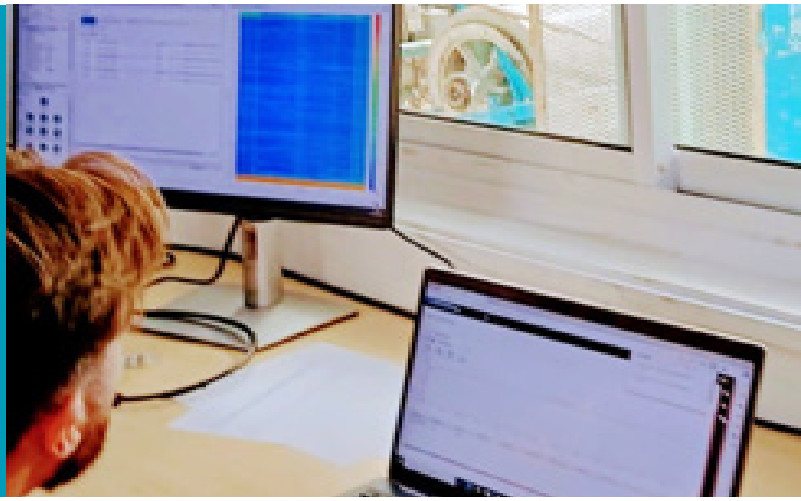
Expro Excellence

DFOS & PLT production profiling in a deep horizontal shale oil well

Well Intervention & Integrity



Objectives and background

- A 6,500 m deep shale-oil well with a 3,000 m horizontal lateral required high resolution production profiling and phase contribution analysis across its multi-stage fractured completion.
- The operation faced several key challenges:
  - Extended horizontal access increasing the risk of debris buildup and limiting the ability to perform multiple logging passes
  - Minimal and uneven influx, making zone identification difficult
  - Uniform horizontal temperature along the lateral, reduced the effectiveness of traditional DTS interpretation

Expro Excellence

- Expro deployed a hybrid Distributed Fiber Optic Sensing (DFOS) and Production Logging Tool (PLT) tractor-conveyed solution to deliver comprehensive full-well surveillance in a single operational run

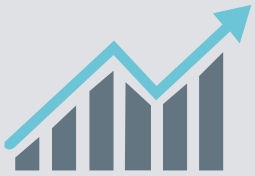
The package included:

- DFOS (DTS + DAS) for continuous distributed inflow monitoring
- eXDTS (Low Freq DAS) to derive velocity profiles from slope-based acoustic patterns
- Full PLT suite including spinner, ultrasonic flowmeter, and multi holdup sensors for independent phase and flow validation
- A structured flow program was executed at shut-in, and at 25%, 50%, and 100% choke settings to capture dynamic reservoir and completion behavior. PLT acquisition was performed during the pull-out sequence at maximum flow rate
- Rapid data processing was enabled through Expro's DFOS eXtract® software with processed data transmitted to an off-site analyst for near real-time interpretation and analysis
- All insights were integrated and visualized using Expro's QikView™ software, delivering a clear, unified picture of the well's dynamic performance and contributing zones

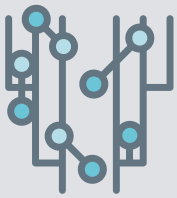
Value to the client

- Delivered a complete production profile across the horizontal wellbore
- Identified clear eXDTS slope signatures, enabling accurate flow- velocity estimation and zone contribution identification
- Holdup interpretation provided robust phase fraction insights, improving understanding of fluid behavior
- Strong alignment between DFOS derived and PLT derived profiles demonstrating high data integrity and validating the combined methodology
- Executed safely and efficiently with excellent data quality obtained from both measurements systems
- Delivered clear visibility of fracture zone contribution showing exactly where flow originates and how production responds to different choke settings
- Verified well performance without the need for extended intervention reducing operational risk, cost and time by avoiding multiple logging runs
- Expro equipped the operator to optimize production and confidently plan future stimulation or surveillance activities
- A compact, integrated DFOS and PLT solution provided the actionable clarity needed to manage complex horizontal shale oil wells effectively

Enhanced production



Well integrity



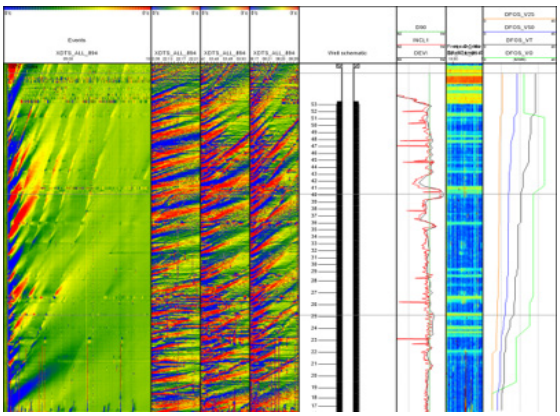


Figure 1 - This eXDTS image set shows the slope pattern of light-phase flow along the horizontal section, followed by the corresponding slope-velocity responses at 25%, 50%, and 100% choke, with the right-most track displaying the derived velocity profiles that clearly highlight flow magnitude and zone contribution under each rate condition.

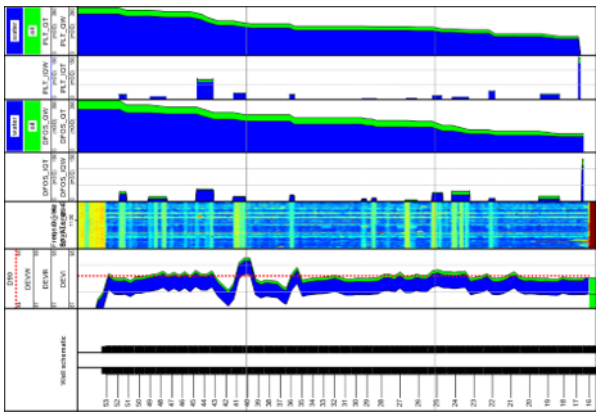


Figure 2 - This comparison illustrates the production profiles from PLT (top) and DFOS (bottom), demonstrating strong consistency in identifying contributing intervals, with DFOS flow quantification supported by PLT holdup measurements to accurately determine phase contribution along the horizontal well.

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