New formation pressure measurement beats the heat

Able to deliver a precise formation pressure measurement in less than a minute at extreme bottomhole temperatures, a new wireline tool delivers critical information with minimum risk.

The PressureXpress-HT* service from Schlumberger provides accurate formation pressure measurements under the most extreme conditions. Rated at 450 °F (232 °C) at 20,000 psi for at least 14 hours, the service allows acquisition of pressure and fluid mobility measurements in a fraction of the time required by multifunction formation tester tools. Fully combinable with other Schlumberger wireline devices, the PressureXpress-HT tool saves time and money by eliminating a separate wireline run to obtain critical pressure data.

Equipped with a flashed high-resolution QuartzDyne gauge backed up by a Sapphire gauge, the tool does not require thermal stabilization; this, coupled with set- and retract-times as low as 1.5 sec, maximizes measurement efficiency while minimizing the possibility of sticking. If desired in low permeability situations, the second gauge can be tasked to measure wellbore pressure so instances of formation supercharging can be compensated with appropriate algorithms. And multiple pre-tests can be performed at any given depth without having to recycle the tool, allowing confirmation of critical data.

Earning praise in some of the world’s hottest wells, the tool uses a heat-management-optimized design for performing extended surveys at maximum temperature for measurement of formation pressure in a wide mobility range, including very low mobilities. Pressure drawdowns as high as 8,000 psi can be measured. The tool determines reservoir fluid density with gradiente and fluid contacts. Critical hydraulic fluid profiling can be performed using inStuPro® real-time quality control and interpretation for pressure and gradient analysis. Pressure profiles and mobility measurements combine with seismic and other log data to develop a static reservoir model after the first logging run.

The PressureXpress-HT service provides accurate, repeatable pressure profiles for integration with petrophysical, seismic, and conventional log data. The combination ensures a more comprehensive reservoir model for simulation. This information improves the quality and effectiveness of multi-stage fracturing operations in low mobility areas, by allowing avoidance of thief zones or depleted zones. Vertical and horizontal flow barriers can be identified and taken into account in the completion design. In injection wells, the tool can be used to monitor flooded performance.

Recently in the Gulf of Thailand, the PressureXpress-HT tool was deployed in wells with bottomhole temperatures above 320 °F (160 °C) to replace a conventional slim-hole formation tester tool. The selection of optimal perforation intervals for the well completion hinged on reliable, accurate formation pressure data to determine the formation fluid type and its mobility. Conventional formation testers use hydraulic control to operate pre-testing pistons resulting in pressure data that is not accurate enough to determine formation pressure gradients. These gradients are used to determine fluid density and identify oil-water contacts or gas-oil contacts. Particularly in low permeability formations, extreme accuracy is essential. Precise control over drawdown pressure, pre-test volume and drawdown rate enables highly repeatable pressure measurements.

Tool electronics are protected inside thermal flasks that eliminate the requirement for gauge thermal stabilization. As a result, the tool does not experience build-down effects. Even under high temperature conditions, the precision and repeatability of the pressure measurement is sufficient to determine a valid pressure gradient and identify the depth of fluid contacts.

For more information on PressureXpress-HT, visit Schlumberger booth 6 or www.slb.com/pressurexpress-h.

* Mark of Schlumberger

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**Caption:** There is no comparison between the precise gradient data provided by the PressureXpress-HT (red dots) and scattered conventional formation tester data (green dots). A fluid contact at 1.002 m is clearly identified.