

Sinopec Uses PowerDrive Archer RSS with Near-Bit GR Imaging to Steer Drilling 100% in Pay Zone, China

MWD and RSS technologies ensure accurate well placement in a thin shale reservoir

CHALLENGE

- Maximize shale recovery potential while drilling two horizontal exploration wells in the Dingye field.
- Distinguish between the gamma ray (GR) responses of a thin reservoir that are similar to the layers above and below.

SOLUTION

- Use PowerDrive Archer* high build rate rotary steerable system (RSS) with near-bit gamma ray (GR) imaging to ensure accurate wellbore placement within a narrow pay zone.

RESULTS

- Successfully drilled the 1,234-m [4,048.56-ft] and 1,556-m [5,105-ft] target lateral sections while maintaining 100% reservoir contact.

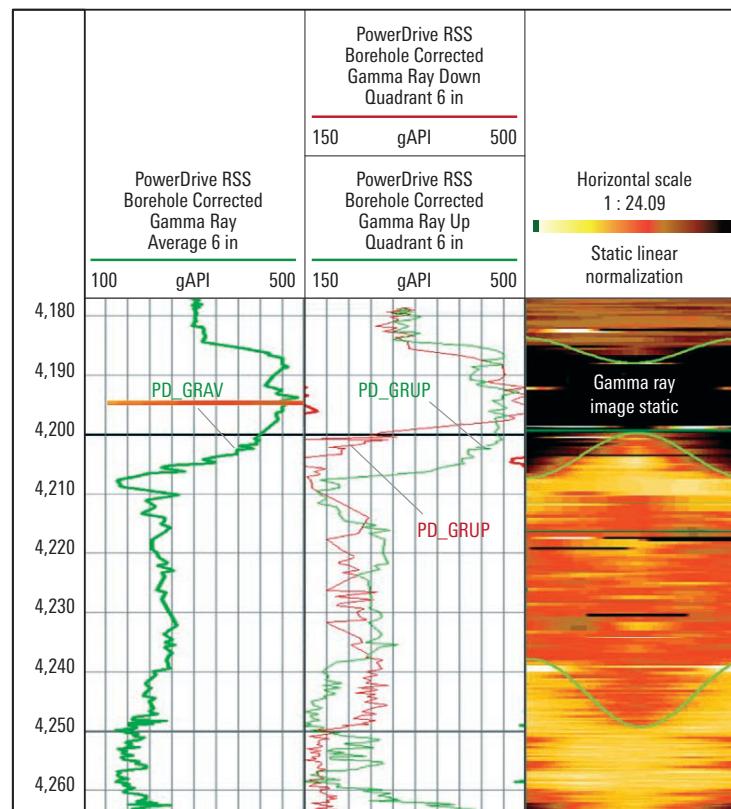


Maximize net pay in narrow pay zone shale wells

After discovering Fuling field in 2012, China’s first commercial unconventional gas field, Sinopec began an ambitious exploration drilling campaign in the nearby Dingye structure. In previous unconventional wells, Sinopec used average GR to guide well trajectories. However, horizontal wells in Dingye field showed similar GR response in the layers directly above and below the pay zone—which ranged from just 2 to 3 m [2.5 to 9.8 ft] thick. To ensure optimal well placement and reduce uncertainty in the planned 1,200–1,500-m lateral sections, Sinopec partnered with Schlumberger for directional drilling services.

Deploy RSS with near-bit GR imaging to enable precise directional drilling

Schlumberger and Sinopec decided to incorporate the PowerDrive Archer high build rate RSS into the bottomhole assembly. In addition to delivering a high rate of penetration and better wellbore quality, the system’s built-in, near-bit azimuthal gamma ray measurement capabilities enable precise, proactive geosteering in thin pay zones. Dynamic near-bit gamma ray images help identify structural dip information, allowing the drilling team to make quick geosteering decisions and minimize the risk of exiting the target.

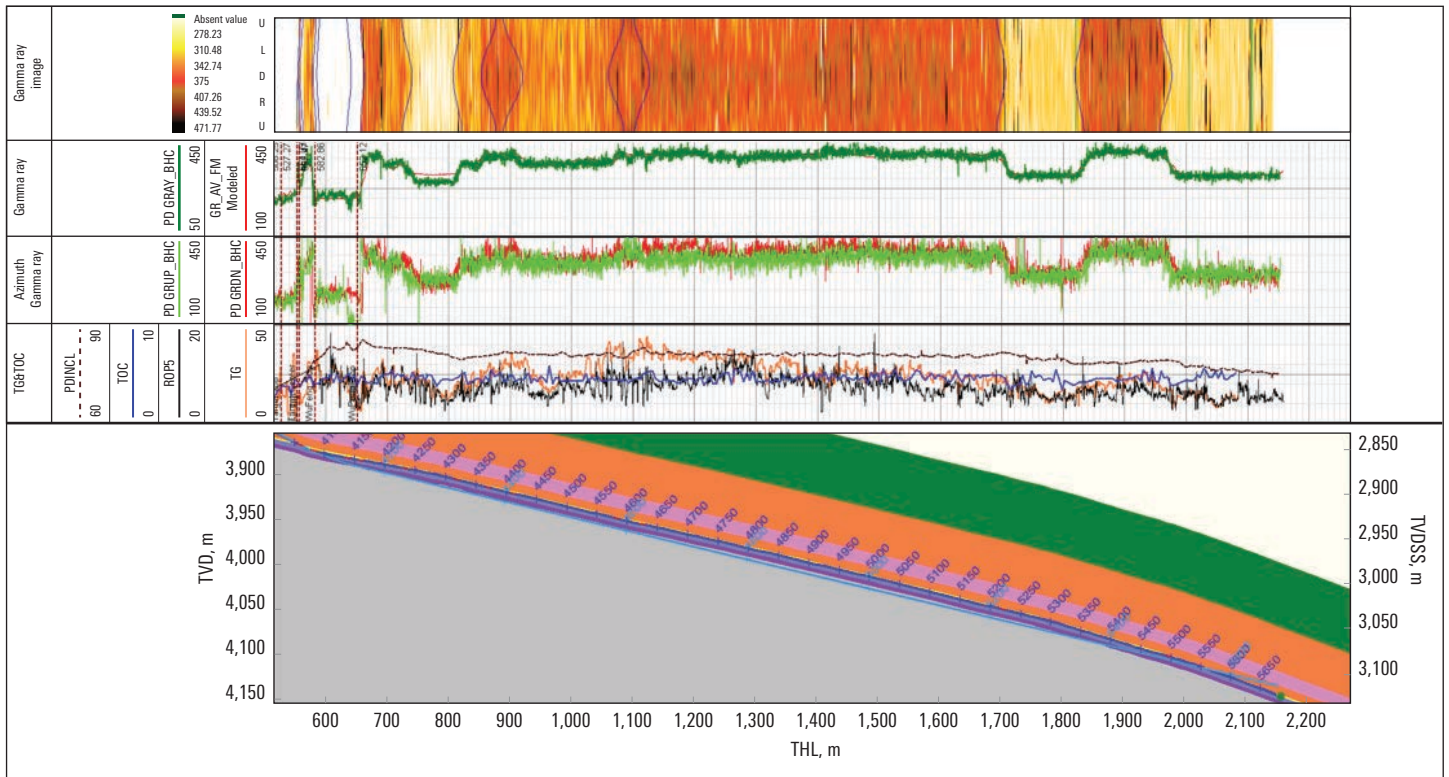


Dynamic near-bit gamma ray measurements helped Sinopec make real-time geosteering decisions and position the wellbores within the thin pay zone.

Maintained drilling trajectory 100% within pay zone for two lateral wells

By taking real-time measurements at the bit, the PowerDrive Archer high build rate RSS enabled Sinopec to reduce structural uncertainties and drill a total of 2,790 m [9,153.5 ft] within the challenging, 3-m-thick pay zone. In fact, the directional drilling team successfully placed both laterals in the zone of interest with 100% accuracy—optimizing reservoir contact and net pay.

Additionally, the unique hybrid steering action of the PowerDrive Archer RSS provided maximum dogleg severity (DLS) control, ensuring accurate well trajectory while minimizing the risk of dogleg complications, such as casing wear, drillstring friction, or stuck pipe. Throughout the drilling campaign, the RSS delivered a maximum DLS of just 3°/30 m, enabling a smooth casing run and avoiding nonproductive time associated with excessive, unplanned doglegs.



The geosteering model (above) illustrates how imaging enabled the drilling team to stay within the very thin reservoir.