World’s First In-Lateral Real-Time Well Cleanup in Multilateral Well, Saudi Arabia

Manara system provides Saudi Aramco with game-changing zonal monitoring and control capability to optimize well cleanup

CHALLENGE
Optimize well cleanup and manage reservoir drainage by compartmentalizing an extreme reservoir contact (ERC) well with downhole sandface monitoring and control within each lateral.

SOLUTION
Deploy the new Manara* production and reservoir management system, developed in close collaboration with Saudi Aramco.

RESULTS
Successfully completed the installation using standard drilling and completion processes, providing unprecedented management of each lateral compartment for optimal well cleanup and manageable production.

“I wanted to offer my sincere thanks to the whole team for the successful Manara system installation—a job very well done. It was not easy, but then truly great things never are easy. Onwards and upwards!”

Brett Bouldin
Production Technology Team
Advanced Completions
Saudi Aramco EXPEC Advanced Research Center

New completion concept needed to effectively manage multilateral wells
To optimize production and ultimate recovery while controlling capital, drilling, and operating costs, Saudi Aramco uses ERC wells with multiple laterals and producing zones in heterogeneous carbonate reservoirs, thereby limiting the number of wellheads and surface infrastructure.

In the past, effective management of production from individual lateral compartments with different pressures, water cuts, and flow regimes was challenging due to the difficulty of placing control technology into laterals. If water or gas broke through in one of the laterals, a production logging intervention or complex surface well testing was required to identify which lateral was affected. In addition, drawdown from each zone in each lateral could not be actively monitored or controlled to optimize the well cleanup for maximum productivity.

Manara system deployed for well cleanup and reservoir management
A total of six stations were distributed across the tri-lateral well, two in each lateral branch powered by four inductive couplers. The Manara system’s measurement and control capabilities enabled production engineers to react to changing reservoir conditions, balance the drawdown across the full 6 km of reservoir contact, and optimize well cleanup zone by zone. During cleanup, high drawdown caused free gas to form, but this was quickly detected and adjustments were made in real time to control the situation. This allowed the lateral to remain online and able to continue producing. All brine volume was subsequently recovered before the well was put on production. An operation that would have taken weeks or months to diagnose with conventional methods was accomplished in 12 hours at no additional cost—without interrupting well production.

With in-lateral measurement and infinite control, the Manara system ensures optimal cleanup and manages reservoir offtake.
CASE STUDY: Manara system revolutionizes well cleanup for Saudi Aramco

Saudi Aramco optimized well cleanup in real time
Following cleanup, contribution was balanced across all three laterals based upon the observed flow performance in each of the six producing compartments. The productivity of each compartment was computed in real time and continuously monitored using WellWatcher Advisor* intelligent completion software. These early measurements combined with the enhanced control capability indicated the potential for significant improvement in production rate per length of reservoir contact.