

ECONOMICAL & REPEATABLE METHOD OF  
OBTAINING DYNAMIC UNDERBALANCE

IPS 16-28

GEODynamics®

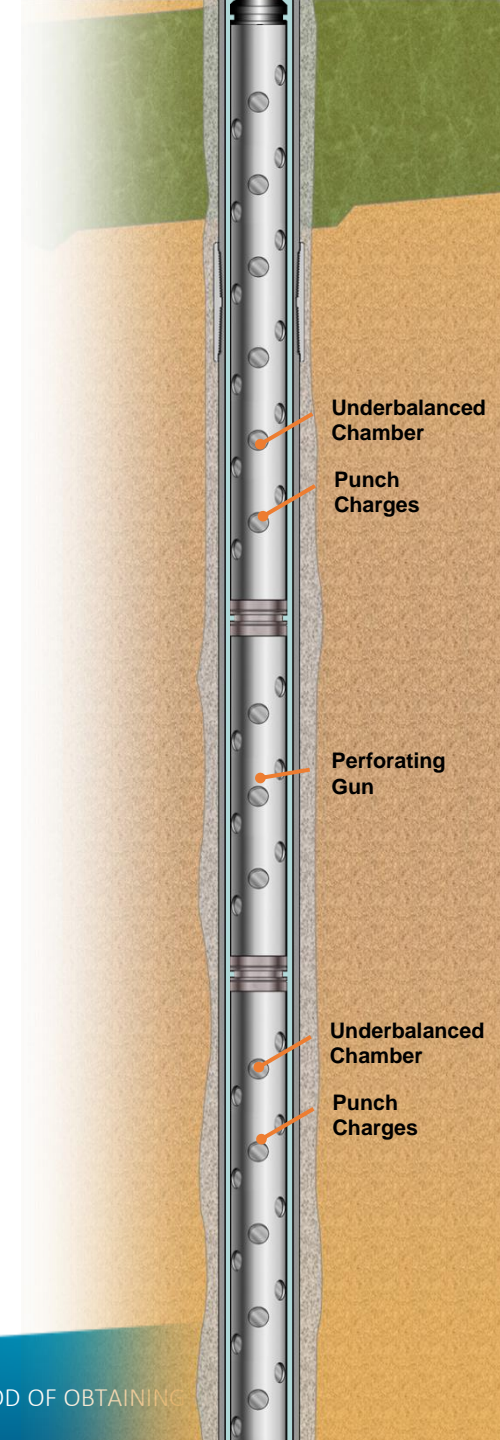
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# AGENDA

- Dynamic underbalanced perforating review
- Development of a vent assembly
- System configuration
- Examples
- Applications

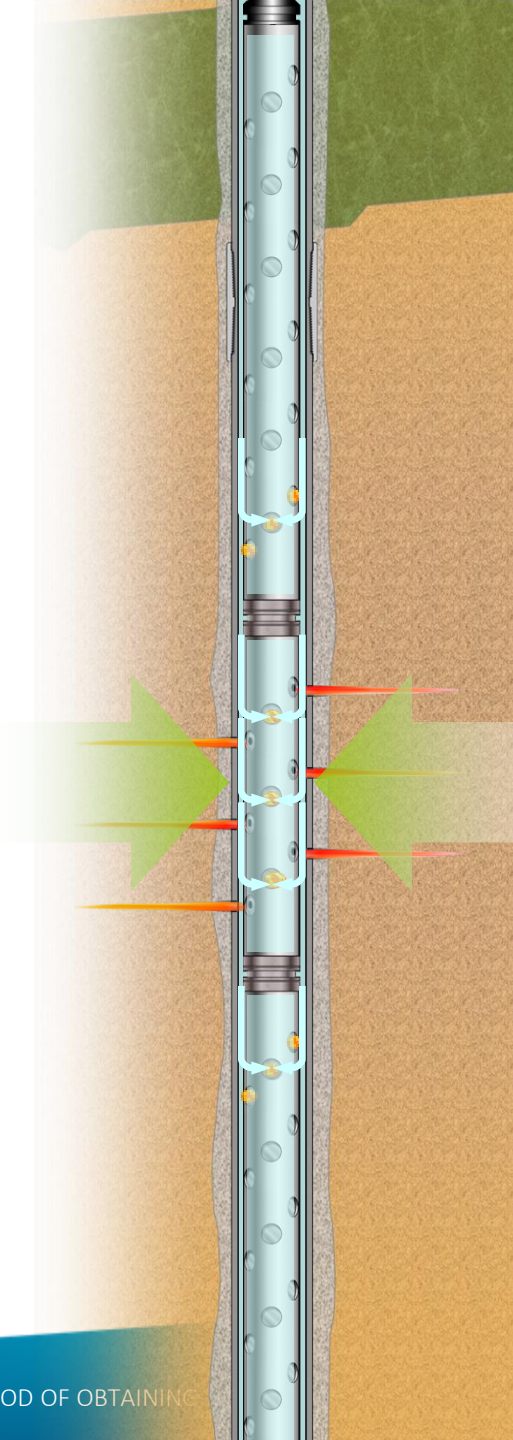
# DYNAMIC UNDERBALANCED PERFORATING

- Dynamic underbalance perforating is a method of disrupting the compacted region and clearing perforations at the moment of perforating through the development of a short duration underbalance
- The underbalance is created from the perforating carrier or through the use of additional chambers above or below the perforating carrier
- The chambers serve to increase the volume available to create the underbalance

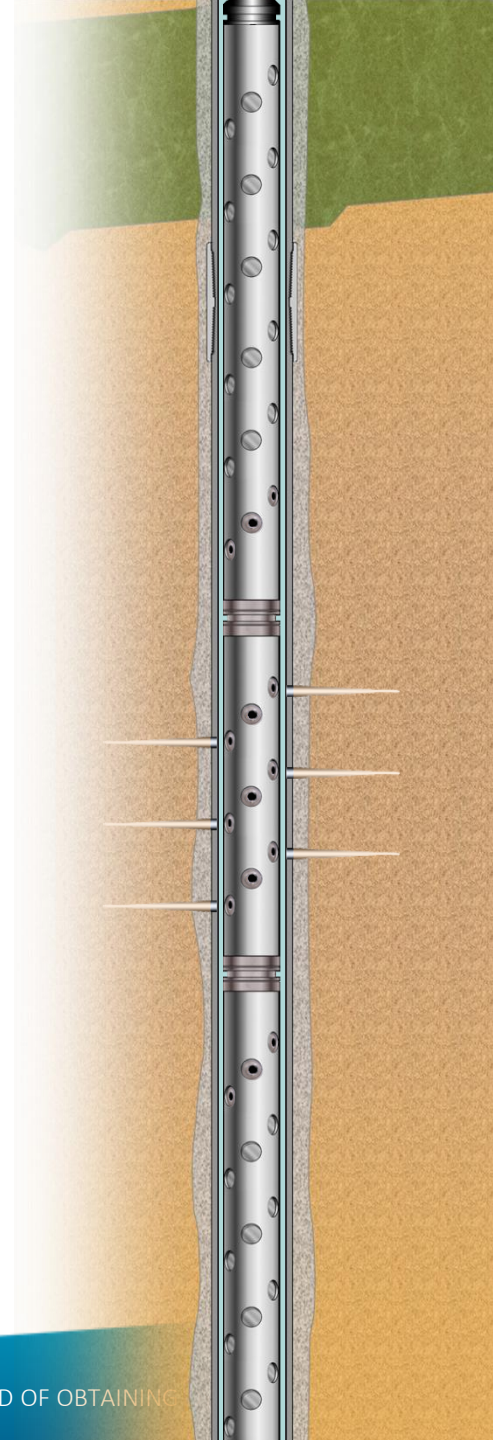
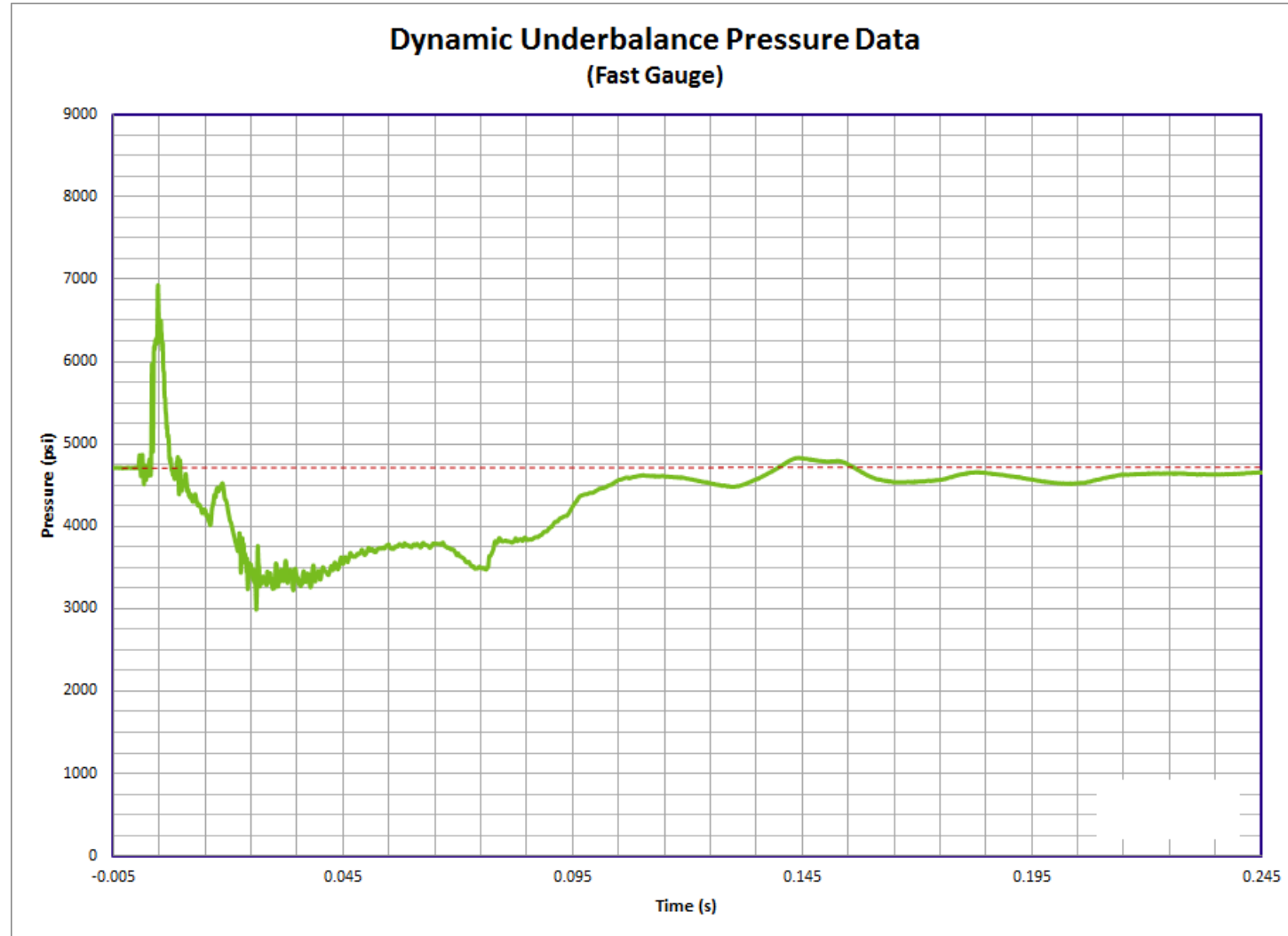


# DYNAMIC UNDERBALANCED PERFORATING

- When the gun fires, the chambers and perforating gun body open to the wellbore and a short duration underbalance is created
- Punch charges can be interspersed with the main perforating carrier or can be placed within the adjoining chambers in order to increase the flow area and open the chambers to the wellbore



# DYNAMIC UNDERBALANCED PERFORATING



# DYNAMIC SURGE VENT

- A dynamic surge vent was developed as an alternative to or in addition to punch charges
- This vent is placed between the loaded perforating carrier and the empty carrier that serves as an atmospheric chamber
- The vent rapidly opens at the time of gun detonation and exposes the chamber to wellbore pressure and creating a dynamic underbalance



# DYNAMIC SURGE VENT

- The vent system allows for the chamber carrier to be reused and also provides a completely open volume
  - No charge loading tube or resulting debris which would be present when a punch charge is used



# DYNAMIC SURGE VENT

- Main carrier detonation causes an internal sleeve to move and allow flow through the vent into the chamber
- Downhole pressure recordings indicate that the vent begins opening at about 2 ms after carrier detonation
- The detonation train can continue below the vent to allow detonation of lower carriers

Vent hole





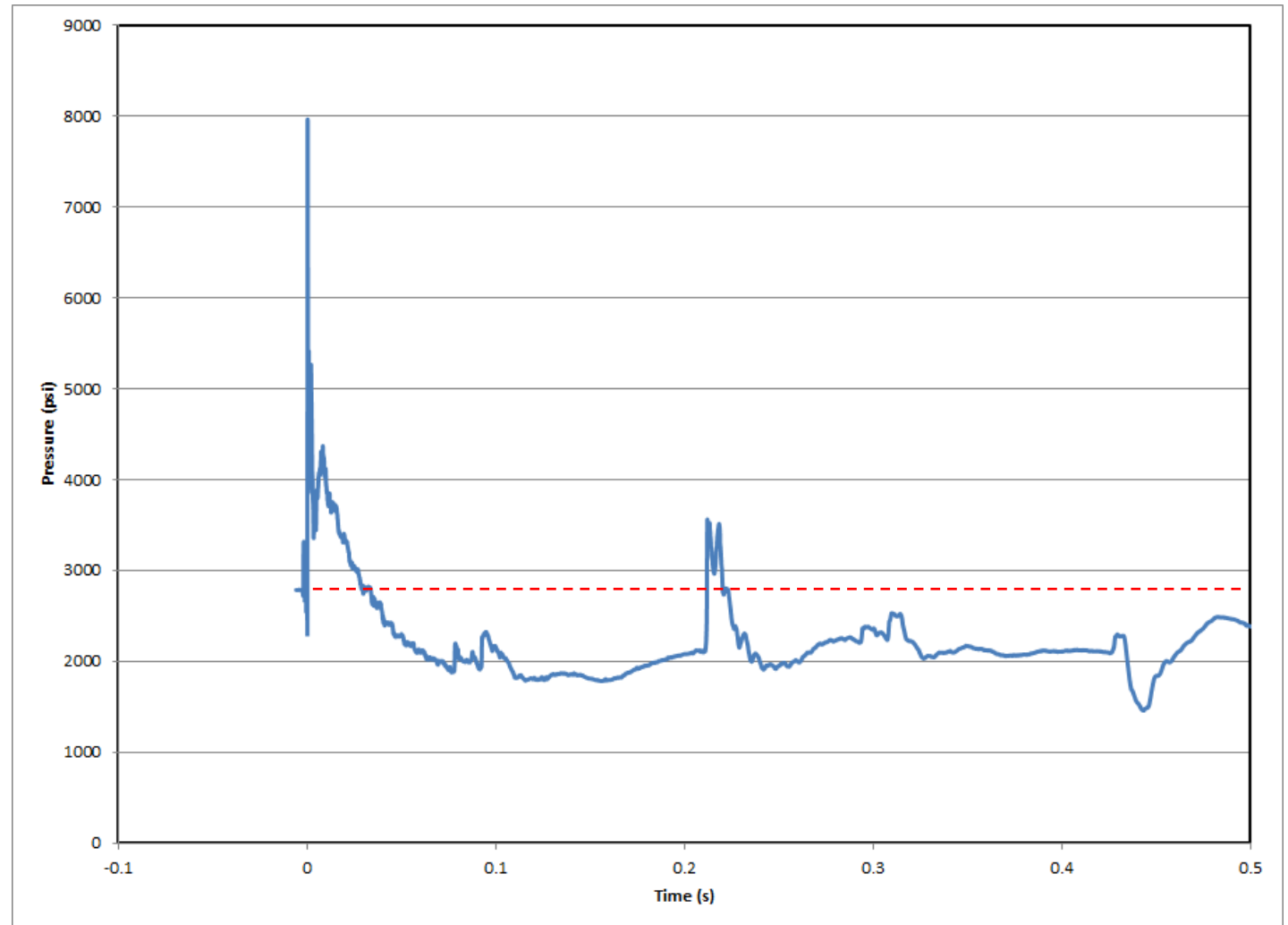
# EXAMPLE 1

## Well Configuration

- Interval depth – 1850 mTVSS
- Sandstone
- 11% porosity

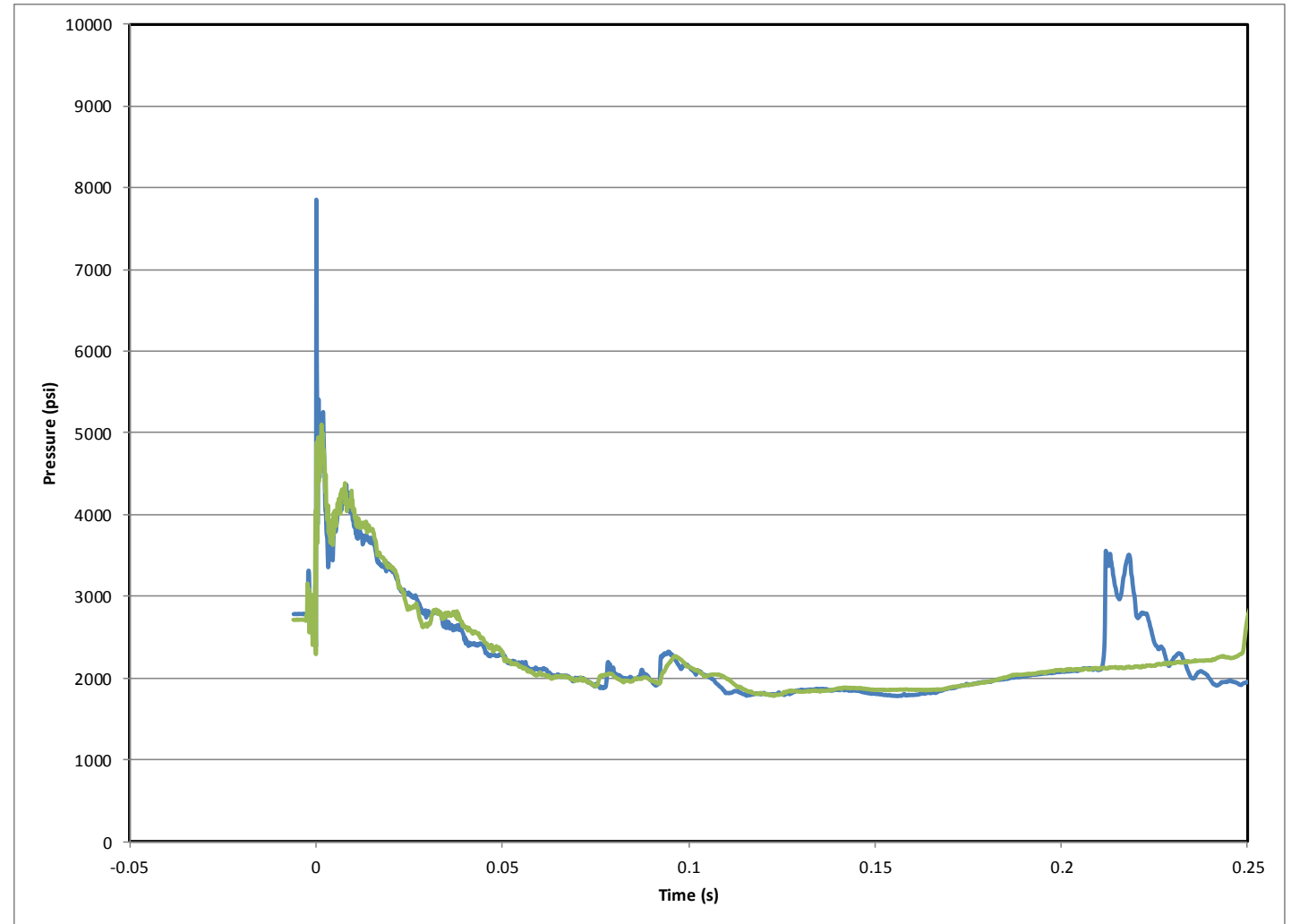
## Perforating configuration

- 6 m perforated interval
- 4-1/2 inch carrier/ 39 gram charge
- 3 m chamber below

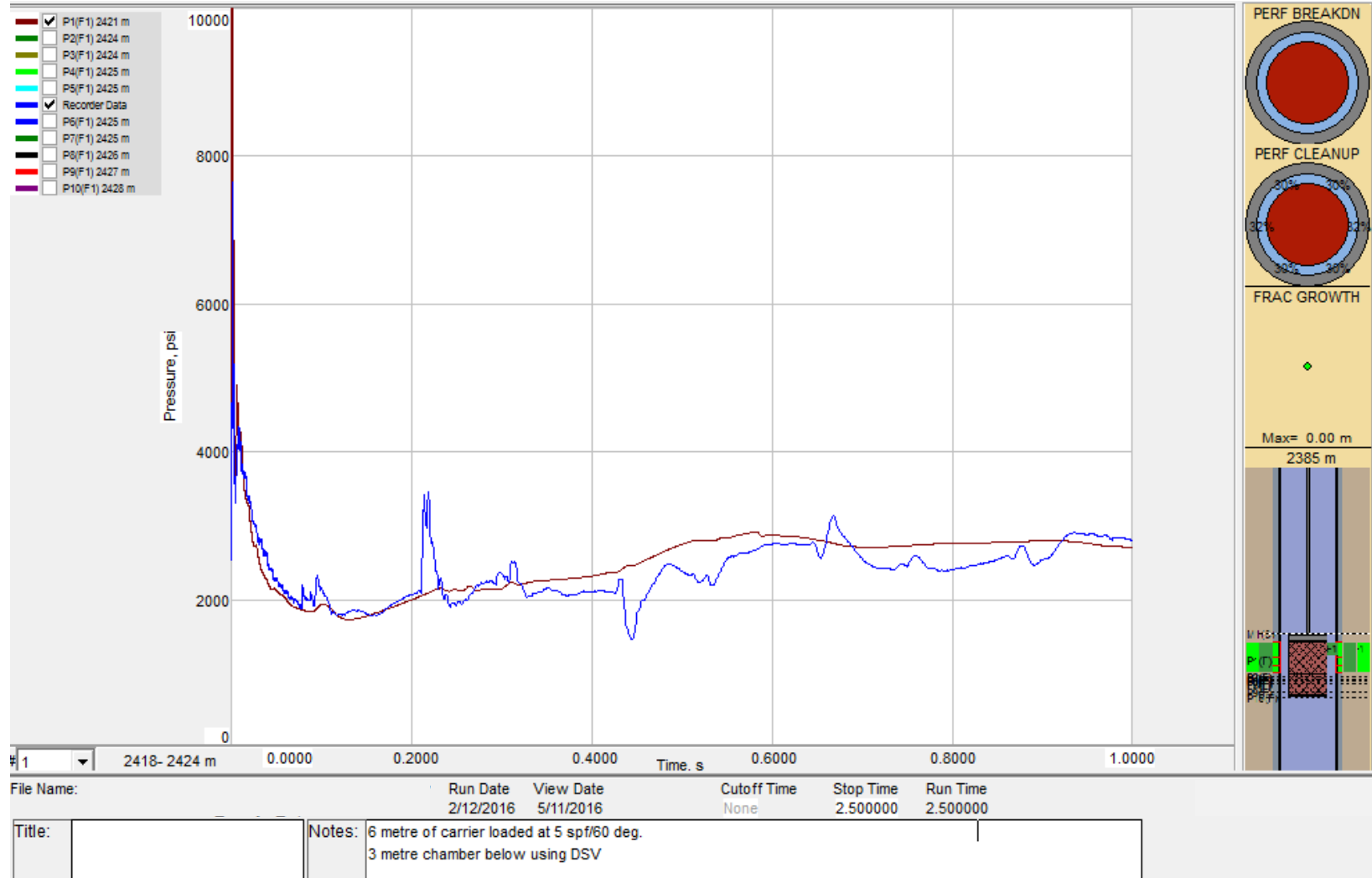


# EXAMPLE 1

- Other runs where made with good repeatability



# MODELING RESULTS



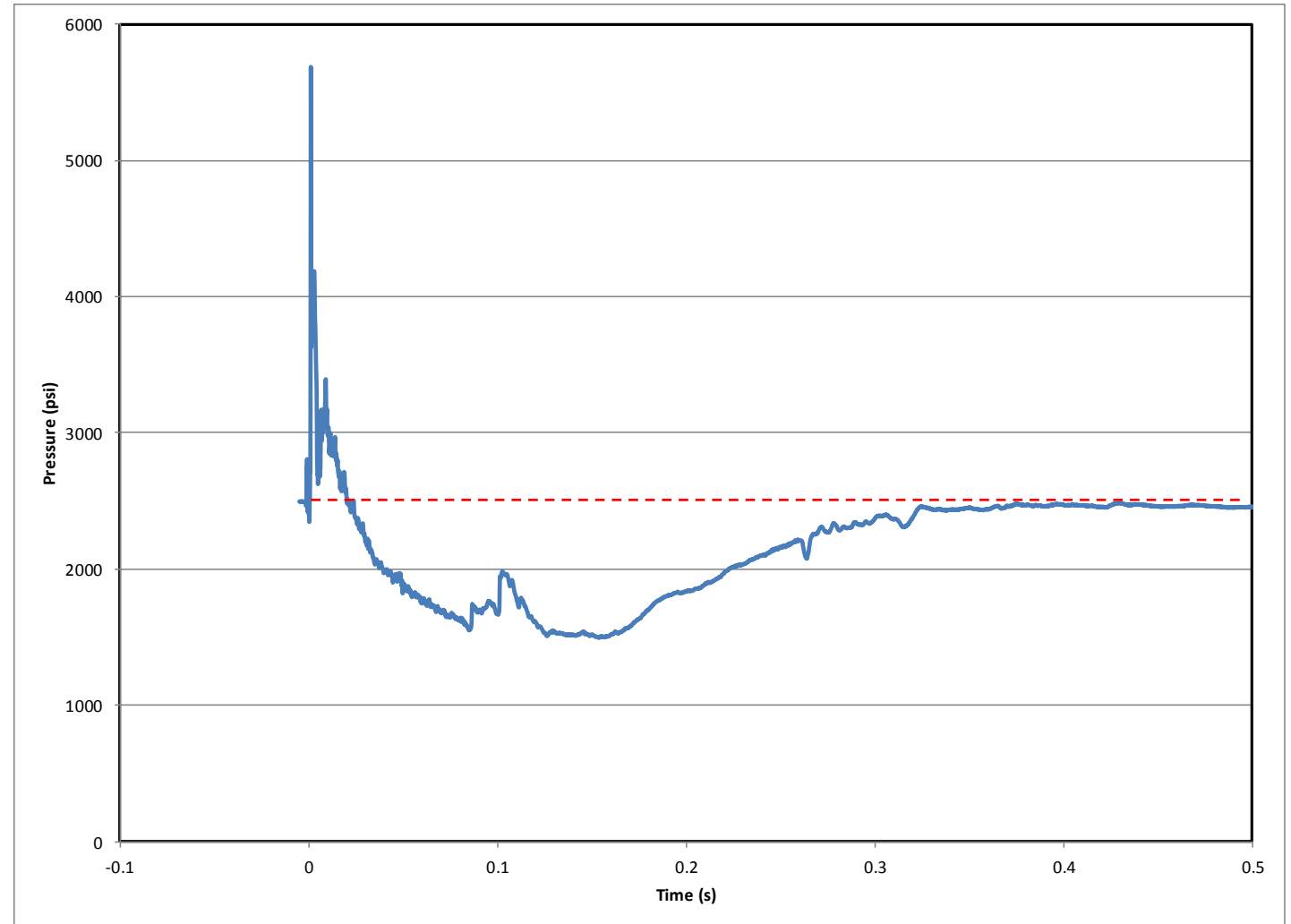
# EXAMPLE 2

## Well Configuration

- Interval depth – 1665 mTVSS
- Sandstone
- 23% porosity

## Perforating configuration

- 4.5 m perforated interval
- 4-1/2 inch carrier/ 39 gram charge
- 3 m chamber below



# APPLICATIONS

- Vent can be used in place or in combination with punch charges
- For longer intervals where more chamber volume may be required – costs associated with carriers and punch charges can be eliminated and the chamber carriers can be reused
- More chamber volume is available since the punch charges and associated loading tube is eliminated

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QUESTIONS? THANK YOU!

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