SeaShield® RCD and MPD Techniques

Enable Re-Entry into a Suspended Well to Facilitate Subsequent Plug and Abandonment

Objectives

- Re-enter and thoroughly re-abandon a previously abandoned gas well. Tests conducted by divers and remotely operated vehicles revealed gas leakage through the 9 5/8-in. casing. Laboratory tests established that the observed gas bubbles were reservoir gas. The customer determined that the existing cement plugs in place were not sufficient to isolate the reservoir from the environment and that there was a high reservoir recharge potential.
- Drill through two cement plugs above a potential high-pressure gas zone. The customer had decided against coiled tubing methods because of the associated time, costs, and risk.
- Provide pressure-control capabilities and divert annular fluid returns away from the rig floor.

Our Approach

- The Weatherford MPD team designed a customized MPD spread and closed-loop drilling (CLD) plan to control pressure when drilling through the cement plugs to the target depth.
- The team met with the customer to perform a hazard and operability (HAZOP) analysis, which confirmed that their spread design and strategy satisfied all safety and drilling objectives.
- The team rigged up the MPD spread, with the API 16RCD-certified SeaShield model 7875 docking station (DS) rotating control device (RCD), hydraulic pressure-relief valve (PRV), and the standard pipework and hoses required for MPD operations. The spread also included a set of custom drilling chokes.
- The team then calibrated and tested the spread offshore and fingerprinted the well behavior before beginning the operation.
- The RCD controlled and diverted fluids and facilitated wellbore pressure management while drilling, stripping, and making connections.
- The MPD spread provided operational flexibility and diverted gas returns away from the rig floor to the mud-gas-separator.
- Constant pressure monitoring enabled maintaining pressure within the predetermined safe limits during both static and dynamic conditions.
- The MPD team drilled through the plugs and reached the target depth without well control issues or lost-time incidents.

Value to Customer

- Weatherford devised an innovative MPD spread and CLD strategy that enabled the customer to safely re-enter a potentially live gas well in the North Sea and subsequently re-plug and re-abandon the well. The entire operation lasted only 9 days compared to an estimated 18 operating days using coiled tubing methods.
- The Weatherford MPD services enabled drilling through the cement plugs and mitigating the risk of any trapped gas beneath them. The services further enabled drilling through the plugs without any plugged choke events.
- The SeaShield DS RCD safely managed pressure and diverted wellbore flow during drilling, stripping, and making connections.

The SeaShield model 7875 DS RCD creates a pressure-tight barrier in the wellbore annulus to safely contain and divert annular fluids from marine risers.

LOCATION
North Sea

WELL TYPE
Offshore, abandonment

ESTIMATED PRESSURE
2,200 psi (15 MPa)

PLUG DEPTHS
- Plug 1: 1,074 ft (327 m)
- Plug 2: 6,162 ft (1,867 m)

PLUG LENGTHS
- Plug 1: 356 ft (108 m)
- Plug 2: 669 ft (203 m)

PRODUCTS/SERVICES
- HAZOP analysis
- MPD spread
- SeaShield DS RCD
- Hydraulic PRV
- Custom drilling chokes

Weatherford®