GeoBalance® Underbalanced Drilling Service

DELIVERING A TOTAL SOLUTION

GeoBalance® Underbalanced Drilling (UBD) Service provides a complete range of UBD Services with precise pressure-control solutions to achieve well objectives in challenging environments. Halliburton delivers high-performance drilling solutions while focusing on improving reservoir recovery and maximizing asset value. As a pioneering industry leader in underbalanced solutions, Halliburton can help increase the productivity of wells and accelerate production revenue. Our advanced technology, products, and services, combined with real-time reservoir evaluation, adds even more value by conducting reservoir assessment as data is collected during underbalanced drilling operations. In addition, our GeoBalance Underbalanced Drilling Service team offers project design and management for safe underbalanced operations during the drilling and completion phases of well construction. Our goal is to maximize reservoir performance without jeopardizing safety or the environment.

Developing and managing the reservoir during the full spectrum of the well construction process is the basis for successful underbalanced drilling programs. Our reservoir characterization services, well construction and project management skills, and technologies are all brought together for an optimal underbalanced program that delivers value. With Halliburton, you get the total solution.

DELIVERING VALUE

Drilling in an underbalanced state offers a unique opportunity to gather real-time virgin reservoir data that would never be seen again after typical damaging affects from conventional overbalanced drilling. In underbalanced drilling, the wellbore pressure is lower than the reservoir pressure. This condition allows formation fluids to flow into the wellbore during the drilling process, preventing drilling mud and associated contaminants from penetrating the producing formation. This protects the producing zone and minimizes the potential for formation damage. Proper instrumentation, data acquisition, and drilling procedures allow acquisition of data that is then interpreted and analyzed to extract information about the reservoir.

DELIVERING TECHNOLOGY AND SERVICES

Four-Phase Separation System

During UBD operations the drilling returns consist of drilling mud or fluid, drill cuttings (solids), and reservoir fluids such as water, gas, and oil. Halliburton’s sophisticated separator technology provides solids management systems for handling drill cuttings, oil, water, gas, and mud. The Four-Phase Closed-Loop Separation Package is a modular, skid-mounted system designed for use in UBD operations on both land and offshore locations. The separation system consists of several skid-mounted assemblies comprising the choke manifold, geologic sampler, first-stage separator, second-stage separator, and pump and piping skid. The separator is capable of operating in H₂S environments and is industry certified.
A Four-Phase Closed-Loop Separation Trailer-Mounted System is also available. Its compact design reduces the overall system footprint to one process trailer, one utility trailer, and one pipe trailer for greater ease of transportation, installation, and commissioning.

**Rotating Control Devices**
The rotating control device (RCD) forms a positive seal around the drillstring, safely diverting flow from the annulus away from the rig floor. It is a key piece of well control equipment, and it is the first line of defense against the escape of well fluids during critical drilling operations. The GeoBalance service offers low, medium, and high pressure RCDs. The RCD 5000™ device is designed and manufactured to API 16 RCD Standards and are API Monogrammed.

**Sentry™ Data Acquisition and Monitoring System**
Data acquisition and monitoring are critical for ensuring that the underbalanced environment is maintained at all times. A multichannel data acquisition and data management system has been specifically configured for GeoBalance system operations. It is used in conjunction with the data gathered through the locally mounted PLC controlling the choke. It integrates formation evaluation information, measure-while-drilling and pressure-while-drilling data, and surface mud-logging information as well as standard drilling parameters. It also provides critical reservoir information. This includes production and flow rates during underbalanced applications to indicate reservoir potential and performance. Emergency Shutdown (ESD) systems are electronically and pneumatically controlled on various kits to ensure safety.

In overview, the system provides the most up-to-date electronic data-gathering hardware and software to help ensure reliability and safety.

**Real-Time Reservoir Evaluation**
With RTRE™ Real-Time Reservoir Evaluation, Halliburton is able to dramatically improve the speed and quality of the decisions needed to develop a customer’s reservoir assets. RTRE analysis delivers an ongoing well test while drilling. Similar to a conventional well test, the reservoir characterization process during UBD monitors the rates, pressures, temperatures, depths, and fluid properties and uses this data to characterize the permeability, reservoir extent (if sufficient time), reservoir pressure, productivity index, or fracture properties of the zones drilled.

If underbalanced conditions are maintained throughout the operation, RTRE also provides an opportunity to review the undamaged reservoir potential which, in some cases, reveals productive intervals missed when drilled conventionally and quantifies their contribution. If the system becomes overbalanced, then skin damage can also be determined using the analytical and numerical simulators developed for well testing while drilling.

This ability to determine the productivity of a formation allows decisions on the viability of the well to be made earlier, before any investments in full completion and testing are made.

Project teams combine reservoir engineering, geology, drilling, completions, and production expertise with local knowledge to create the best, most integrated technology solution for specific reservoir challenges.

Membrane Nitrogen System
The advanced technology nitrogen membrane generation plant comprises the latest design enhancements in feed air compressors, membrane nitrogen generation, and nitrogen compression. The nitrogen membrane system generates a minimum 95 percent nitrogen purity. The control system continually and rapidly controls purity and monitors all major system parameters. A high accuracy pressure- and temperature-compensated flow meter provides instantaneous and totalized flow to the jobsite data acquisition system. All information is conveniently displayed on a master display panel, indicating all parameter levels and alerting the operator to system alarms and shutdown options.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

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