

RCX Service Determined High Levels of CO₂ Using New Methodology

An operator drilling off the west coast of Africa encountered high-gas content in one of their wells. In order to control pressure throughout the wellbore, the well was drilled with managed pressure drilling (MPD) techniques. It was critical for the operator to quantify CO₂ levels. This information would help them determine the economic viability of the reservoir before drilling farther or completing the well. Due to the highly corrosive environment, tight formation, and near-balance condition, pressure testing and sampling proved to be extremely challenging.

Baker Hughes, a GE company (BHGE), logged the well with pressure testing services and equipment. In order to analyze the downhole fluids accurately, BHGE deployed the **Reservoir Characterization eXplorer™ (RCX™) service**, configured with an elongated probe; multitanks carriers; and the **In-situ Fluids eXplorer™ (IFX™) service**.

The high concentration of CO₂ meant the packer had a limited life span and could sustain considerable damage due to the corrosive nature of the gas. After lost

seals and a casing check, the packer was changed out and run again.

After completing 56 pressure testing stations, a sampling station was conducted. A new methodology of calculating CO₂ was used. The tuning fork of the IFX service measures density. When sampling in a complete gaseous environment, it can deliver CO₂ data in real time. There must be enough pressure on the backside of the tuning fork to detect a useable signal in gas. Once this is established, the spectrum is analyzed for any two-phase fluids. If no fluids are detected, then a valid CO₂ measurement can be obtained from the tuning fork of the IFX service's module.

The corresponding pressure gradient matched the tuning fork density during sampling. The high-density measurement in the gaseous environment meant the CO₂ content was in the range of ~75%. This was also verified with pressure-volume-temperature (PVT) analysis and matched the surface logging readings. Subsequent runs in the hole with a new tool string validated the response, highlighting the effectiveness of the new methodology.

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Challenges

- Conduct pressure testing in extremely challenging environment
- Get reliable pressures and samples to determine CO₂ concentration levels
- Overcome near-balance and MPD conditions

Results

- Conducted pressure testing and sampling in a corrosive environment for an extended time period
- Pressure tested 56 stations
- Determined CO₂ concentration levels in real time