Challenge
Obtain accurate pressure measurements for determining the pressure gradient in high-temperature wells with low-permeability formations.

Solution
Perform pretests at multiple depths with PressureXpress-HT* high-temperature reservoir pressure service, which is specifically engineered for high-temperature environments and provides precise control of pretest volume and rate for efficiently and accurately measuring reservoir pressure and mobility, even in low-permeability formations.

Results
Used PressureXpress-HT service’s accurate pressure measurements to construct a valid pressure gradient and definitively identify the fluid contact for targeting perforation intervals.

Accurate pressure measurements needed in high-temperature, low-permeability conditions
The Gulf of Thailand is known for its high temperature gradient. One major operator’s wells usually have bottomhole temperatures in excess of 320 degF (160 degC). A slim formation tester tool was needed to obtain crucial reservoir pressure measurements, which along with fluid type and mobility measurements would be used to select the perforation intervals. However, because conventional multifunctional tools for formation testing employ hydraulic control for pretesting, the resulting pressure would not be sufficiently accurate for determining the pressure gradient, especially for low-permeability formations.

Effective thermal design incorporating versatile, enhanced pretest system
PressureXpress-HT high-temperature reservoir pressure service is specifically engineered for pressure and mobility testing at up to 450 degF bottomhole temperature. Compared with conventional multifunction formation tester tools that also collect fluid samples, PressureXpress-HT service significantly reduces the time and risk involved with testing operations by making highly accurate reservoir pressure and mobility measurements typically in less than a minute.

Innovative tool architecture enables the superior thermal stability of the HPHT quartz gauge and extended holding time—up to 14 h—while eliminating the need for gauge temperature stabilization. By combining these capabilities with the precision of electromechanical pretest control, PressureXpress-HT service provides accurate gradients and overall data quality not achievable by either conventional standard or high-temperature formation testers.

Reservoir pressure gradient determined from accurate pressure measurements
The precise control of pretest volume and rate provided by the enhanced pretest system of PressureXpress-HT service enabled performing pretests at multiple depths to produce a profile of pressure versus depth and accurately establish the reservoir pressure gradient. With this critical information, the operator was able to optimize the selection of perforation intervals.

CASE STUDY
Formation Evaluation

PressureXpress-HT Service’s Pretesting Provides Pressure Profile at Temperatures Above 320 degF
Accurate pressure and mobility measurements are immune to thermal effects that distort conventional formation tester results, Gulf of Thailand.
The accuracy of PressureXpress-HT service’s measurements that results from precise control over both the pretest volume and drawdown rate made it possible to determine a valid pressure gradient and establish the fluid contact in the high-temperature conditions. The measurements from a conventional formation tester tool (green) are influenced by transient temperature effects. By using a flaked design to eliminate the need for gauge thermal stabilization, PressureXpress-HT service does not experience build-down effects.