



OTC2017

HART ENERGY

| THE OFFICIAL 2017 OFFSHORE TECHNOLOGY CONFERENCE NEWSPAPER | DAY 1

Improve Productivity With Real-time Sandface Data

■ Tool provides real-time data in difficult wells.

CONTRIBUTED BY SCHLUMBERGER

Production logging in subsea wells is challenging and costly, but skipping it leaves operators with insufficient early-well-life reservoir information for an accurate understanding of reservoir connectivity, drainage and flow assurance. Conventional sensors such as pressure and temperature gauges can provide valuable reservoir contact data, but only if they're installed along the sandface, where environmental factors and well design often preclude their use.

The new WellWatcher Flux multizonal reservoir monitoring system overcomes three technical challenges: acquiring sandface zonal pressures and high-resolution temperature data across multistage subsea completions, transmitting those in real time to the surface even in deep wells with upper and lower completions and interpreting the data to gain knowledge that would otherwise be too expensive to collect.

The system provides continuous sandface monitoring across one or multiple zones with only a single wellhead penetration. It extends monitoring into lower completions with field-proven inductive coupling techniques that provide wireless power and data communication without the challenges sometimes associated with optical fiber.

The robust temperature sensors have a resolution 100 times higher than that of optical fiber, and a proprietary multidisciplinary transient interpretation technique allows operators to optimize well production and reservoir depletion while maximizing field economics. The data can be used to identify real-time production

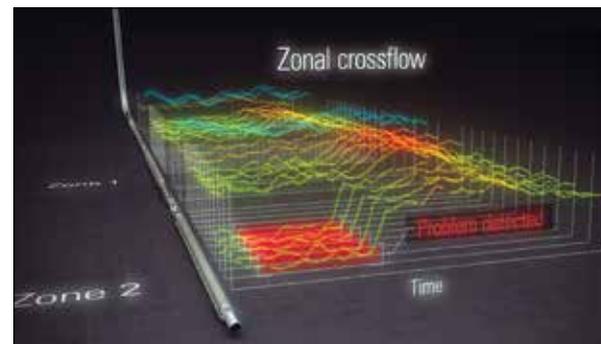
and injection profiles, permeability and skin changes, water breakthrough, fines movement, and out-of-zone injection. High tolerance for debris and vibration makes the system particularly suitable for multistage deepwater completions, where intervention costs and risks are high.

Data gathering in the Caspian Sea

Government regulations in the Caspian Sea mandate production logging each well at least once per year. High pressure and hydrogen sulfide levels up to 15% in one operator's wells posed significant HSE risk, necessitating use of specialized equipment during logging and increasing operating time and cost. Moreover, production must be suspended on all wells on the platform when a well is logged, resulting in deferred production and compounding the inherent risk of shutting in a well.

For a new well Schlumberger recommended the WellWatcher Flux system to acquire the required production data, and the benefits of the new system became apparent even before the well was placed on production. During the injection test and subsequent acid stimulation, the system transmitted data to the surface in real time.

The high-resolution temperature data helped identify zones that were successfully stimulated by indicating the exothermic reaction that occurs as acid contacts the formation, including higher localized temperature increases in the higher permeability zones. The data revealed exactly which zones had the best permeability distribution.



The WellWatcher Flux system continuously monitors subtle temperature changes at the sandface to provide real-time production information. (Image courtesy of Schlumberger)

Improving injection or production wells

The WellWatcher Flux system has been used to monitor cleanup-phase effectiveness, track injection flow paths, identify the most prolific producing zones, identify water or gas breakthrough and monitor changes. The surface acquisition system can transmit data to a customer's office, where thermal modeling software enables interpretation of flow events in real time, enabling fast, informed decisions for optimal control of assets.

The WellWatcher Flux system brings value to a single well or an entire field when strategically placed across the reservoir. Operators can now detect changes earlier than ever before, improving well management and optimizing reservoir drainage.

Visit Schlumberger booth 2415 Monday at 12 p.m. for a special presentation with more details about this new technology. ■