
Profiling Complex Flow in Deviated Wells- A North Sea Case Study

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The keys to proactive production and reservoir management are production logs that profile fluid entries and diagnose problems in producing wells. Designing optimal production strategies and remedial operations requires high-confidence diagnosis. Production logging in deviated wells producing mixtures of various phases is challenging because of complex flow regimes. This is further complicated by fluid recirculation in the wellbore, causing the heavier phase to fall back towards the bottom of the wellbore, resulting in negative velocity on the low side. In this paper we present a field example that uses a new compact, integrated production-logging tool that incorporates the latest technological advances and best practices to address complex production-logging requirements. We also present the logging results in similar wells during the same campaign that were logged with a conventional production services platform tool. We are able to demonstrate the added value in terms of comprehensive flow diagnosis. A production logging operation using the new tool, which specializes in horizontal and deviated well logging, was planned to obtain key inputs for the reservoir model and investigate reasons for low well productivity. The well was producing from multiple horizons, and it was critical to obtain an accurate flow profile and infer the extent of depleted layers in the field. Production logs from the new tool resulted in accurate flow diagnosis and led to better understanding of complex flow mechanisms across multiple producing zones. Future steps after this logging operation include re-perforation and hydraulic fracturing of selected intervals. The tool provides a recording of holdup and velocity profiles along the vertical diameter of the borehole cross-section. The direct measurement of the velocity and fluid holdup profile enhances the capability of the analyst to determine the downhole phase.
