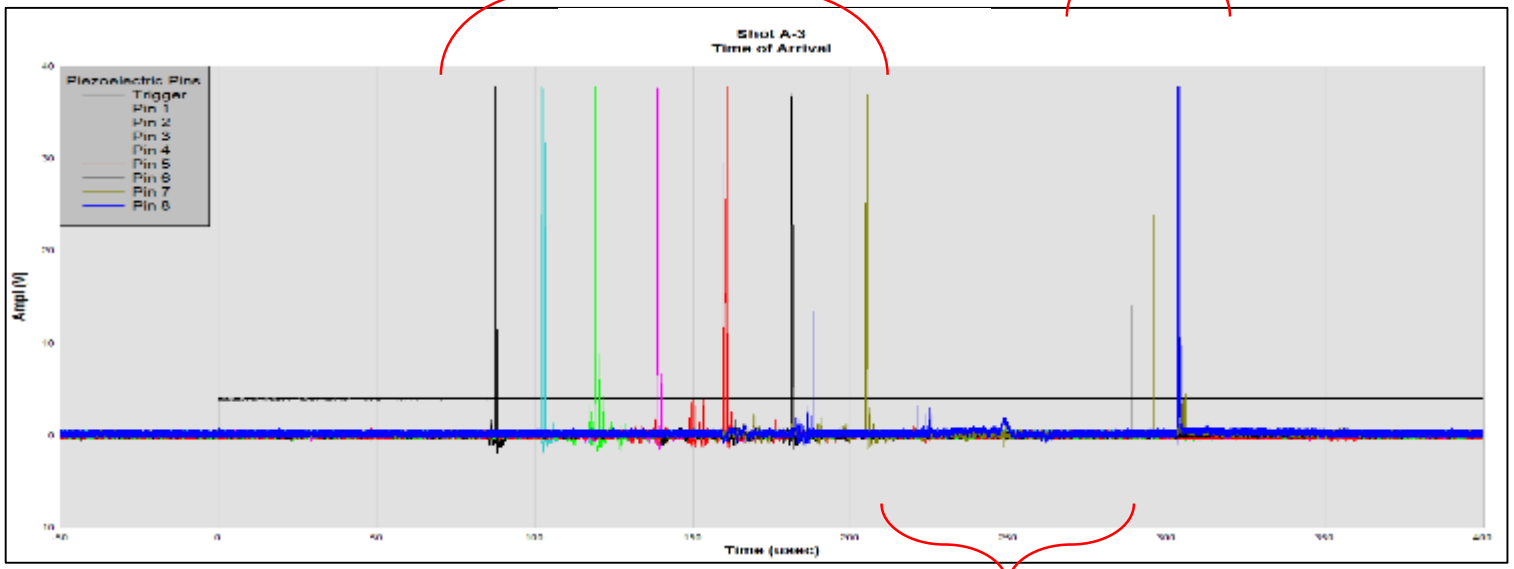


Shot #A-3

- Witness plate with ‘GO’ hole
- Pin data shows LOW velocity

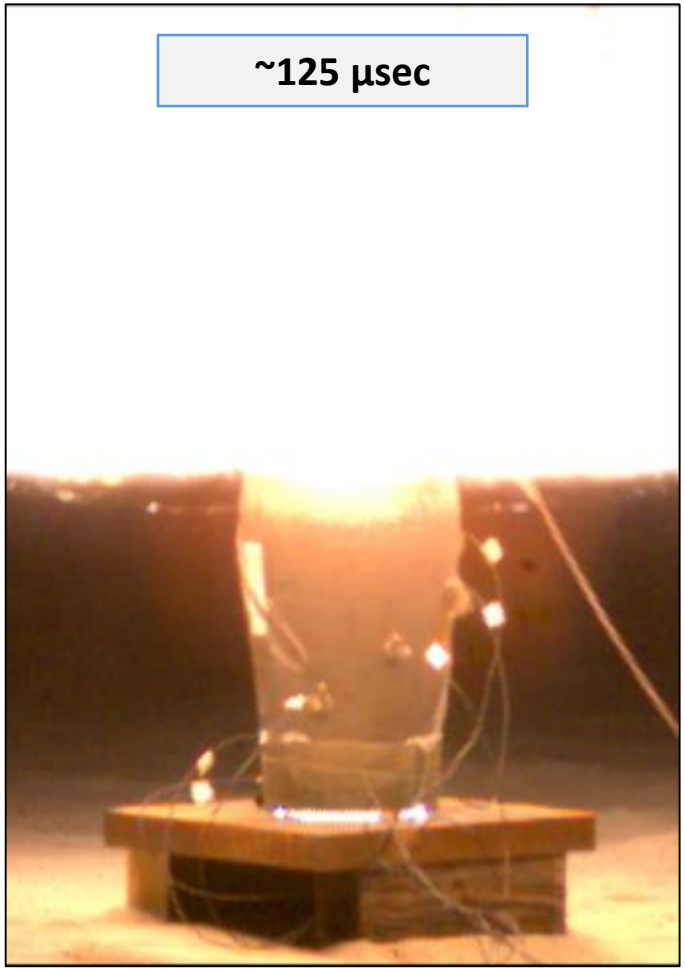
~35% det. velocity

~98% det. velocity

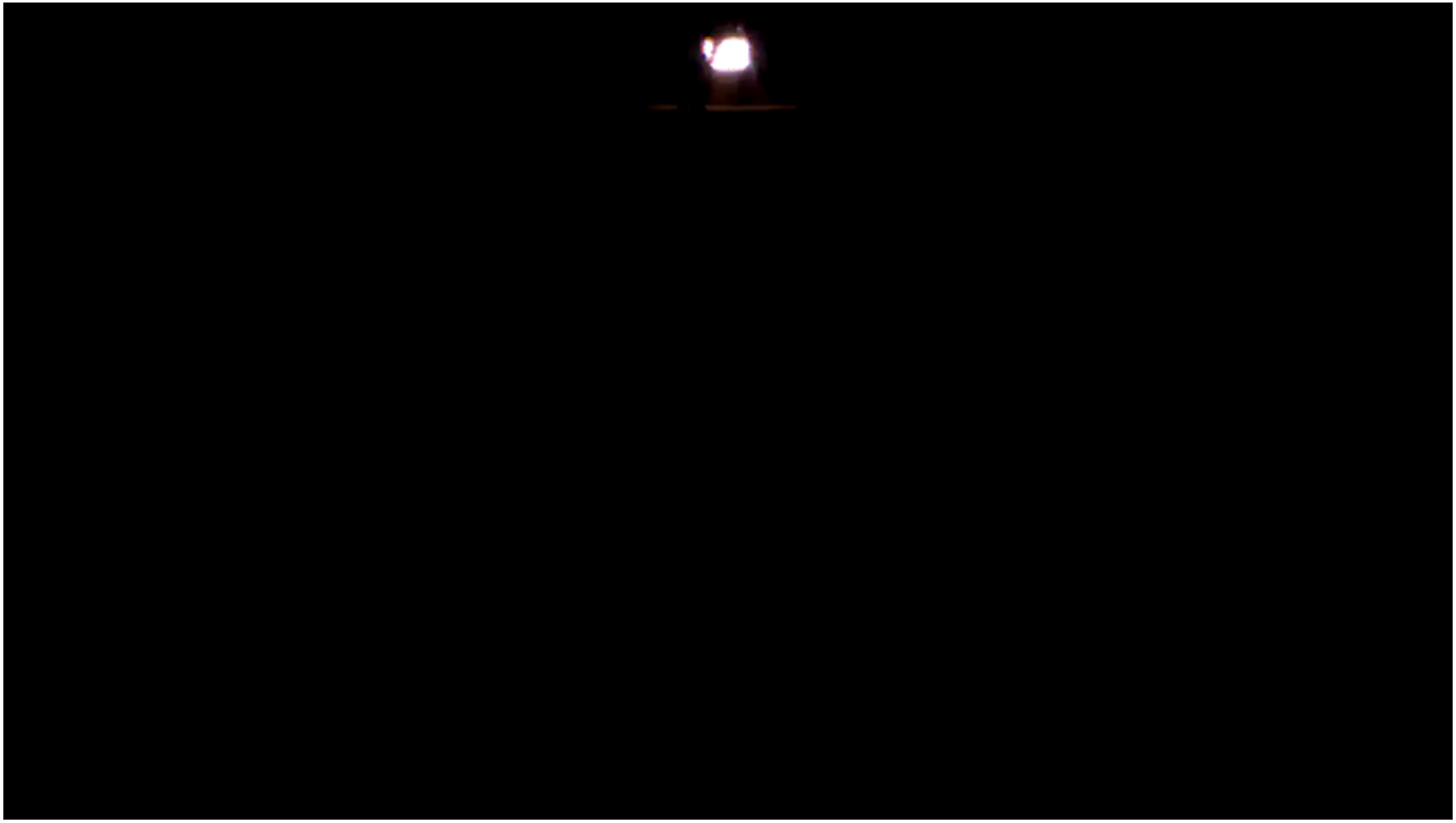


~50-100 µsec delay

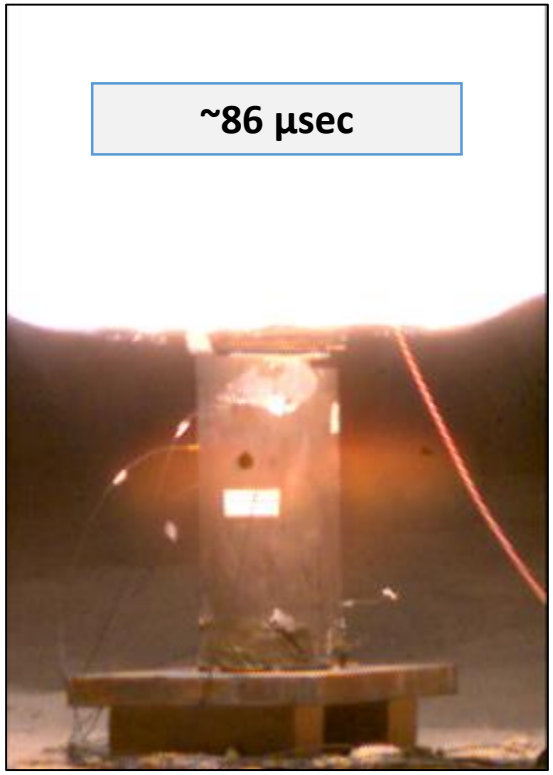
Typical ‘GO’ Reaction

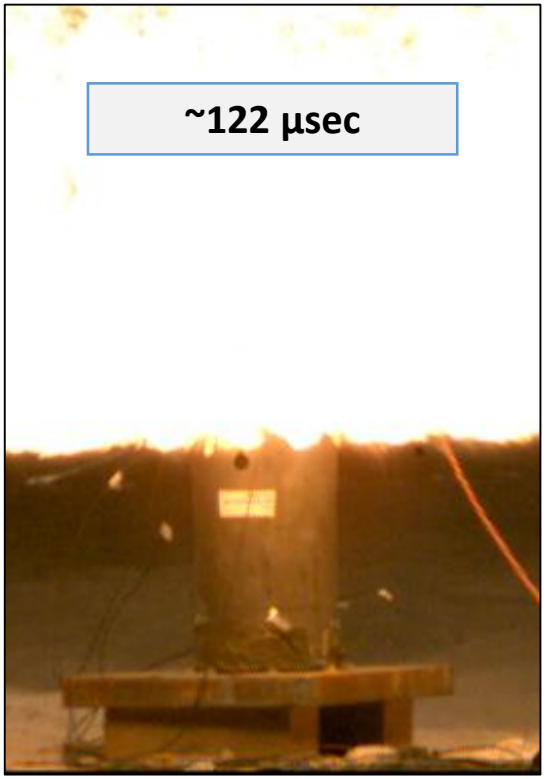


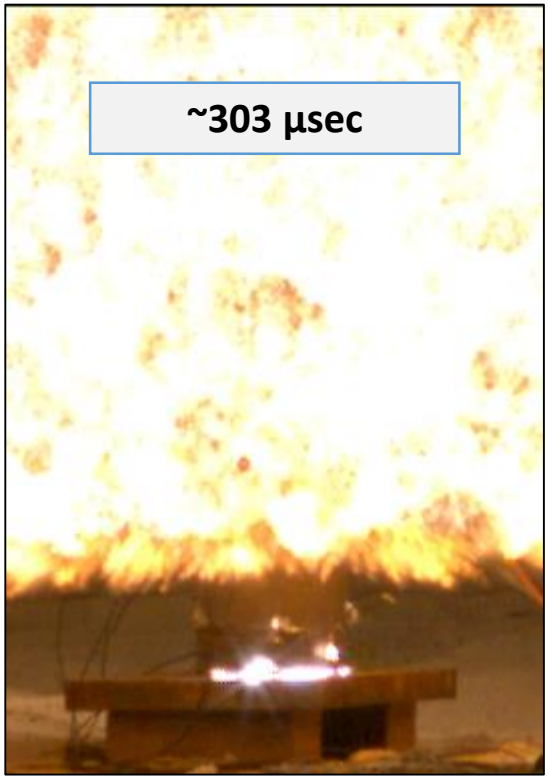
‘GO’ Video



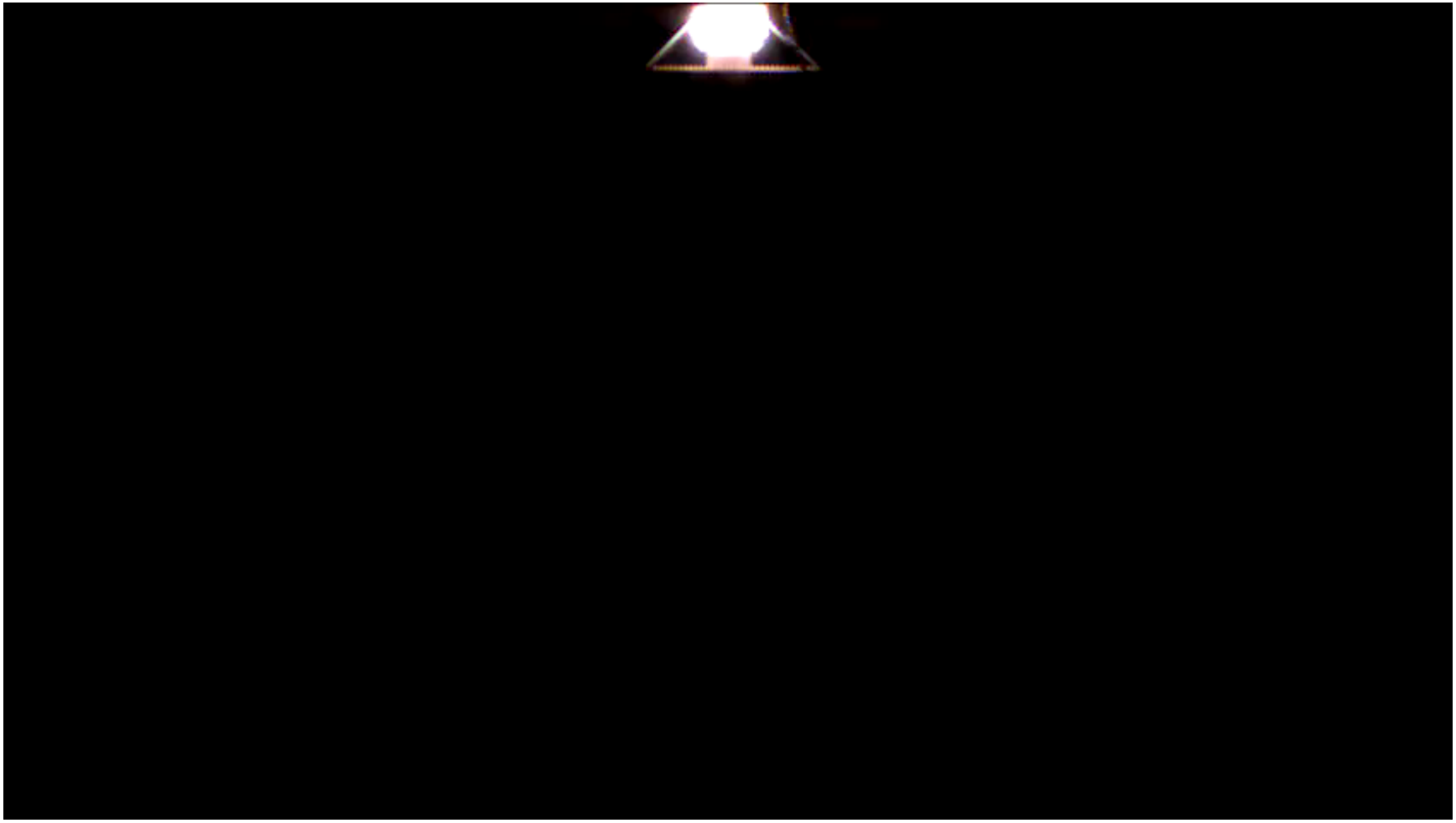
Delayed Response



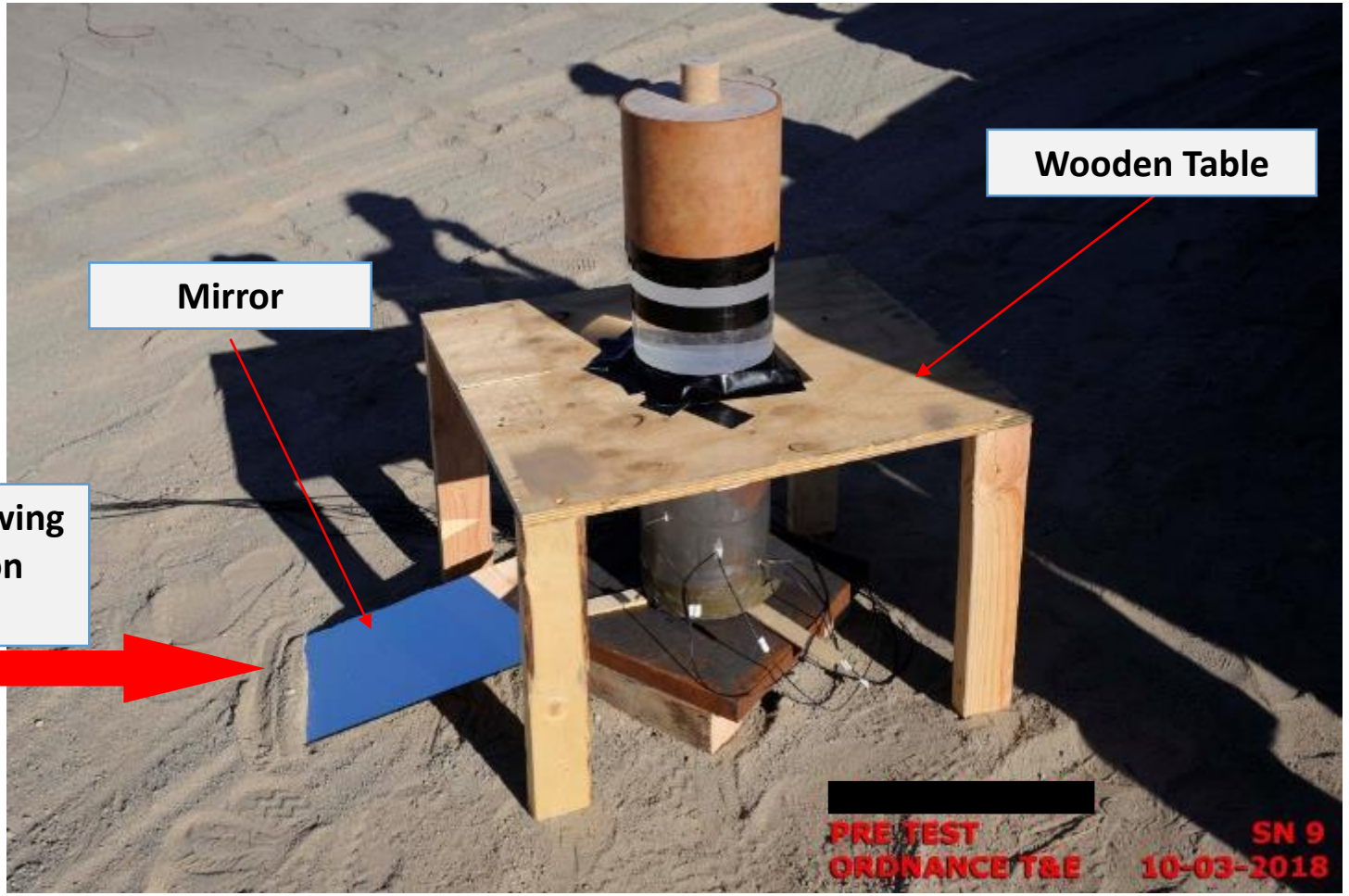




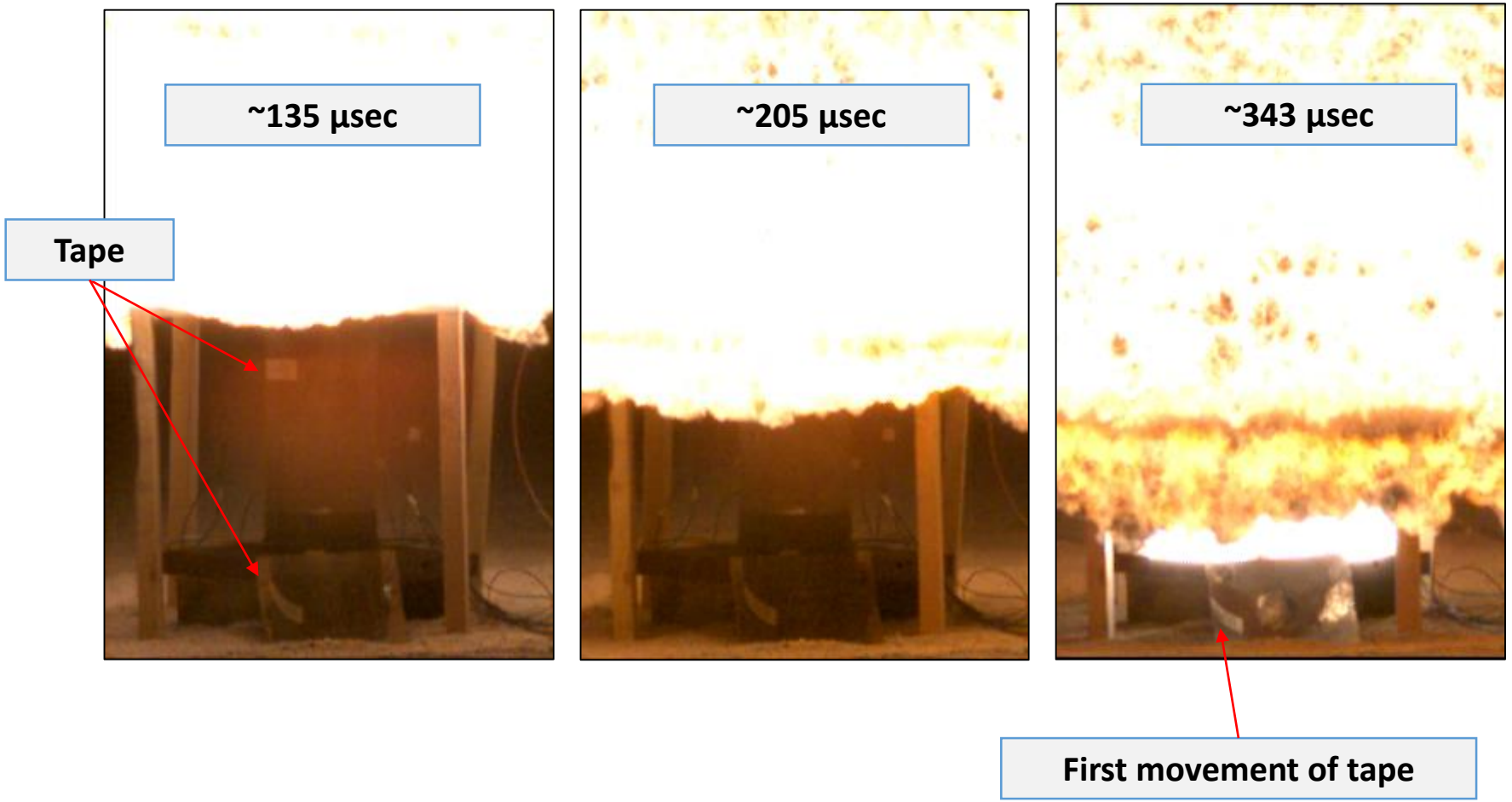
Delayed Response Video



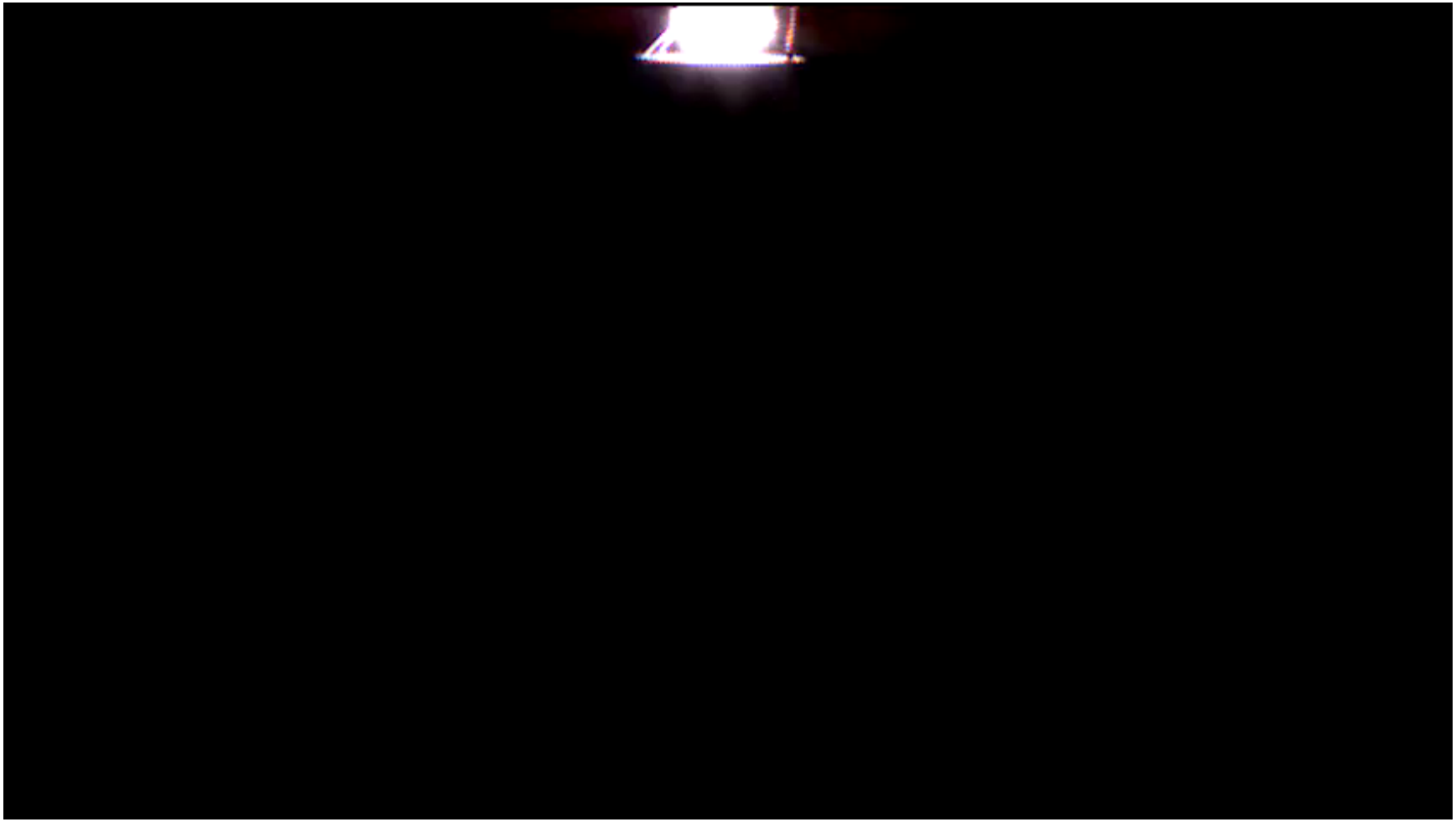
Setup change



Modified Set Up Results



A-19 Video



Conclusions

- Unique results obtained from SLSGT with non-ideal explosive
  - Potential DDT
- Test-ism not ruled out
  - Explosive slamming into witness plate?

- Future Work & Improvements
  - Increase Length of tube – 32” tube
  - Larger table
  - Additional pins to get cylinder expansion direction
  - Foil gauge on witness plate to record impact/shock timing
  - Potential increase air gap from 0.25” to 0.50”