

Efficient formation pressure measurements provide reliable data for the right test—the first time

CRITERIA

- Do you have data acquisition time constraints?
- Do you want to make the best use of the time available to get a stabilized pressure measurement?
- Do variable mobilities, unknown depletion, unknown mud overbalances, or all three, apply to your pressure acquisition operations?

BENEFITS

- Provides better-stabilized pressures
- Enables the right test—the first time
- Eliminates guesswork and repeat pretests
- Enhances seal success rates
- Saves rig time by reducing NPT

The TOP* time-optimized pretest reduces NPT by increasing formation pressure-while-drilling data acquisition efficiency. This unique system enables the StethoScope* service to make a right test—first time measurement in a wide variety of formation permeabilities and mud overbalances—known or unknown—within a brief, drilling-transparent period of 5 min.

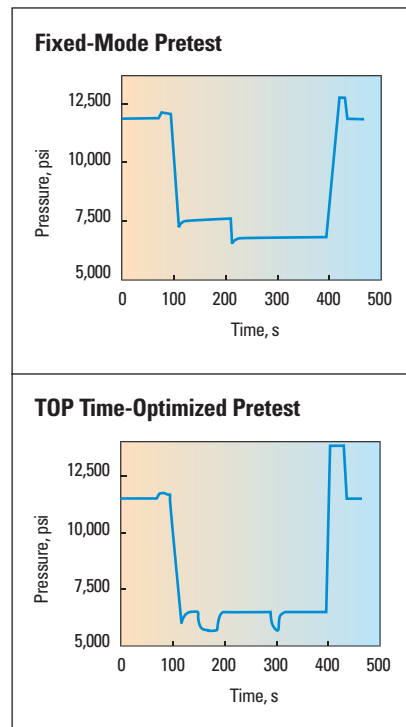
ADJUSTS TO CONDITIONS TO ENABLE STABILIZED PRESSURES

Unlike fixed-mode pretests, in which the rate, volume, and duration of each drawdown and buildup sequence are prespecified, the TOP pretest adjusts the sequence to the conditions encountered—without exceeding the specified overall time limit. This capability allows stabilized formation pressure measurements to be acquired under conditions in which fixed-mode pretests are ineffective, such as heterogeneous formations with unknown mobilities, depleted formations with high overbalances, or both. As a result, no rig time is wasted repeating ineffective tests. Plus, pressures are more stabilized and higher seal success rates are achieved.

PROVIDES OPTIMUM PRESSURE MEASUREMENTS

The TOP pretest acquires optimum real-time pressure measurements using the identification-investigation-measurement sequence.

- First, it identifies the point at which the sandface pressure goes below formation pressure and fluid from the formation flows into the StethoScope tool.
- Next, it obtains an initial estimate of formation pressure and mobility.
- It then uses those estimates to design one or more measurement phases that will achieve a stabilized sandface pressure within the allotted time.



These two pretests, conducted in a formation with an unknown pressure overbalance, were performed at the same depth in the same well. The 5-min fixed-mode pretest was unable to overcome the pressure overbalance and provided no valid information, but the TOP time-optimized pretest successfully acquired a pressure measurement in the allotted 5-min time period.

FEATURES

- Right test—first time measurements in a wide range of formation permeabilities and mud overbalances—known or unknown
- Pressure measurements within 5 min—even in depleted formations with high overbalances and formations with uncertain and low mobilities
- Measurement quality verified in real time

TOP Pretest Sequence

Controlled expansion of flowline at slow, constant rate—either continuously or in series of measured steps

Recognition of point or range of points at which fluid is being extracted from formation, i.e., mudcake has been breached, sandface pressure has gone below formation pressure, and fluid has begun flowing from formation into StethoScope tool

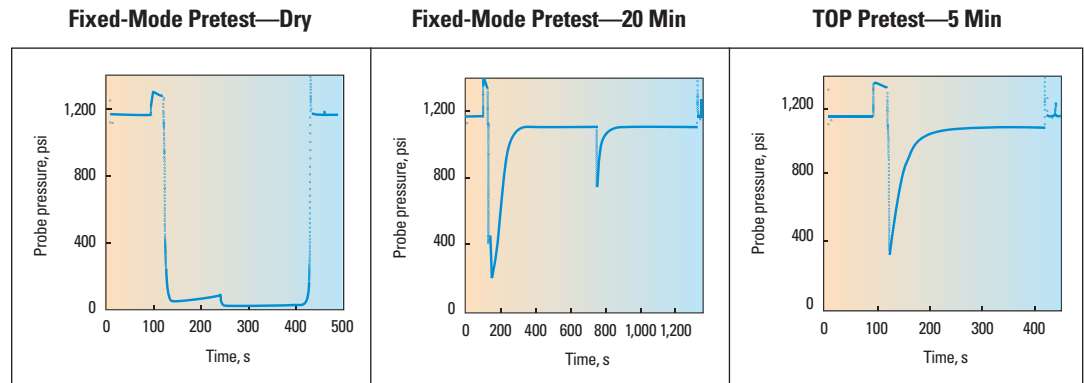
Termination of drawdown after extraction of limited volume of fluid from formation

Allowing probe pressure to reach a substantially stabilized sandface pressure in as short a time as possible

Determining first estimate of formation pressure and formation mobility from first drawdown and buildup sequence

Based on estimated mobility and formation pressure, determining parameters—essentially volume and rate—for second pretest that will put probe pressure within some specified neighborhood of stabilized sandface pressure at end of allotted time for test

Perform pretest using the parameters just determined



These three pretests, conducted in a low-mobility formation, were performed at the same depth in the same well. The short-duration fixed-mode pretest resulted in a dry test. A fixed-mode pretest specifically tailored for low-mobility formations took 20 min to acquire a pressure measurement. The TOP pretest acquired a pressure measurement in just 5 min with superior stabilization.

INSTANTANEOUSLY VERIFIES MEASUREMENT QUALITY IN REAL TIME

Pretest quality is verified in real time, during the pretest and post-pretest, using On Demand Frame (ODF) mud pulse telemetry technology to transmit

- the last determined buildup pressures for each investigation and measurement phase, quoted to a resolution of 0.1 psi
- the rate of pressure change at the end of the last measurement-phase buildup, recast as an equivalent pressure change over a 1-min period
- the pressure variance determined at the end of the last measurement-phase buildup
- seven points along the last measurement-phase buildup, spaced logarithmically in time.

Other information about the character of the pressure response—such as when during the buildup the pressure stabilized, whether a slow leak or pressure relaxation is suspected, and whether the test is likely to be supercharged—is transmitted when requested.

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