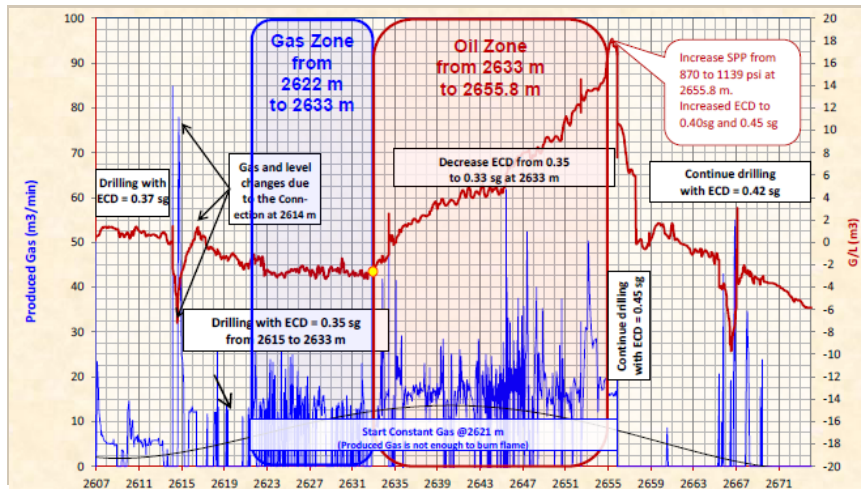


Underbalanced Drilling Technology Enables Drilling to Total Depth in Less Than 1 Day



Produced gas vs gain/loss vs target depth (TD) for UBD operation in Alrar field, Algeria.

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.

CLIENT
Sonatrach

LOCATION
Alrar field, Algeria

WELL TYPE
Onshore, depleted, oil and gas

FORMATION
Devonian and Argyle

HOLE SIZE
6 in.

SECTION LENGTH
210 ft (64 m)

DRILLING FLUID
Nitrogen and crude oil

DEPTH
2678 m TVD

AVERAGE RATE OF PENETRATION
14.07 ft/hr (4.29 m/hr)

PRODUCTS/SERVICES

- Underbalanced drilling services
- SafeShield® Model 7100 RCD
- UBD choke manifold
- Four-phase separator



SafeShield is a registered trademark of Weatherford in the US, Canada, and the European Union.

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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.

