**Case study:** Australia

# Team located 9,300 miles from rig provides remote MWD services to navigate and drill complex pay

In early 2020, an operator working in Australia needed to drill a series of horizontal wells to maximize pay exposure in a complex reservoir that included a coal seam and a narrow vertical drilling window approximately 5 m (16 ft) in height. It was also critical to minimize any dogleg severity (DLS) and a maximum target DLS of 4°/30 m (98 ft) was accepted. The operator also wished to push penetration rates as much as possible and established a target rate of penetration (ROP) of 60 m (197 ft) per hour.

Based on the operator's objectives, Baker Hughes engineered multiple bottomhole assembly (BHA) designs for this application. The 12 ¼-in. section would be drilled using a high-performance **Navi-Drill™ Ultra Series motor** and a **NaviGamma measurement-while-drilling (MWD) service**. The BHA for the 8 ½-in. curve section would employ an **AutoTrak™ Curve high build-up rate rotary steerable system (RSS)**—the first in-country deployment of the technology. For the 6 ½-in. reservoir the 6 $^{1}/_{8}$-in. reservoir section, a Navi-Drill motor, and an **AziTrak™ deep azimuthal resistivity measurement tool** were added to the BHA design to drive ROP and assist in reservoir navigation. In addition, several sidetracks were planned to ensure adequate well separation, and Baker Hughes provided whipstocks and directional support for these activities as part of the drilling program.

In order to ensure the best possible service, improve collaboration with the client, drive efficiencies, and reduce onsite and travel-related health, safety and environmental (HSE) risks, Baker Hughes established a unique operational model that included directional drillers at the rig site and two types of **Remote Operations Services (ROS)**. These remote service teams consisted of an in-country reservoir navigation team working directly with the client in Australia and a remote MWD team located in the new Baker Hughes ROS hub in Romania.

The teams collaborated and executed to deploy the technology flawlessly and drill a total of four wells to date. All of the wells were drilled to total depth (TD), stayed within the narrow window targeted by the client, and avoided any excessive DLS. All of the reservoir logs were processed accurately and delivered to the client on time. The team was also able to improve on the client's ROP target by delivering an average on-bottom ROP of 70 m (230 ft) per hour.

By deploying both the AutoTrak RSS and the Navi-Drill Ultra drilling motor, ROS engineers displayed the capacity to handle any kind of BHA (RSS or conventional) remotely while maintaining the client key performance indicators (KPI) with timely delivery of logs and other deliverables. More wells are planned with the client and Baker Hughes is committed to delivering an ever-increasing number of its services remotely to ensure high-quality, efficient, and consistent performance everywhere it operates.

## Challenges

- Drill multiple wells within a narrow target window
- Avoid excessive DLS
- Deliver a smooth wellbore at superior ROP
- Deploy new technology for first time in country
- Drive operational efficiencies
- Minimize HSE risks

## Results

- Supported and managed directional activities remotely
  - Maximized operating efficiency
  - Reduced HSE risks
- Met all customer KPIs
  - Delivered smooth wellbore that met customer's DLS target
  - Exceeded customer's on-bottom ROP target by 10 m/hr (33 ft/hr)
- Delivered superior operational efficiency
- Achieved exceptional HSE results