

## Perforating Charges Engineered to Optimize Hydraulic Stimulation Outperform Industry Standard and Reactive Liner Technology

IPS 16-11

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AUTHORS: Joel Walden, Kevin Harive, and John Pinkett\*, Halliburton

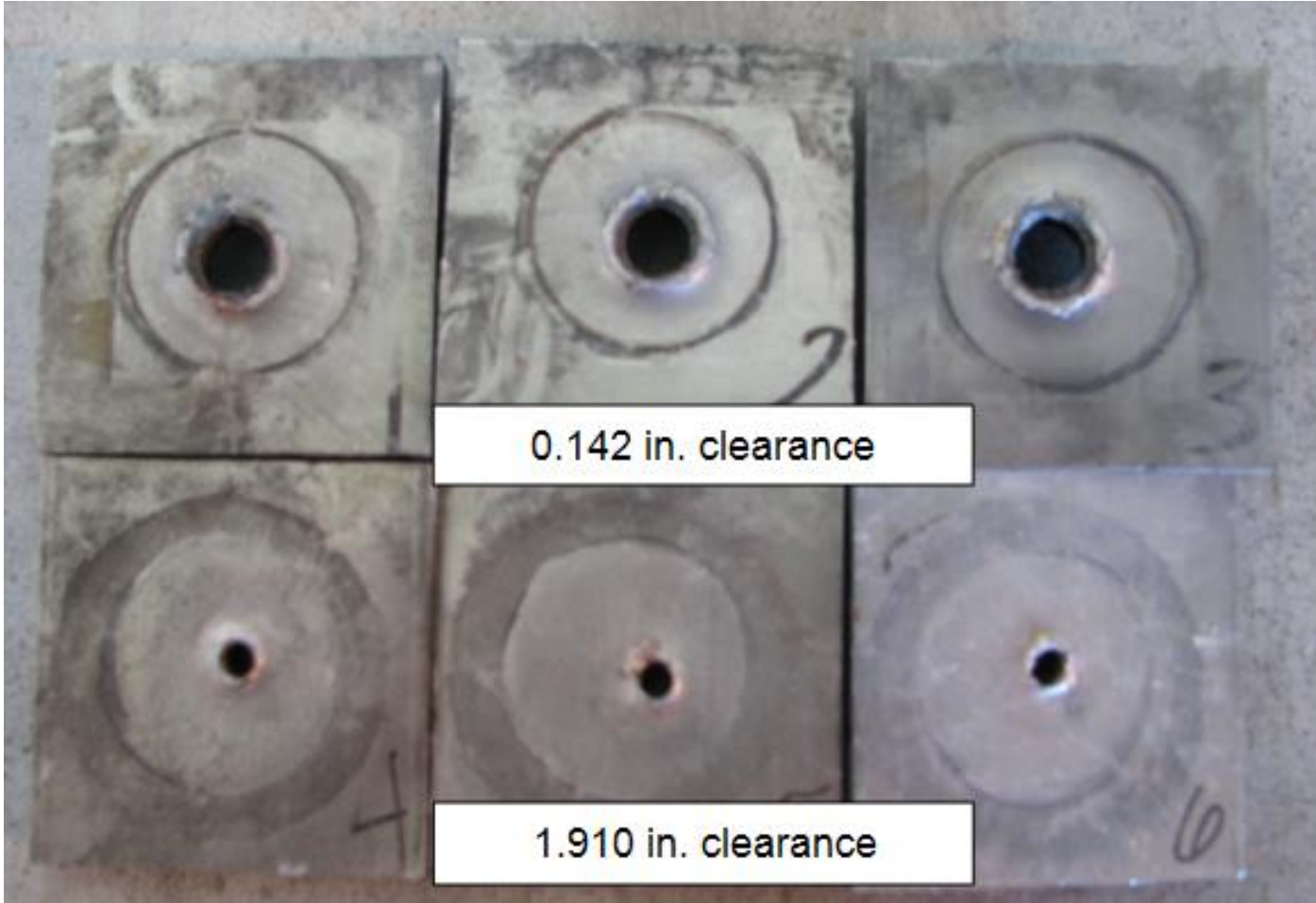
# Challenges

## Horizontal Perforating



# Challenges

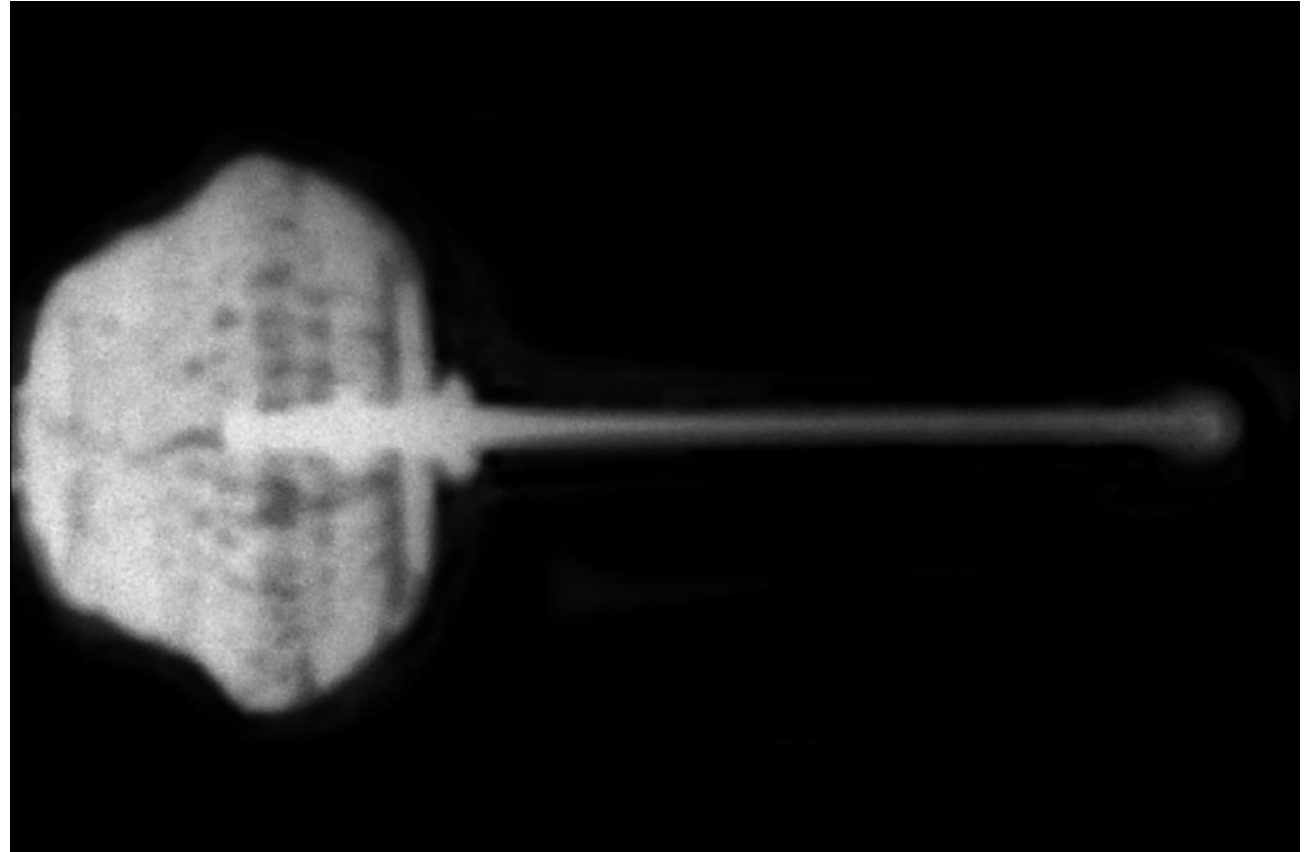
## Horizontal Perforating



# Challenges

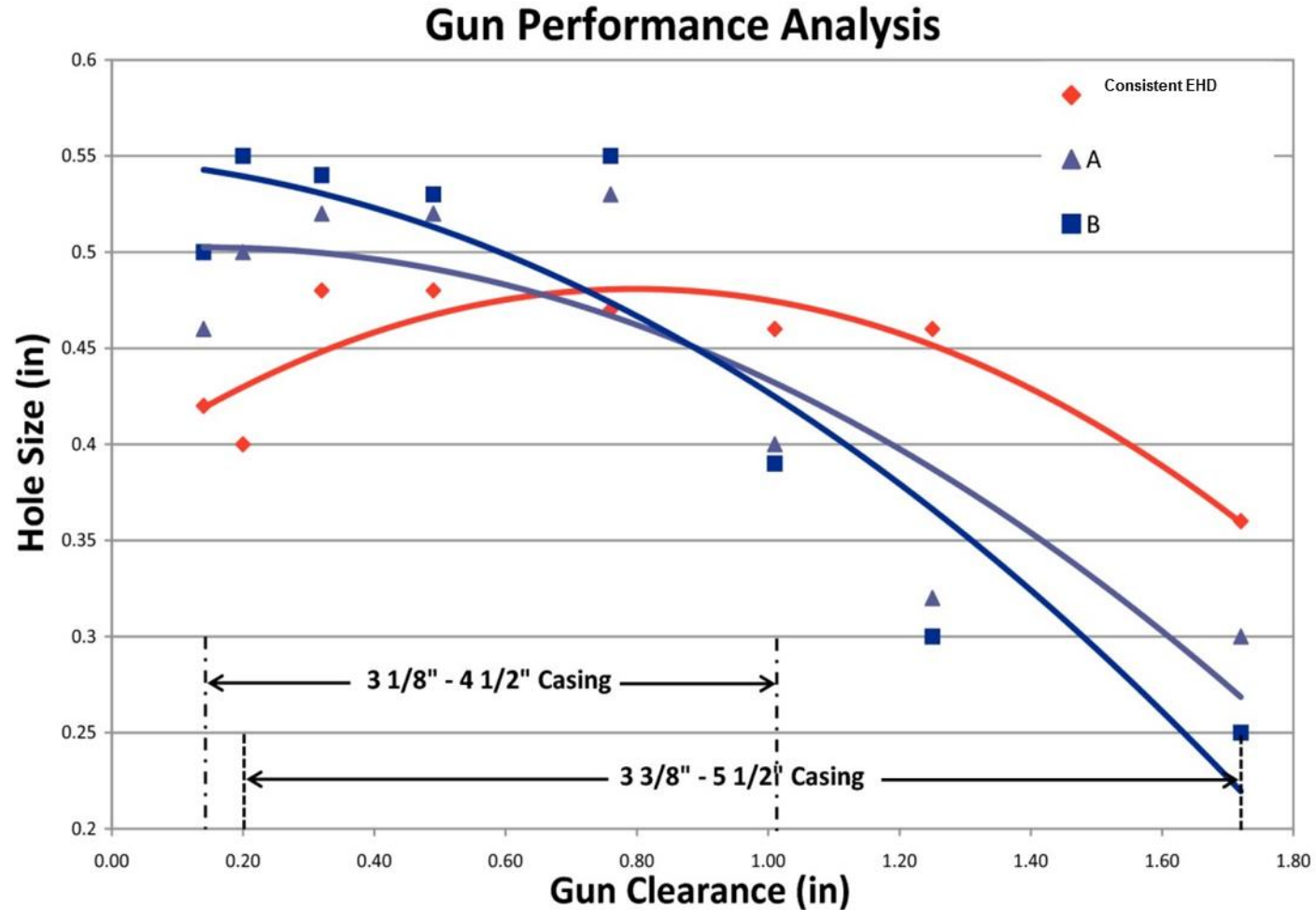
## Horizontal Perforating

- Centralized perforating guns
- Oriented perforating
- Hydrajetting
- Bullets
- Chemically reactive compounds



# Challenges

## Horizontal Perforating



# Case Study

Wyoming, Niobrara Formation

- Two wells in the Powder River basin
  - First well: alternating stages
    - Seven stages shot with low entry-hole diameter (EHD) variability charge
    - 12 Stages shot with deep penetrator
  - Second well: alternating stages
    - Six stages shot with low EHD variability charge
    - 14 Stages shot with deep penetrator
    - 11 Stages shot with reactive liner charge

# Case Study

Wyoming, Niobrara Formation

## ■ Result

- First well: alternating stages
  - 6% Reduction in treating pressure with a 5% increase in rate
  - 6.3% More proppant placed per stage with only a 0.4% increase in fluid required
- Second well: alternating stages
  - 5.5% Reduction in breakdown pressure compared to the reactive liner charge stages
  - 3% Reduction in treating pressure compared to deep penetrator and reactive liner charge stages
  - 5% Increase in pump rate
  - 12% More proppant pumped with only a 0.83% increase in fluid required



# 2016 INTERNATIONAL PERFORATING SYMPOSIUM GALVESTON

QUESTIONS? THANK YOU!

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PERFORATING CHARGES ENGINEERED TO OPTIMIZE  
HYDRAULIC STIMULATION OUTPERFORM INDUSTRY  
STANDARD AND REACTIVE LINER TECHNOLOGY