



Weatherford®

REAL RESULTS

Extreme Environment OmniWell™ Permanent Downhole Optical Pressure/Temperature Gauge for Multistage Fracturing

Objectives

- Optimization of multistage-fracture stimulation design by understanding the phenomenon of high Near-Wellbore Pressure Loss (NWBPL) due to tortuosity.
- Accurate downhole monitoring of pressure and temperature (P/T) data during fracturing operations at extremely high pressure and temperature.

Results

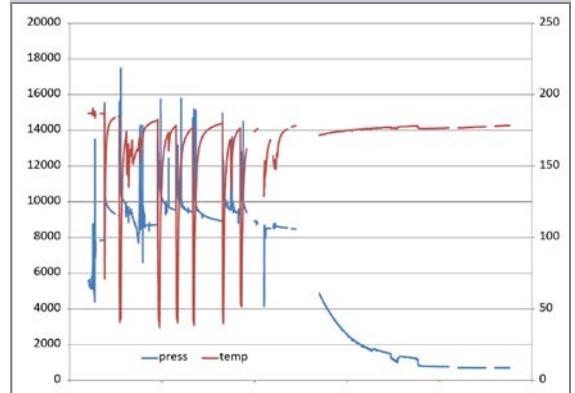
- Flow stimulations were undertaken in seven stages of the targeted zone.
- Continuous real-time downhole P/T data was provided.
- Weatherford installed a new-generation permanent downhole P/T gauge on production tubing and subjected the gauge to 376°F (191°C) and 18,100 psi (1248 bar) during fracturing.
- Well gas-flow rates remained steady at approximately 2 MMscf/day.

Value to Client

- Real-time downhole P/T monitoring enabled the client's fracture stimulations to be pumped to completion by avoiding screenouts with early detection and reaction.
- Downhole data dispelled screenout risks where the fracture would have been cut short based on surface pressure data.
- A downhole gauge provided superior data quality (relative to surface data), enabling NWBPL to be analyzed.
- Valuable understanding was gained of the fracture geometry and NWBPL functions when combined with other diagnostic tools.



Weatherford's optical permanent downhole monitoring system provides real-time P/T monitoring to assist in fracturing operations.



Graph of multistage fracture monitoring.

Location

Australia

Well Type

- Land vertical well
- Exploratory shale gas – fracture monitoring

Casing Size

7-in. 29 lb/ft

Tubing Size

4 1/2-in. 13.5 lb/ft, Super13Cr

Well Depths

11,427 ft (3483 m)

Gauge Depths

10,039 ft (3060 m)

Products/Services

- *OmniWell* optical permanent downhole monitoring system
- Extreme environment optical P/T gauges and cable rated to 392°F (200°C) and 20,000 psi (1379 bar) continuous operation

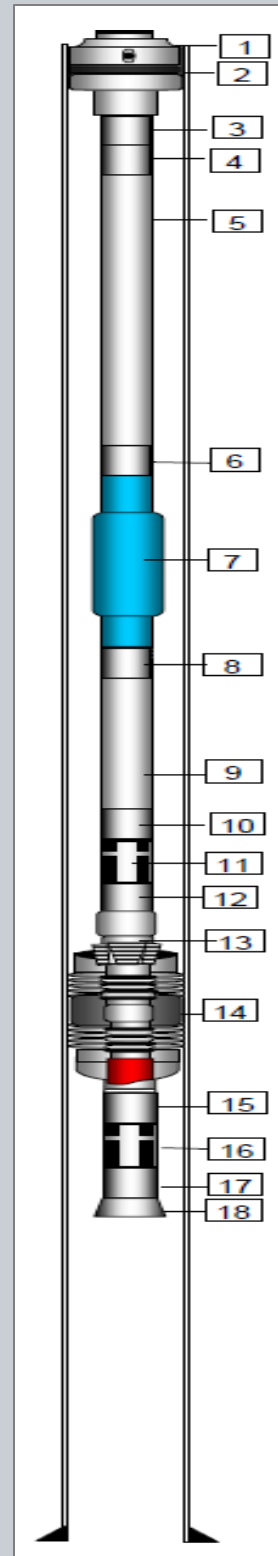


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Downhole Optical Gauge

- | | |
|---------|----------------------|
| 1 | Tubing spool flange |
| 2 | Tubing hanger |
| 3 to 4 | Pup joints |
| 5 | Tubing |
| 6 | Pup joints |
| 7 | Gauge mandrel |
| 8 to 10 | Pup joints |
| 11 | R nipple |
| 12 | Pup joints |
| 13 | Seal assembly |
| 14 | Hydraulic set packer |
| 15 | Pup joints |
| 16 | RN nipple |
| 17 | Pup joints |
| 18 | Wireline entry guide |



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