Sample Gas and Condensates in a Multiphase Flow Environment

PhaseSampler, PhaseTester, and PVT Express technologies enable comprehensive production testing in a gas condensate reservoir

**CHALLENGE**
Collect representative samples of gas and condensates during production testing, and improve multiphase flow rate measurements by using realistic fluid properties.

**SOLUTION**
Combine PhaseSampler* multiphase sampling equipment with PhaseTester* portable multiphase well testing equipment and PVT Express* onsite well fluid analysis service to characterize and measure the phases passing through the flowmeter at line conditions.

**RESULTS**
Accomplished all well test objectives, including three-phase sampling and analysis, improved flow rate measurements, recombination of the producing well stream, and development of a compositional PVT model.

**Representative multiphase samples needed**
Rospan International was operating in the deep Achimovsk and Valenginian formations, located in its huge Urengoiskoe gas condensate field in the Yamal Nenets region of Western Siberia, 50 mi [80 km] south of the Arctic Circle. Most production was from the Achimovsk horizon, which is nearly 10,000 ft [3,000 m] below the surface. The company collaborated with Schlumberger in conducting a comprehensive well testing campaign for these two formations.

For more than 10 years, Schlumberger used multiphase flowmeters in the field to reliably measure oil, gas, and water flow rates without phase separation, but phase sampling was typically accomplished at the separator, and samples collected there were not as representative of production as samples collected at line conditions.

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PhaseSampler multiphase sampling equipment.

Vostochno-Urengoiskoe, pad 21.
Comprehensive samples collected at line conditions
PhaseSampler multiphase sampling equipment enabled the collection of oil, gas, and water samples directly from the PhaseTester flowmeter at line conditions during production testing.

The PhaseTester flowmeter was used to test wells at various choke settings. It was coupled with PhaseSampler equipment that enabled collection of multiphase samples for determination of in situ volumetric properties and gas composition.

Representative fluid properties data derived from analysis of samples collected at line conditions, in turn, increased flow measurement certainty when the data were input to the computation algorithm of the multiphase flowmeter.

The PVT Express service contributed fast onsite analysis of the gas and condensate samples, without phase changes, for high-confidence sample validation and characterization of fluid properties.

All well testing objectives accomplished
All of Rospan’s testing campaign objectives were met, including three-phase sampling at line conditions, thorough fluids analysis, and improved multiphase flow rate measurements.

Further, by combining multiphase sampling and measurement technologies with comprehensive onsite fluid analysis, Schlumberger was also able to provide Rospan with recombin ed single-phase samples of the producing well stream and a compositional PVT model using equation-of-state modeling.

Compositional model of multiphase samples and the mathematically recombined single-phase fluid.

Multiphase flow rate measurements obtained with the PhaseTester flowmeter.

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