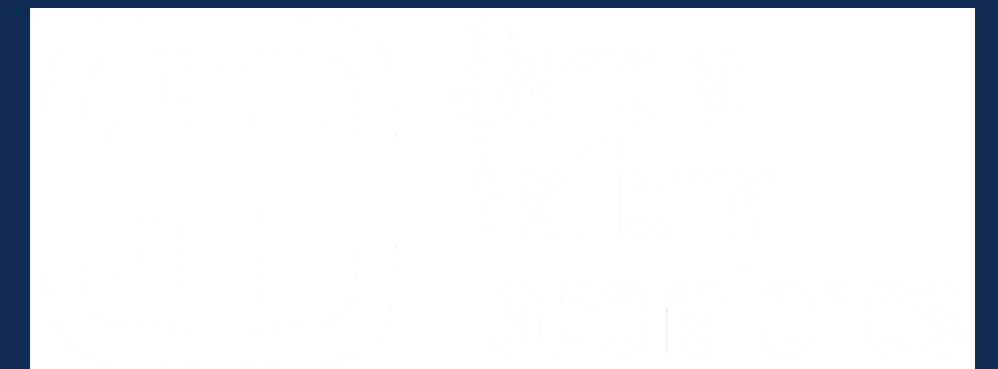




Requirements for Simulating the Transmitted Wave Profile through Metal Barriers



Requirements for Simulating the Transmitted Wave Profile through Metal Barriers

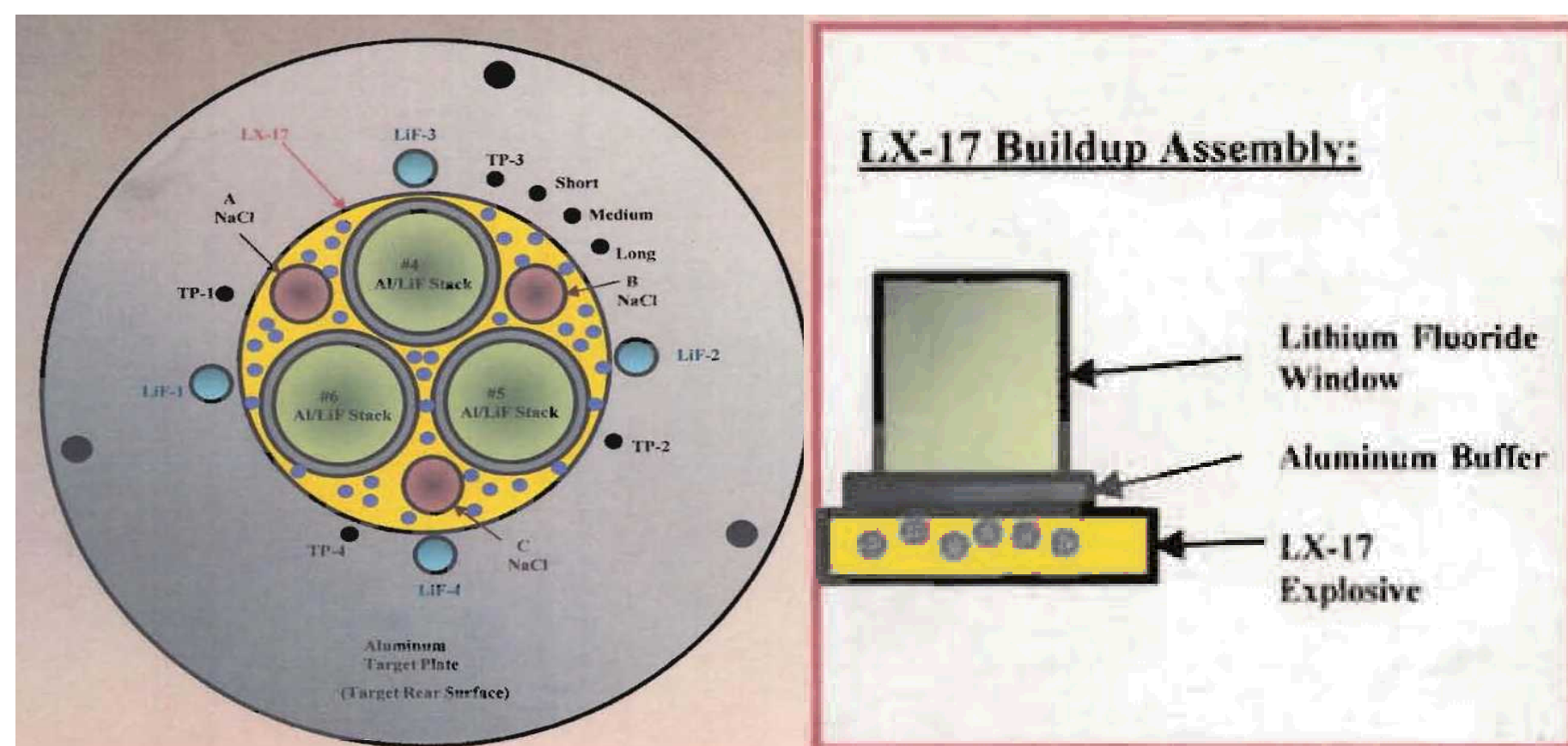
Leah Tuttle, Seth Root, Bob Schmitt, Eric Harstad

Test Arrangement

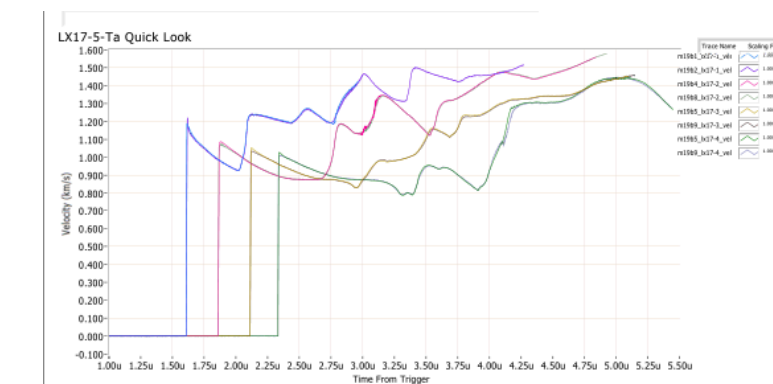


Powder gun used to accelerate a copper flyer to ~ 2 km/s to impact a disc of LX-17 IHE

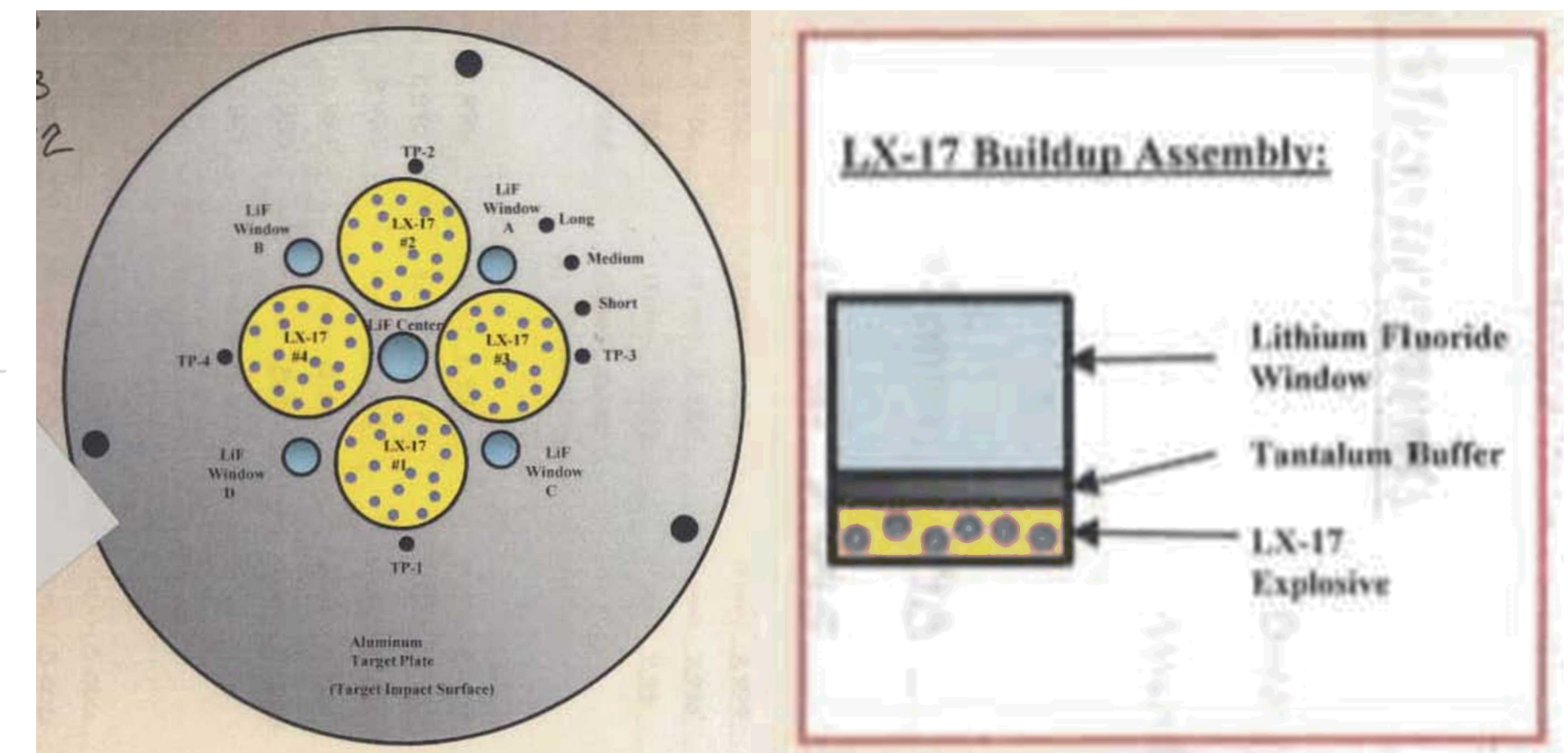
Test Setup 1 – Aluminum and Copper Buffers



VISAR Measurements

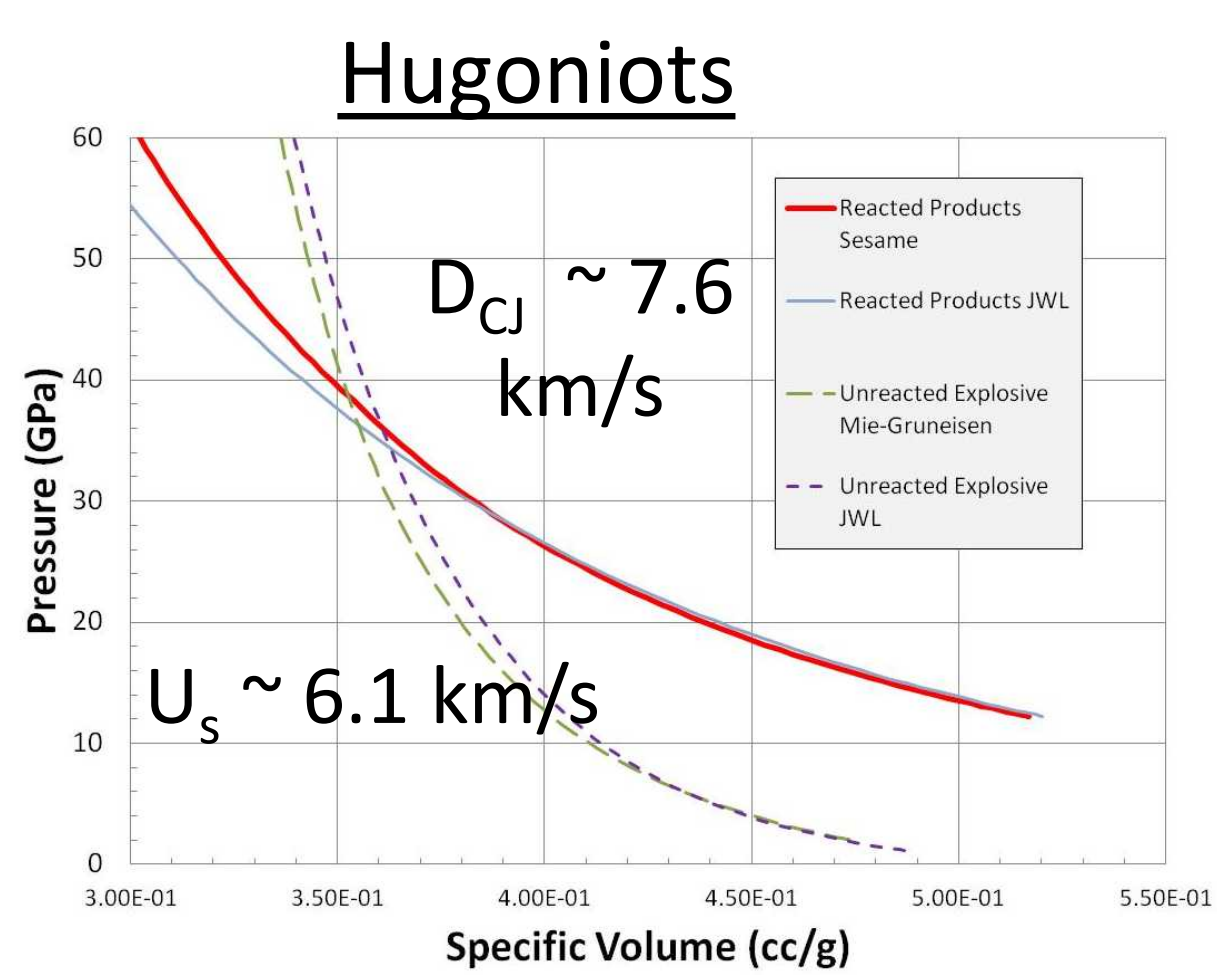


Test Setup 2 – Tantalum Buffers



Model Description and Analysis

1D Rectangular CTH simulations using HVRB reactive flow model (Mie-Gruneisen and JWL or Sesame EOS)



Mie-Gruneisen Parameters

Material	ρ_0 (g/cc)	C_0 (km/s)	S	Γ
LX-17	1.90	3.05	1.95	1.00
Copper	8.93	3.94	1.49	1.99
NaCl	2.17	3.53	1.34	1.60

Estimate Transition

$$t = \frac{x}{U_s} + \frac{(W-x)}{D_{CJ}}$$

$$x = 4.3 - 4.9 \text{ mm}$$

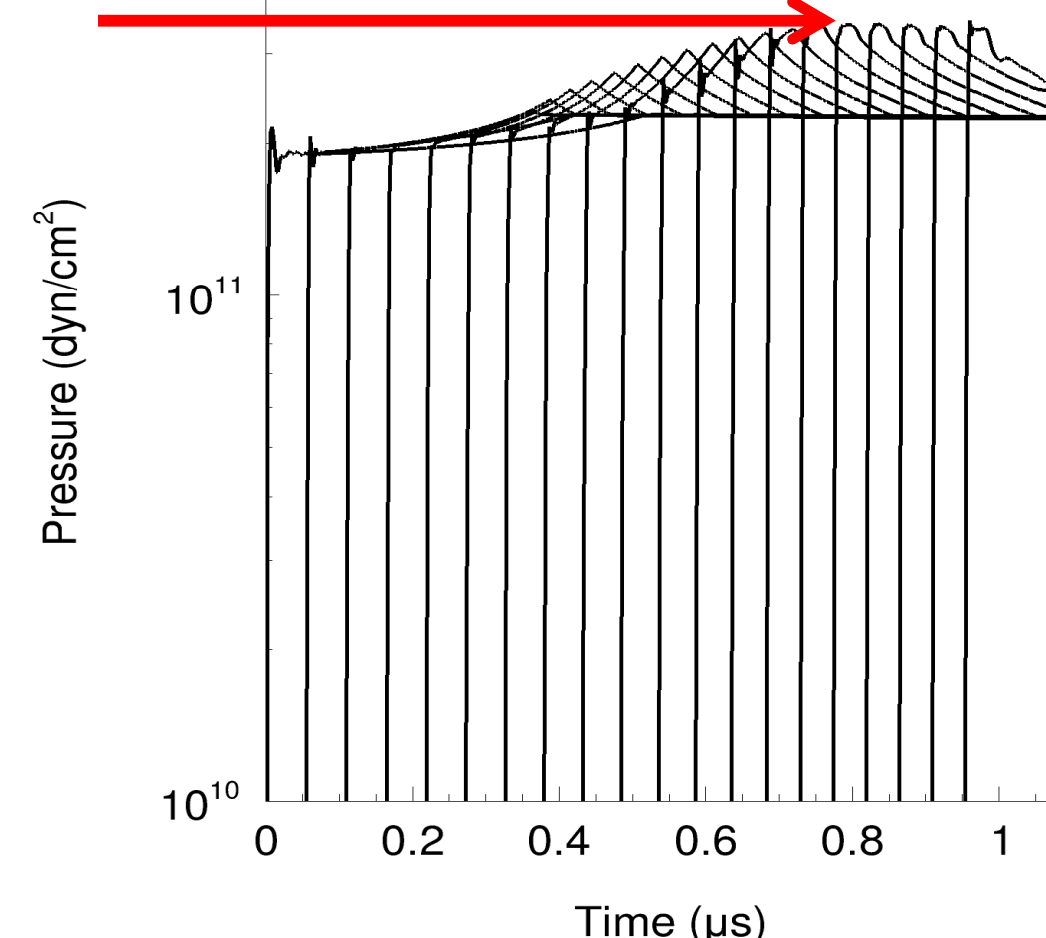
Estimate Pressure

$$P_{LX-17} = \rho_0 C_0 u + \rho_0 s u^2$$

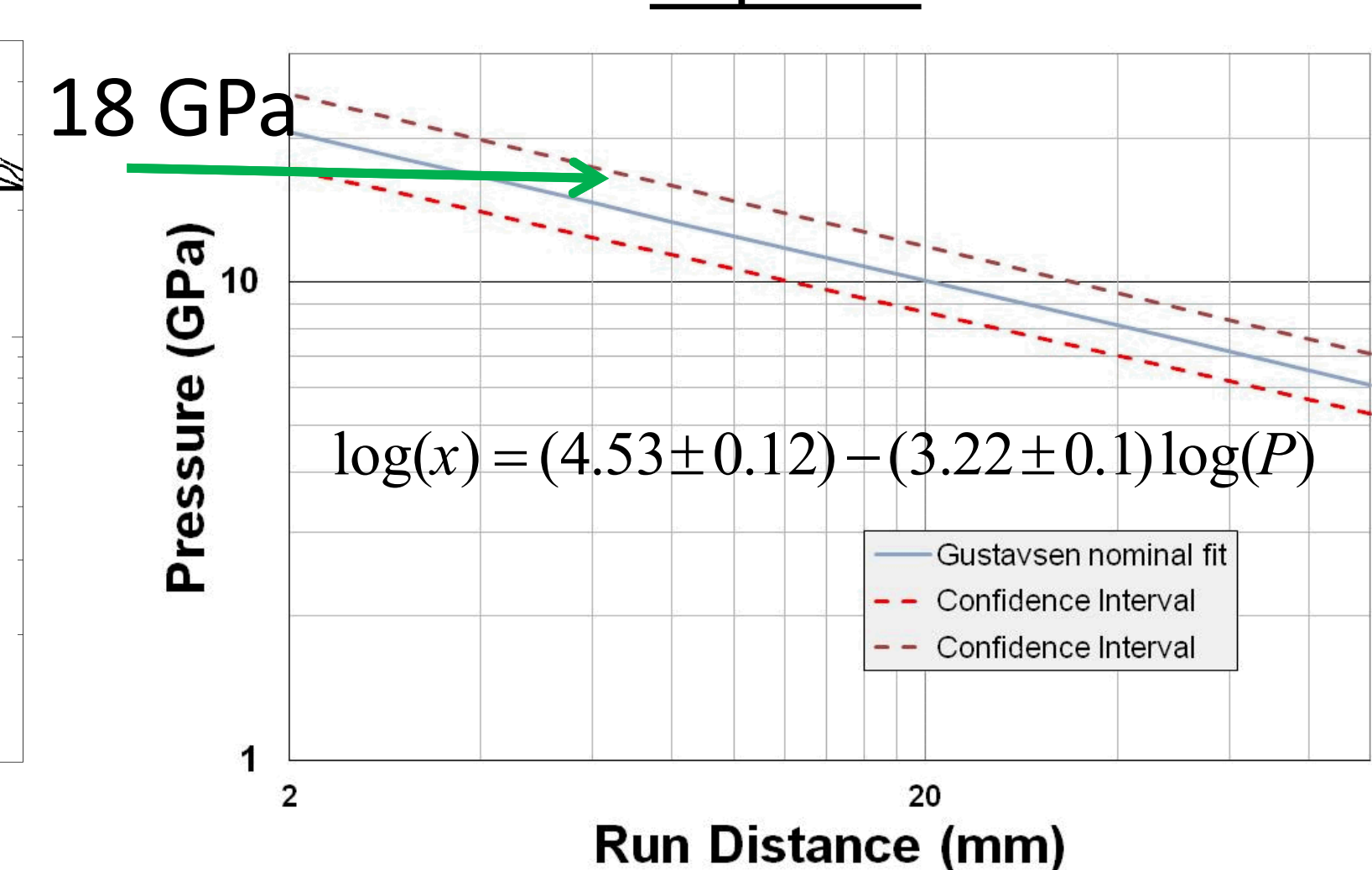
$$P_{Cu} = \rho_0 C_0 (u_0 - u) + \rho_0 s (u_0 - u)^2$$

P=18 GPa

Detonation

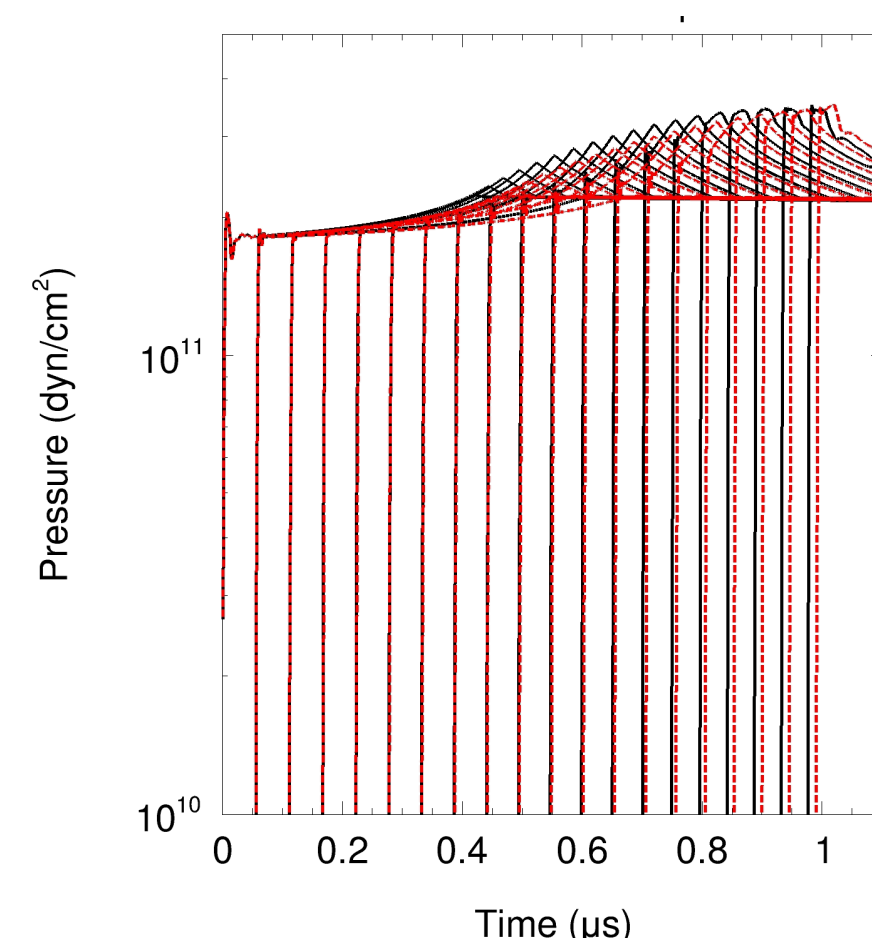
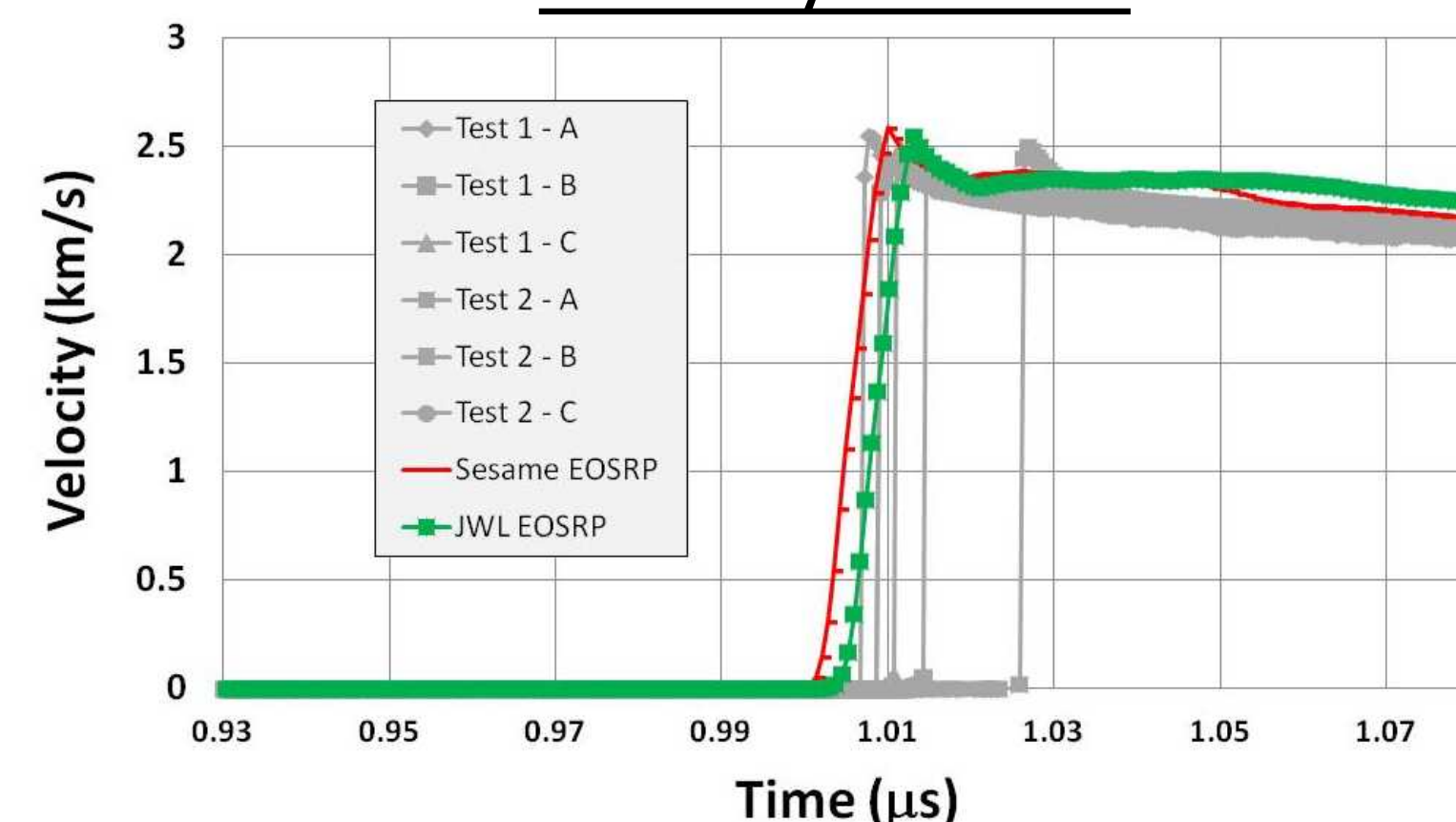


Pop Plot



Simulation Results and Comparison

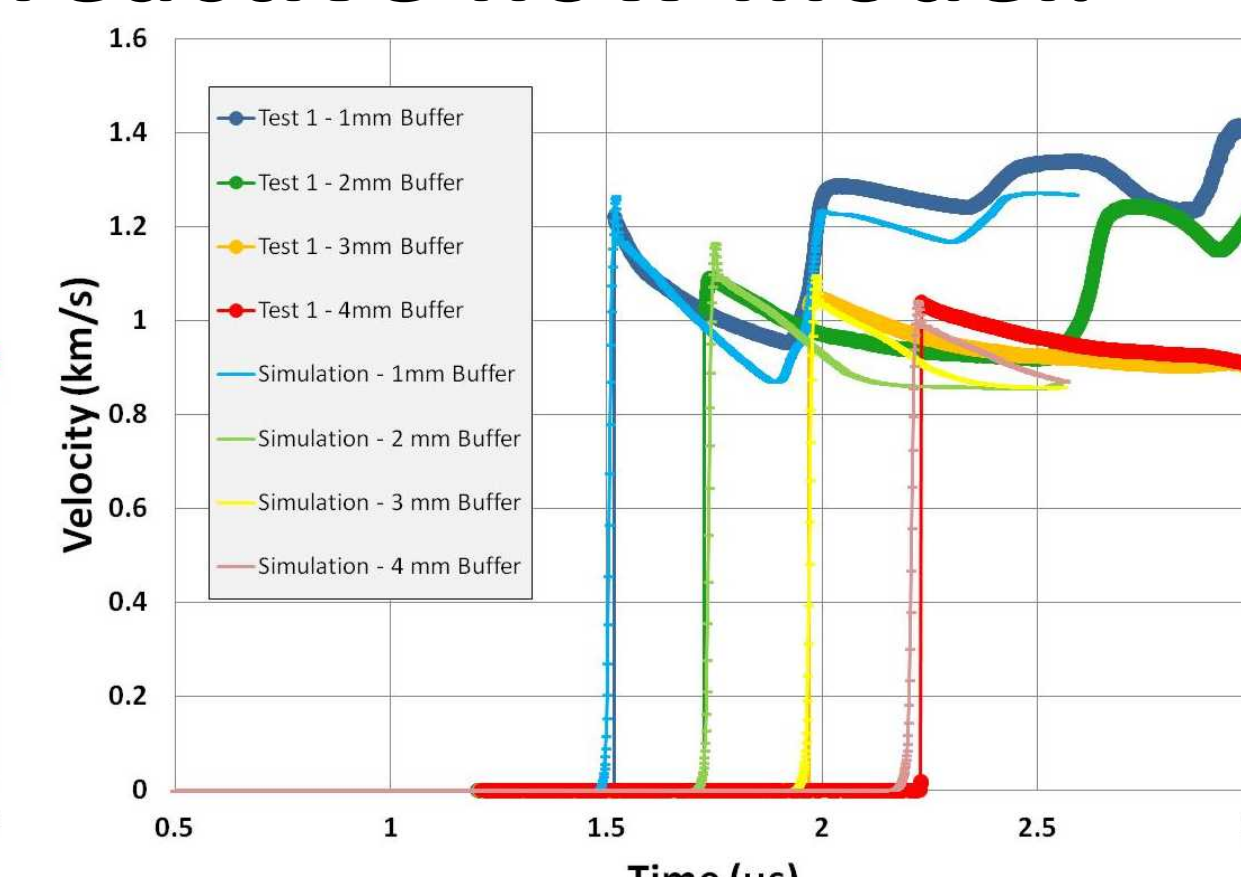
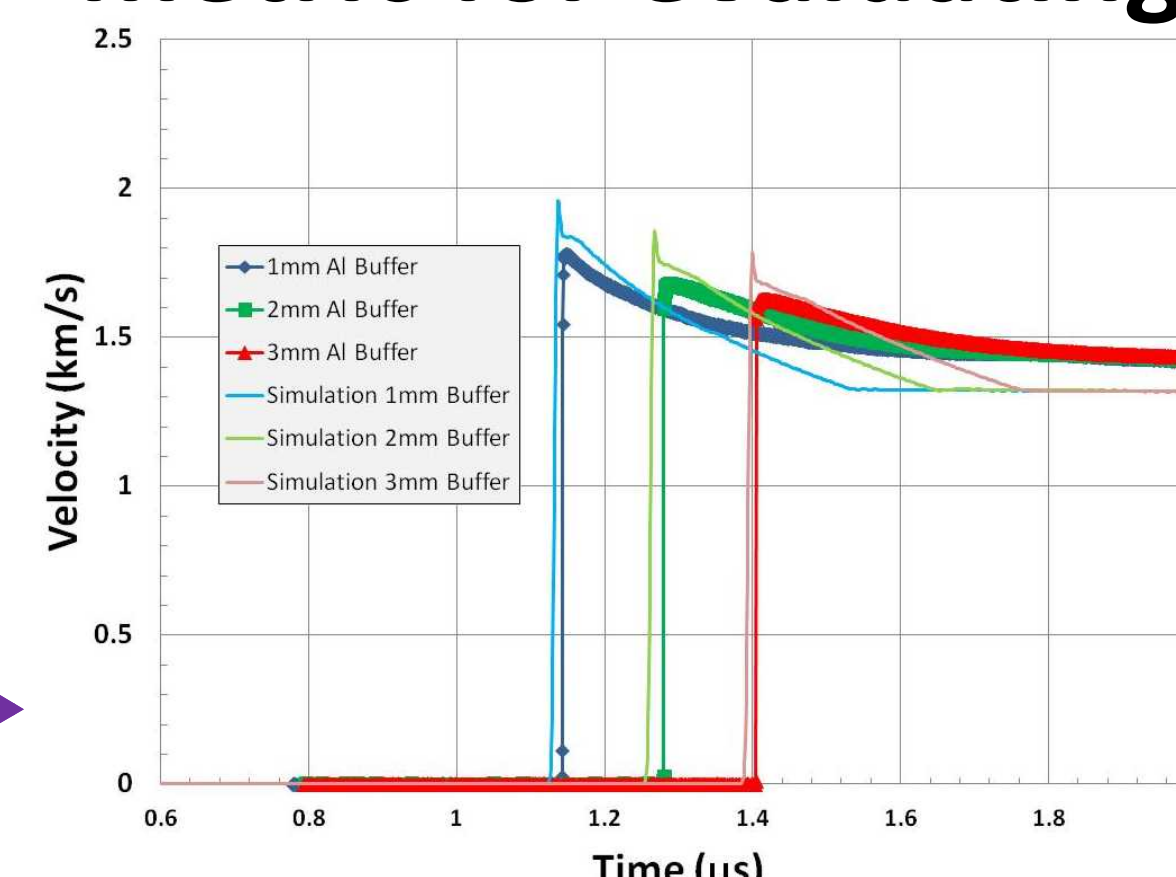
Velocity Profiles



NaCl/LX-17 Interface

LiF/Buffer Interface

Comparison of velocity profile provides a metric for evaluating reactive flow model.



HVRB parameters can be adjusted to capture the SDT suggested by test data.