

Enhanced Well Integrity Protects Against Influx in Over-Pressured Formation, Ensures Zonal Isolation and Well Stability

Objectives

- Drill a 311-mm (12.2-in.) openhole section using managed pressure drilling (MPD) with statically underbalanced mud (1,800 kg/m³ [112 lb/ft³]) to a total depth of 805 m (2,641 ft) MD/TVD.
- Maintain a constant equivalent circulating density (ECD) and equivalent static density (ESD) of 2,130 kg/m³ (132 lb/ft³) at the Cardium formation (751 m [2,463 ft] MD/TVD).
- Perform a dynamic formation integrity test (DFIT) at TD using MPD and displace the well with kill mud (2,450 kg/m³ [152 lb/ft³]) while maintaining constant ECD/ESD.
- Run and land 244.5-mm (9 5/8-in.) casing with a solid body mandrel, then displace with light mud (1,800 kg/m³ [112 lb/ft³]) in preparation for cementing using MPD equipment.

Our Approach

- Due to the RCD bore-through size limitation and the casing's solid body mandrel, Weatherford MPD experts adapted by rigging up a 2-in. to 4-in. pipe crossover on the casing spool's side outlet. A management of change (MOC) was initiated, and surface lines were pressure tested.
- The blowout preventers (BOP) were closed and the well returns were diverted to the MPD manifold. The Coriolis flow meter and separator were bypassed during cementing.
- The MPD solution maintained a constant ECD/ESD of 2,450 kg/m³ (152 lb/ft³) at the Cardium formation while taking returns through the side outlet. Cement returns reached surface due to 346% excess volume.
- Surface backpressure of 2,500 kPa (362 psi) was held on the annulus for 8 hours post-cementing to ensure proper setting.
- The MPD lines and BOP stack were flushed to remove cement debris.

Value to Customer

- **Zero Nonproductive Time (NPT):** The operation was executed without delays or complications.
- **Enhanced Well Integrity:** Constant ECD/ESD was maintained throughout, preventing influx in the over-pressured Cardium formation.
- **Optimized Cement Quality:** Cement density (2,100 kg/m³ [131 lb/ft³]) was slightly lighter than kill mud (2,450 kg/m³ [152 lb/ft³]), reducing risk of gas intrusion and ensuring a high-quality cement job.
- **Integrated Pressure Management:** Demonstrated the effectiveness of the Weatherford managed pressure wells strategy in integrating MPD with cementing and completions to enhance safety, reduce risk, and improve operational efficiency.



The critical component of any closed-loop drilling system—and the first line of defense for your wellbore—is the RCD which create a closed-loop environment to contain and divert fluids and to enable wellbore pressure management.

LOCATION

Grand Prairie, Alberta, Canada

WELL TYPE

Vertical development

FORMATION

Cardium

HOLE SIZE AND ANGLE

311-mm (12.2-in.) vertical intermediate hole section

CASING SIZE AND TYPE

339.7 mm (13.3 in.), 81.1 kg/m, J-55 surface casing

PRESSURE

15,692 kPa (2,275 psi)

DEPTH (MD/TVD)

- Surface casing depth: 620 m (2,034 ft)
- Cardium formation depth: 751 m (2,463 ft)
- Intermediate section total depth: 805 m (2,641 ft)

PRODUCTS/SERVICES

- RCD Model IP 1000
- Set point choke
- Coriolis flow meter
- Atmospheric separator
- Flare stack
- Piping

