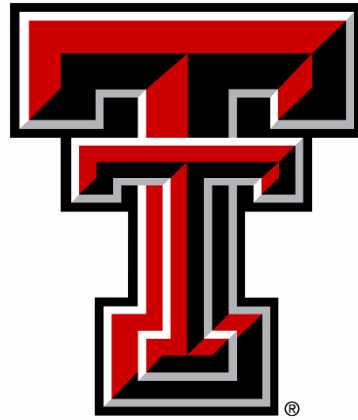




# 2025 GAS LIFT WORKSHOP



## The Texas Tech Gas Lift Consortium

Advancing Late-Life Gas Lift Technologies  
Smith Leggett, Texas Tech University  
June 4, 2025



Fasken Oil and Ranch

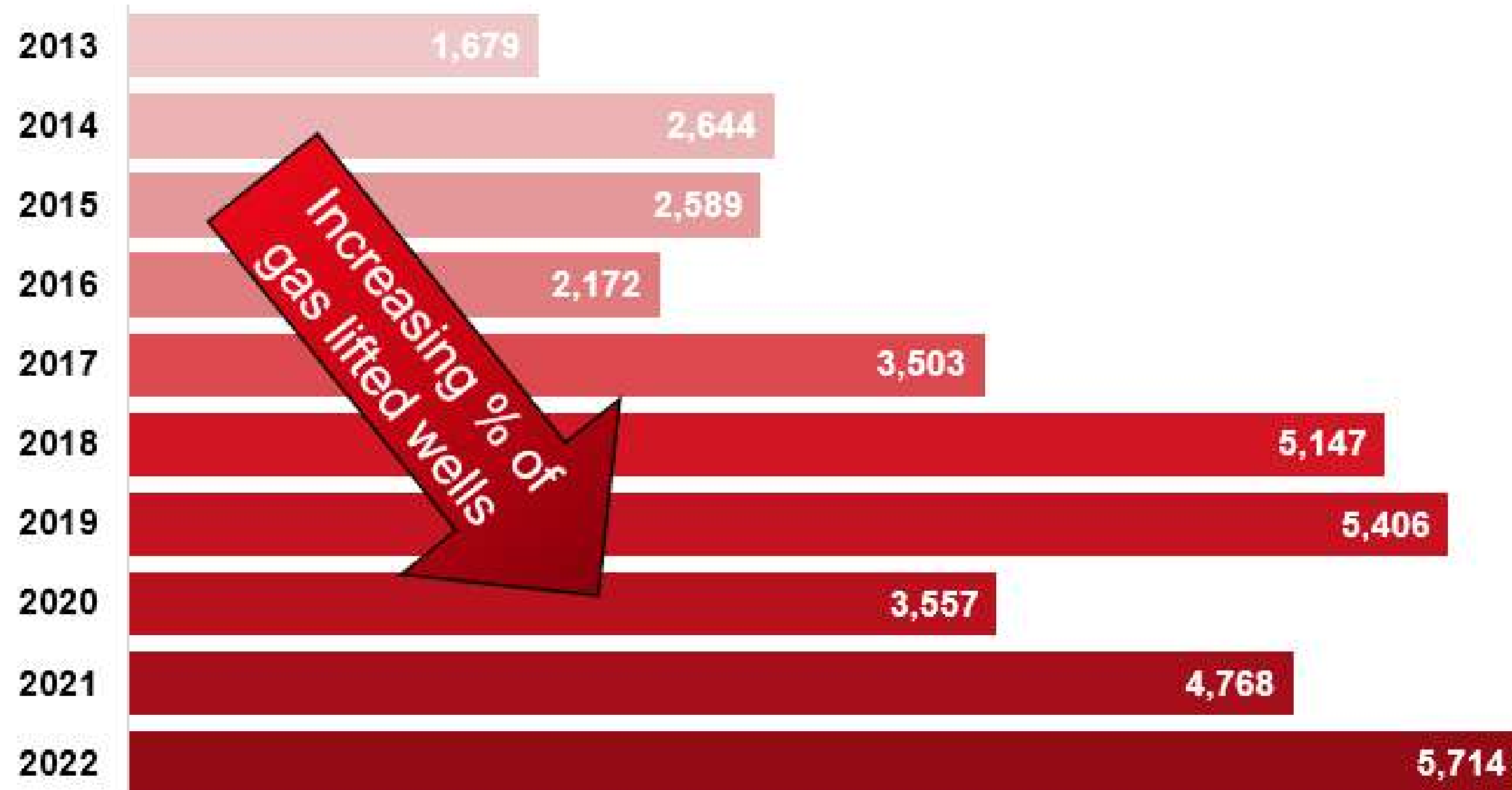


ALRDC.COM



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## Permian Horizontal Wells Completed in Last 10 Years



*37,179 total*

## Lift Methods for Late-Life Wells Formerly on Continuous Gas Lift

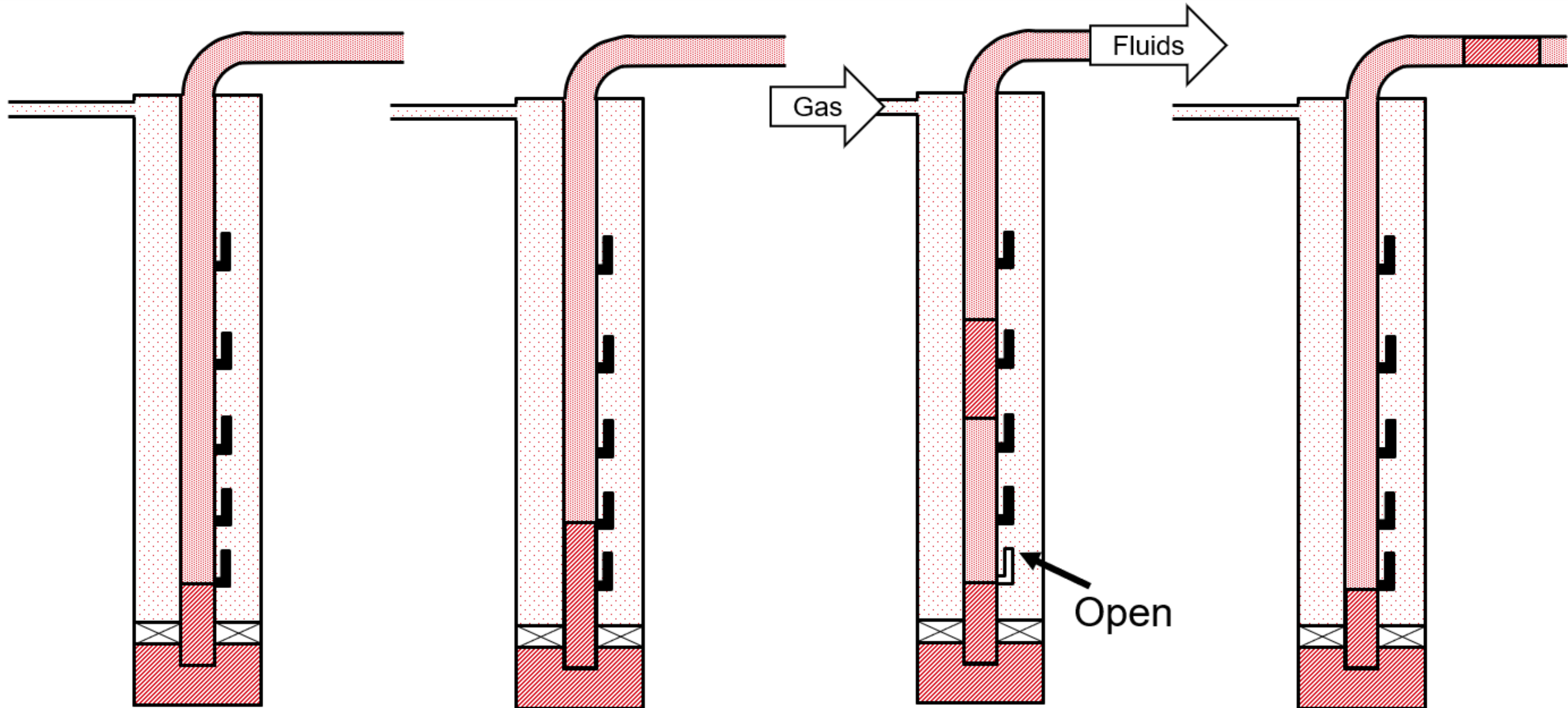
Lift Type	Tubing	Notes
Gas-assisted plunger lift (GAPL)	Intermittently open	Intermitted on surface. Side-pocket mandrels present a challenge.
Intermittent gas lift (IGL)	Always open	Requires pilot valve and packer.
Chamber lift	Always open	Complex tubular configuration
Plunger lift	Intermittently open	No injection gas
Intermittent lift	Intermittently open	No injection gas

*All methods involve intermittently lifting a liquid slug to surface using energy from expanding gasses below.*





## Intermittent Gas Lift



## Problem Statement

1. Many unconventional wells are or will soon be candidates for a late-life gas lift method.
2. All late-life gas lift technologies involve lifting a liquid slug using energy from expanding gases below.
3. Robust, accessible models are needed for IGL design and application
4. The Texas Tech Gas Lift Consortium aims to address knowledge gaps in late-life gas lift technologies.

## Methods

- Conduct pilot-scale experiments in the Red Raider #2 vertical test well
- Interpret data from field-scale experiments in deviated, unconventional wells
- Develop models that honor experimental results



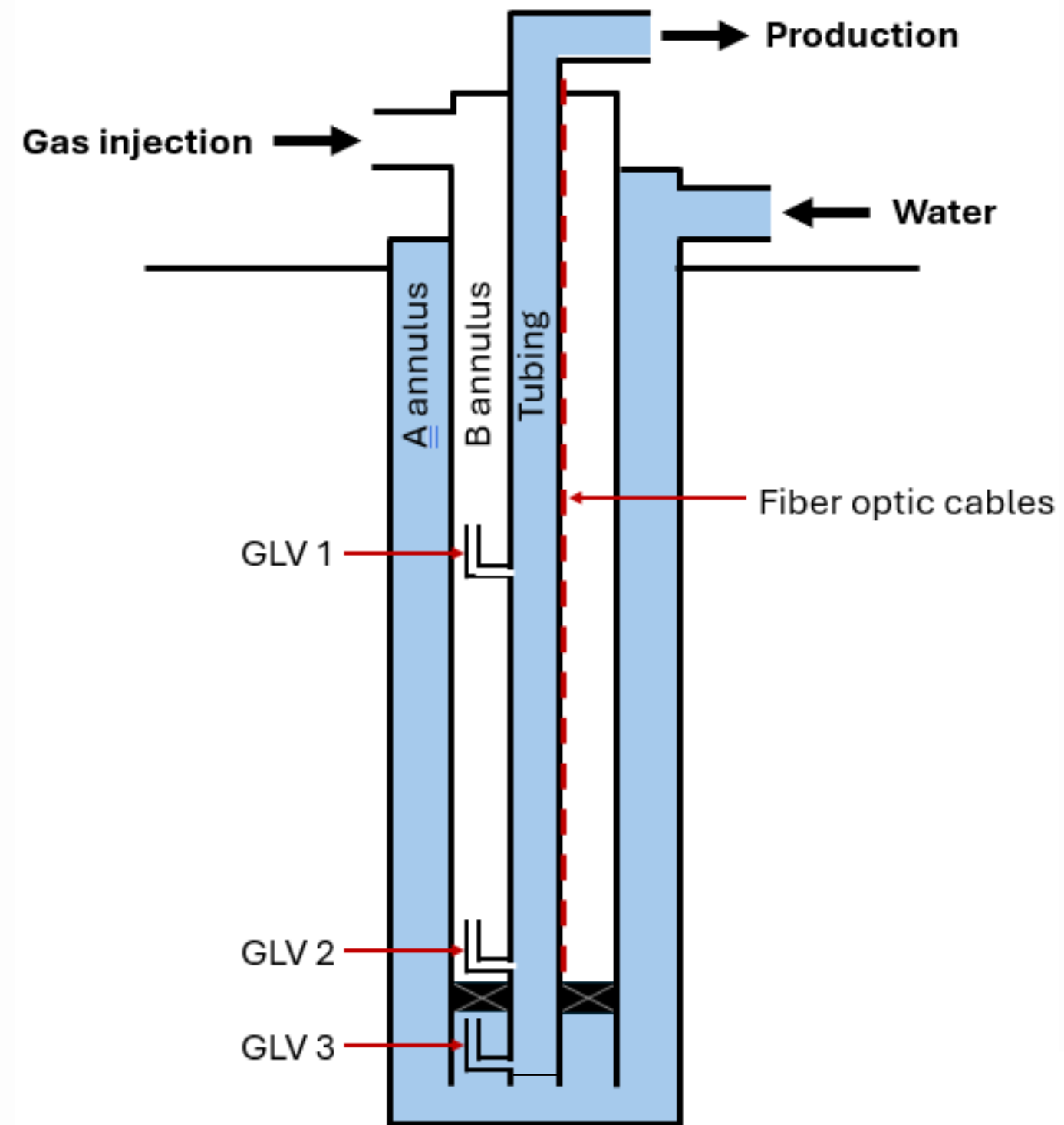
# **2025 GAS LIFT WORKSHOP**

## **Pilot-Scale Experiments and Modeling**





# 2025 GAS LIFT WORKSHOP



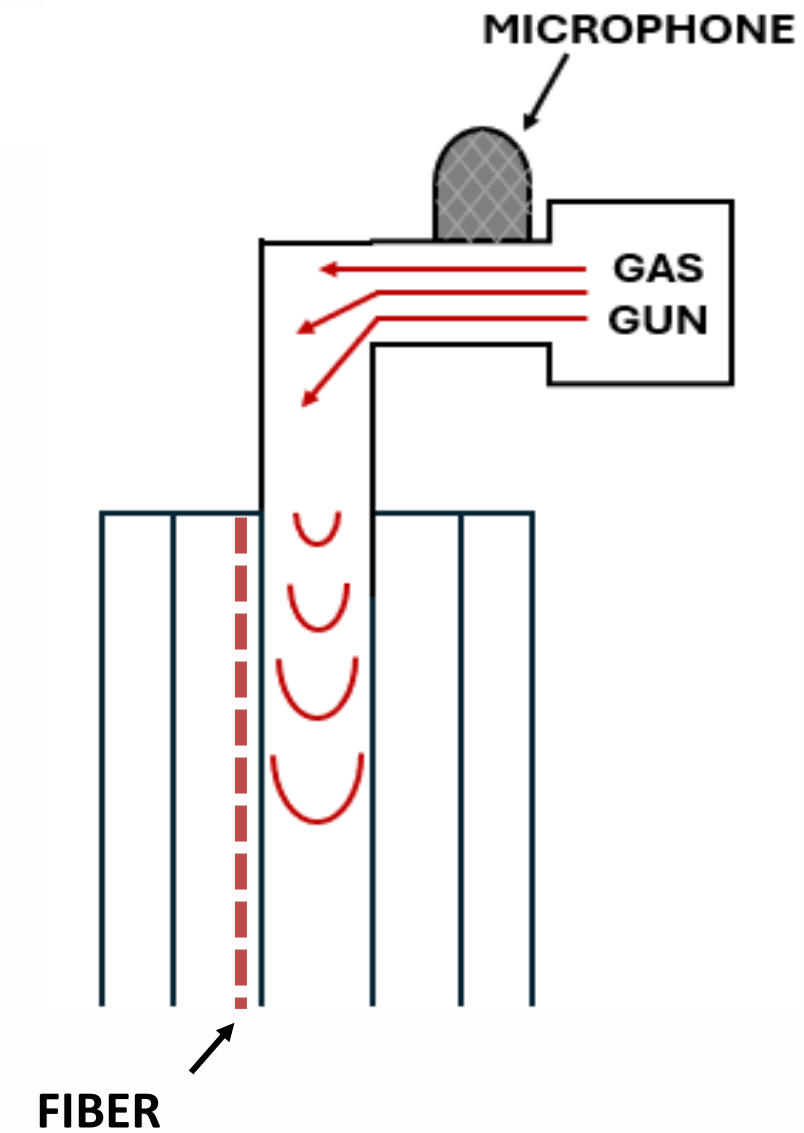
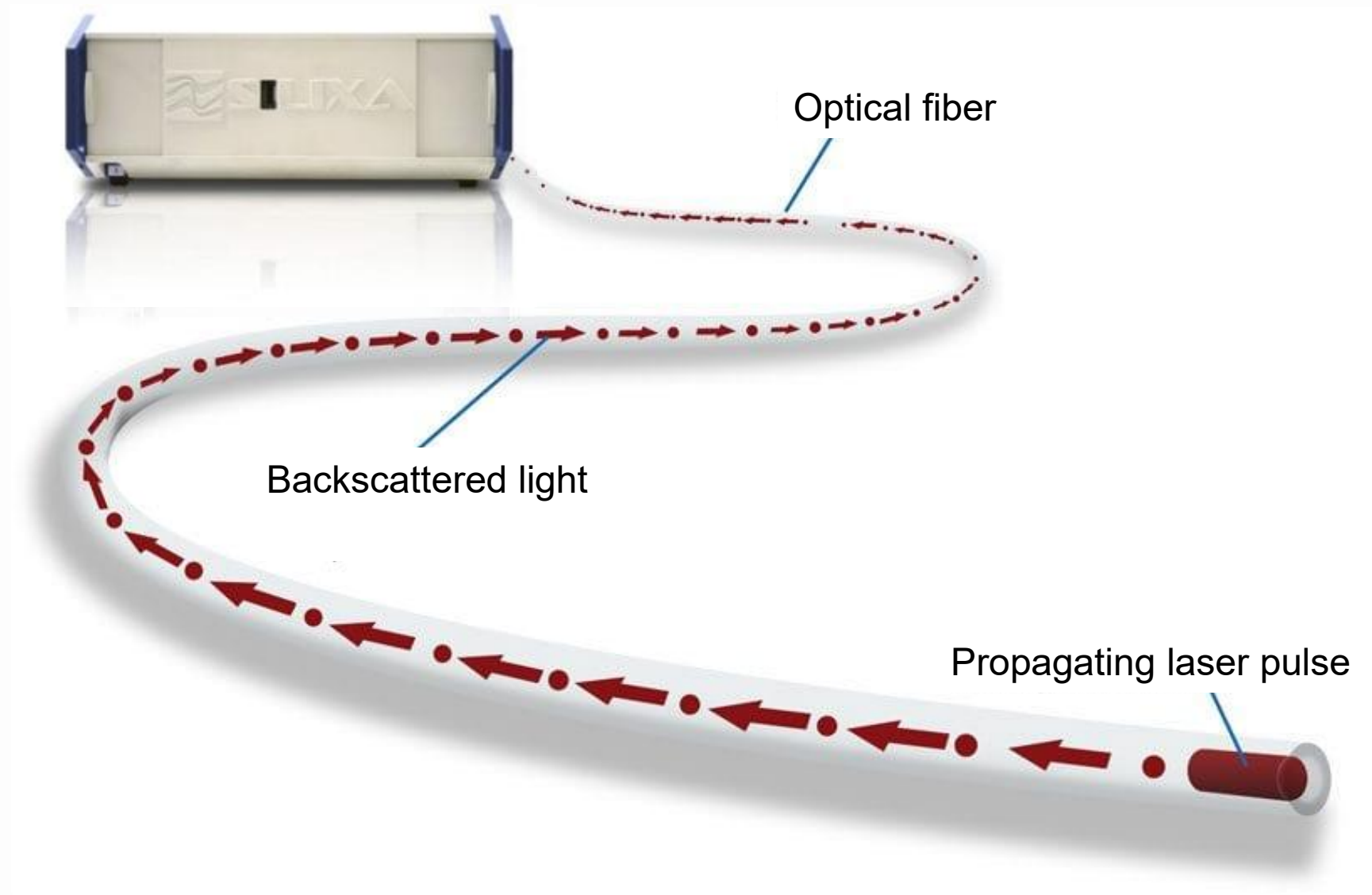
## Red Raider #2 Experimental Facility







## Liquid Slug Monitoring with DAS Enhanced by Fluid Shots

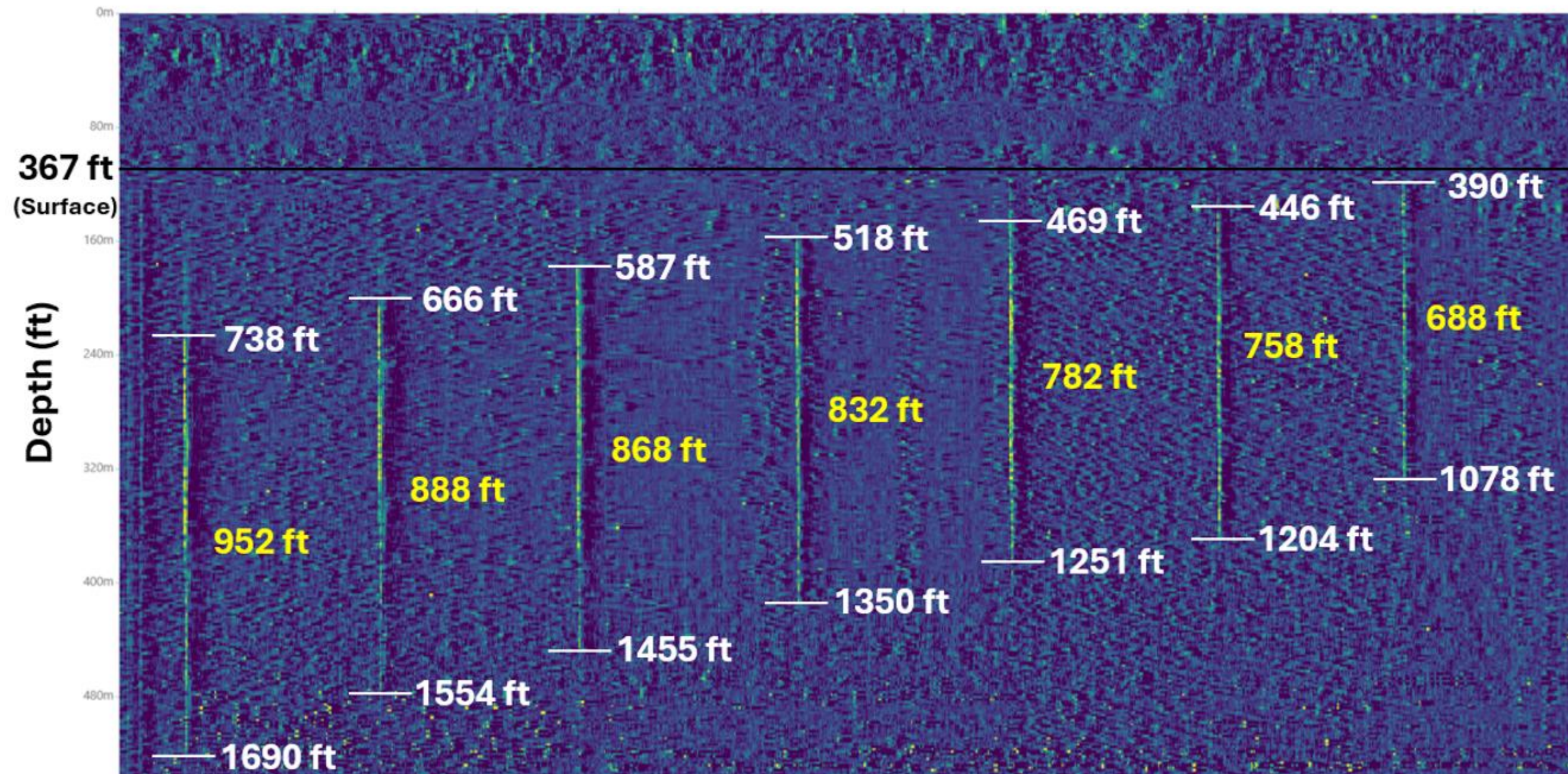






# 2025 GAS LIFT WORKSHOP

2 minutes





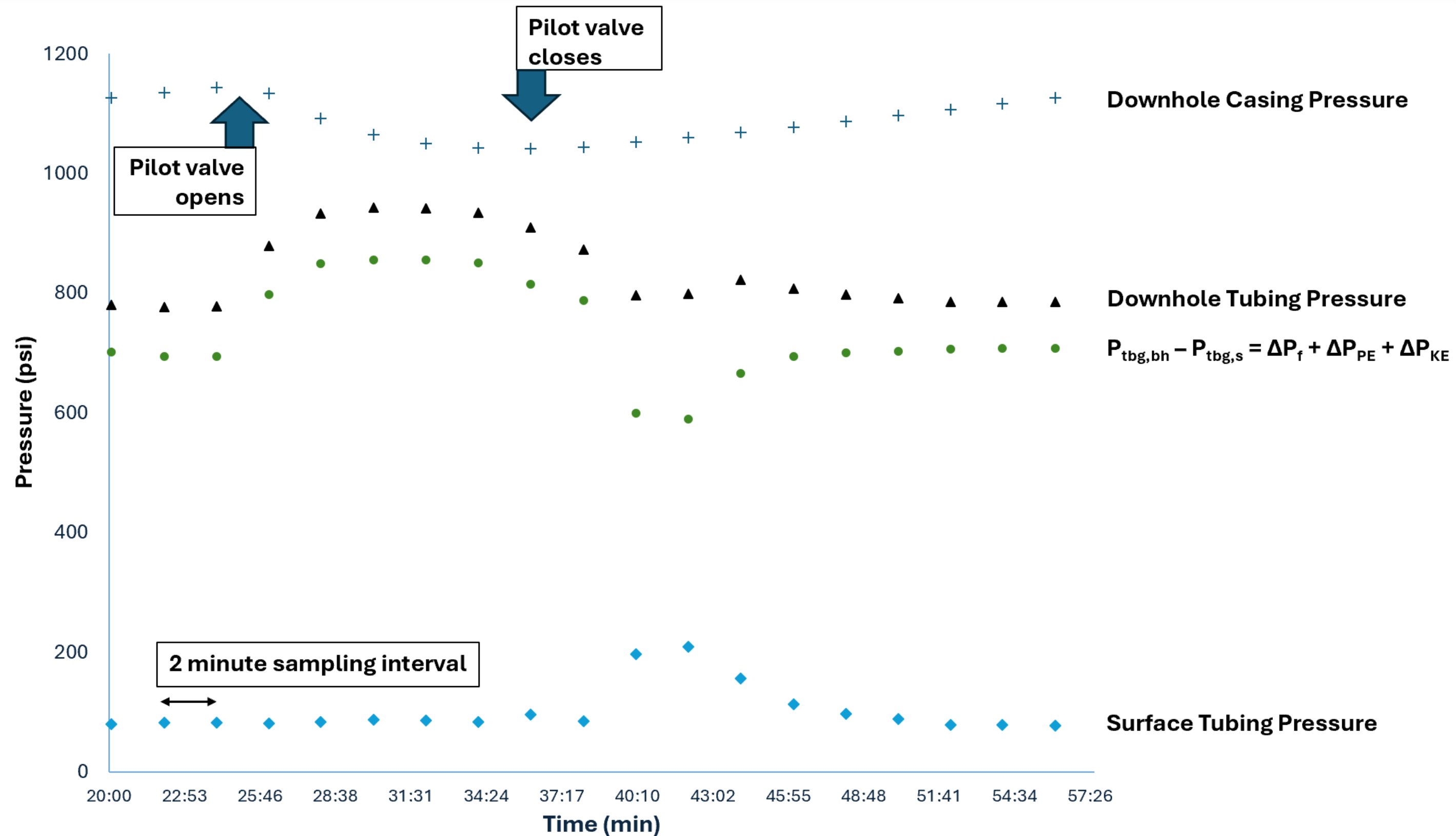


# **2025 GAS LIFT WORKSHOP**

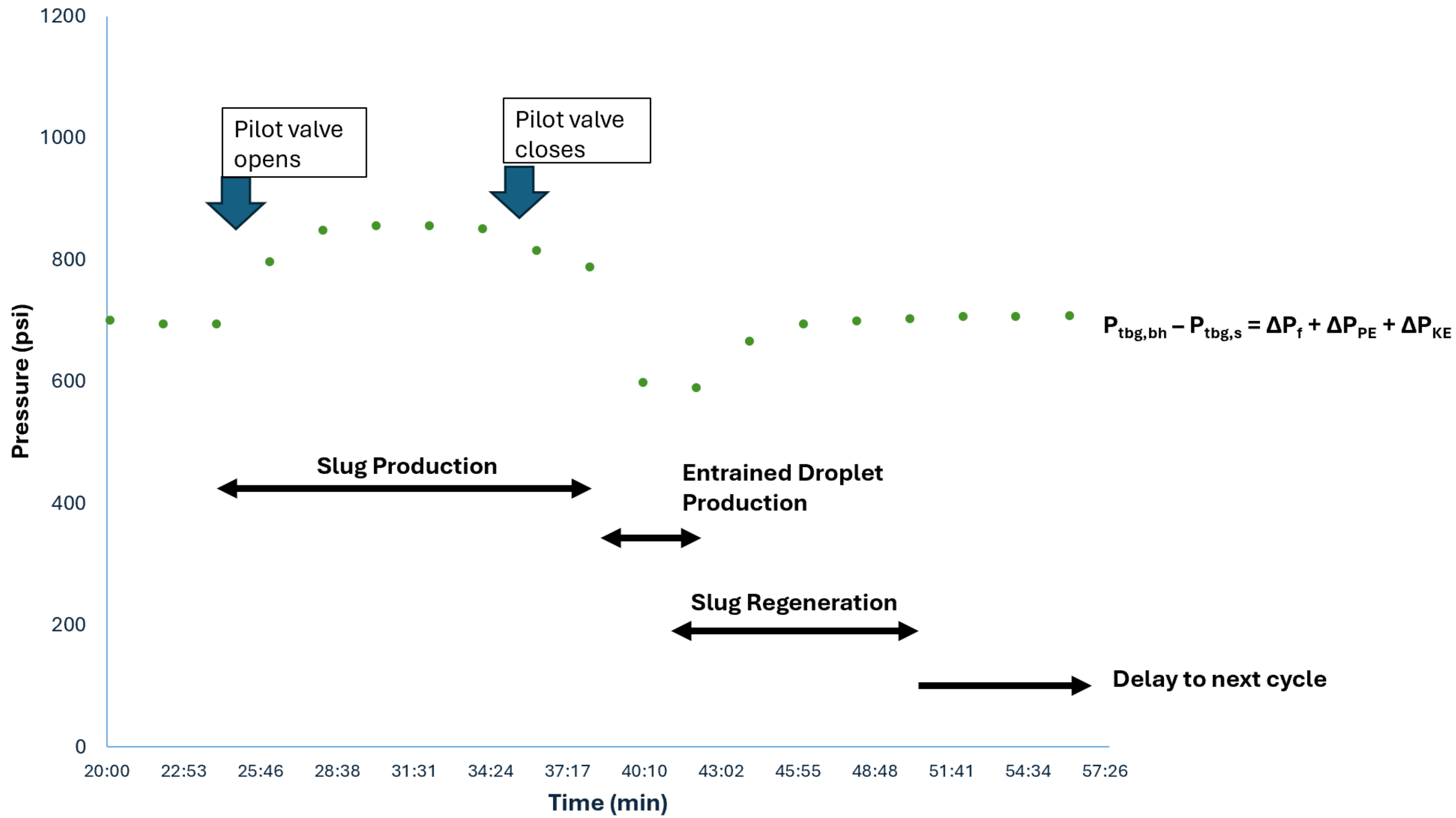
## **Observations from Field-Scale Experiments and Modeling**



## Permian Basin Unconventional Well on IGL







## IGL Well Conversion Results

- 524 ft/min slug velocity interpreted
- Pilot valve closes before the slug reaches surface
- Low fallback factor of 2.7% achieved despite low slug velocity
- IGL conversion maintained 300 BFPD production with 30% reduction in lift gas

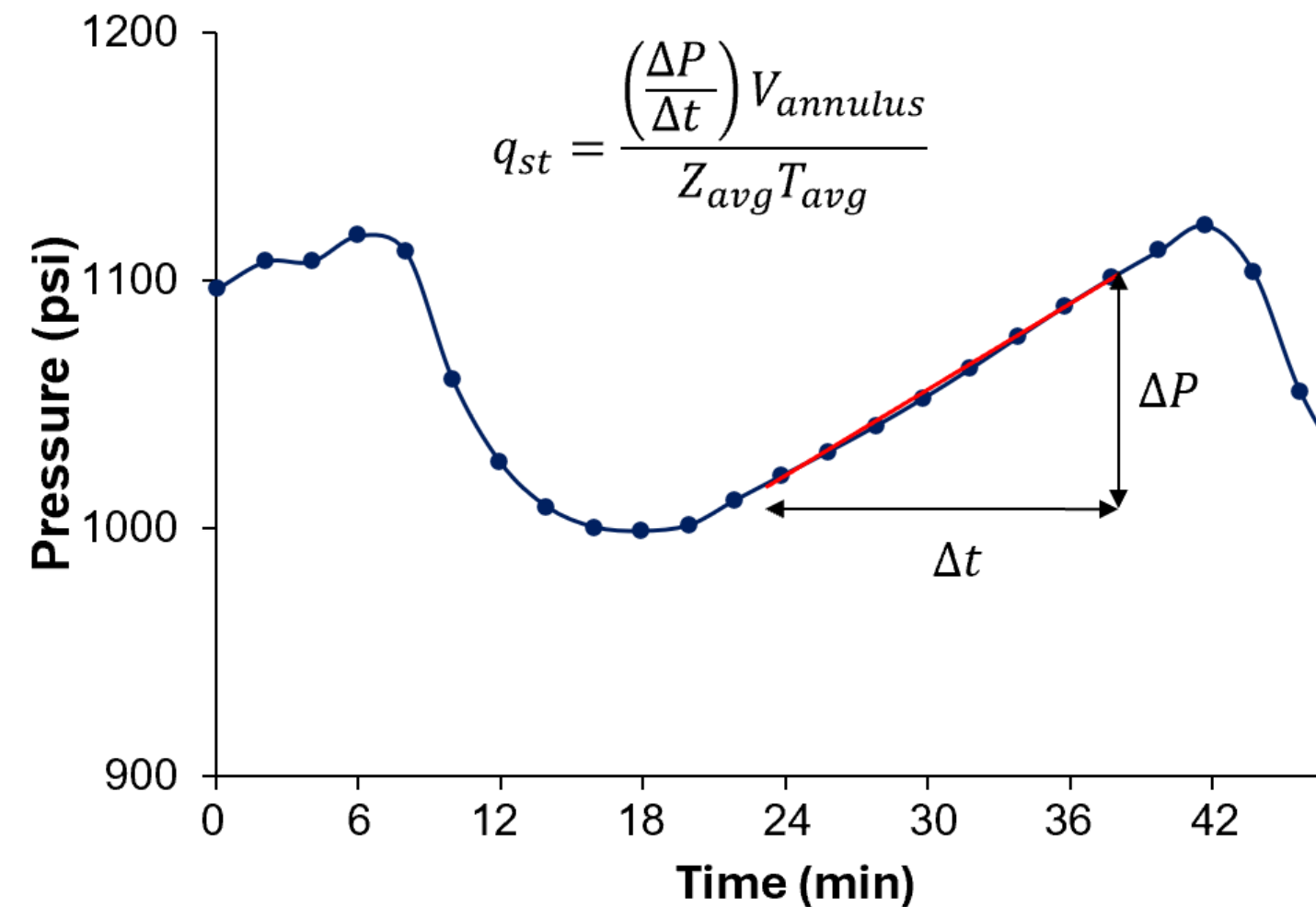


## Consortium IGL Model Matches Field Results when Using Gas Injection Rate Calculated from Pressure Buildup Measurements

Parameter	Model	Actual	% Error
Valve Opening Pressure (psi)	1069	1107	-4
Valve Spread (psi)	139	130	+6
Gas Injection Rate (MSCFD)	401	401* 500**	0 -20
Number of Cycles	38	40	-5

\*Calculated from casing pressure buildup

\*\*Reported by gas injection meter



## Conclusions

- Demonstration of new methods for liquid slug characterization
- Results challenge conventional wisdom regarding liquid production rate ranges for IGL and slug velocity requirements for low fallback factors.
- Physics-based models accurately predict IGL performance on unconventional wells.
- Tubing or gas lift valve leaks hinder lift gas savings, but are easily detected by comparing calculated and measured injection rates.



## Acknowledgements and Thanks

- Graduate Research Assistants:
  - Erasmus Mensah
  - Caio Morias de Almeida
  - Hyojeong Seo
- Texas Tech Gas Lift Consortium Members
- Echometer
- ALRDC Gas Lift Workshop



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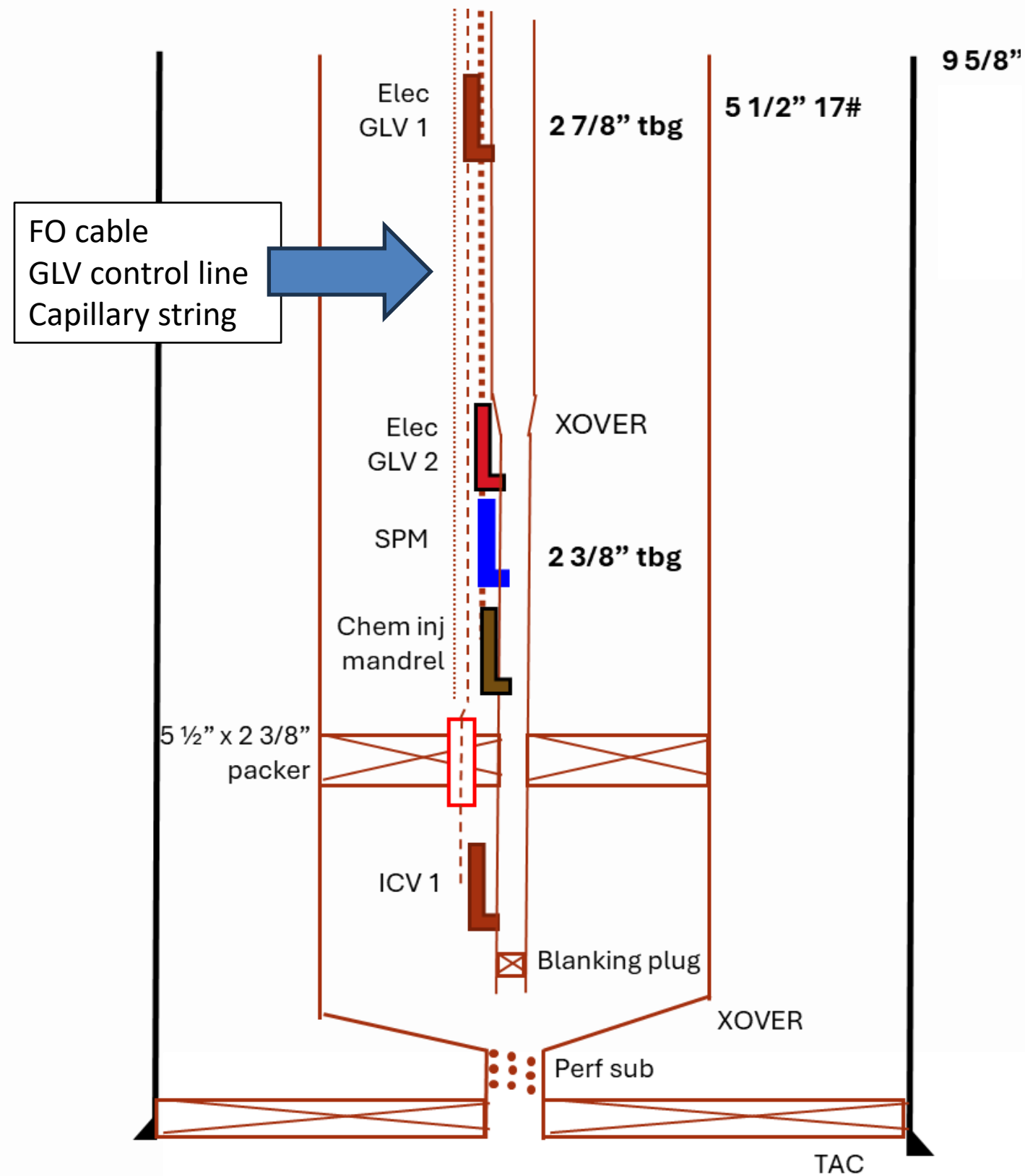
## Question Time







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## Red Raider #2 Experimental Facility





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