Underbalanced Drilling Technology Enables Drilling to Total Depth in Less Than 1 Day

**Objectives**

- Drill a 210-ft (64-m), 6-in.-diameter vertical hole section of a depleted reservoir to target depth (TD) in underbalanced conditions, prevent fluid losses, and minimize formation damage in the challenging Devonian and Argyle formations of Algeria's Alrar field.

- Establish reservoir productivity and determine the maximum flow rate.

- Acquire logging data, pressure data, and formation fluid samples to optimize reservoir management.

**Our Approach**

- The client called on Weatherford because previous attempts to drill the section had resulted in formation damage and a substantial amount of time spent trying to cure drilling fluid losses by using lost circulation material (LCM) or remedial cementing.

- Weatherford recommended using the underbalanced drilling (UBD) approach with nitrogen drilling fluid to achieve a bottomhole circulating pressure slightly lower than the predicted reservoir pressure gradient.

- Nitrogen drilling fluid was available on site by injecting membrane-generated nitrogen into the crude oil to create a multiphase fluid.

- The Weatherford team drilled in UBD mode for 210 ft (64 m) until reaching TD and then successfully conducted a flow test to estimate well production.
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Value to Client

• Using the Weatherford UBD approach, the operator reached TD in less than 1 day without any lost time or near-miss incidents, saving an average of 16 days in rig time and associated costs.

• Weatherford UBD system identified the gas cap, oil zone, and water zone in the reservoir section. UBD results were in agreement with wireline logs.

• Drilling the well with UBD technology helped to mitigate fluid loss, significantly reduced formation damage, and enabled the operator to obtain real-time reservoir characterization data to gain a better understanding of lithological, reservoir, and fluid properties.

• With client coordination, the overall drilling operation was optimized for significant cost savings.