

CASE HISTORY

CHASING SUB-SEISMIC SANDSTONE RESERVOIRS WITH AT-BIT AZIMUTHAL GAMMA RAY AND INCLINATION

APPLICATION

Geosteering
Formation Evaluation
Wellbore Imaging

TECHNOLOGY

Measurement While Drilling (MWD)
 + Falcon Electromagnetic (EM) MWD
 Logging While Drilling (LWD)
 + BitSub At-Bit Azimuthal Gamma Ray/Inclination sensor

LOCATION

Alberta Province,
Canada

CLIENT CHALLENGE

An operator drilling in Southern Alberta identified an oil-rich target formation and planned a series of horizontal wells for their 2022 drilling campaign.

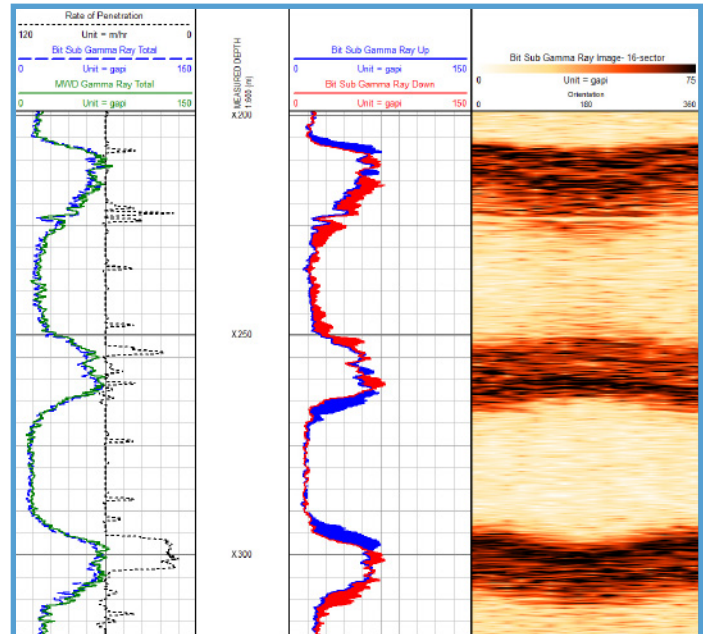
Offset vertical well logs revealed that the sandstone formation was less than 3m thick, ultimately leading to difficulties imaging the formation through traditional seismic data acquisition methods. Not only were geologic structure variations expected in the formation dip along the 2000m of vertical section, but there was also the possibility of stratigraphic lateral variability in formation thickness. Since this was a conventional reservoir that wasn't to be hydraulically stimulated, the amount of lateral wellbore exposure to the target formation directly correlated with the production efficiency.

SCIENTIFIC SOLUTION

As the well's production efficiency and economic success were heavily related to the percentage of geosteering target accuracy, Scientific Drilling's advanced LWD sensors were critical in providing accurate and reliable data to the onsite geologists for the log correlation purposes.

By utilizing Scientific Drilling's BitSub technology, an industry-leading LWD measurements sub at the bit, the operator was able to determine which direction to steer their lateral based on the azimuthal gamma ray and continuous inclination at the bottom of the mud motor.

By transmitting the at-bit data to the Falcon EM MWD system via Short Hop, the preferred mud motor power section configuration was utilized to maximize drilling performance. Optimal data density for real-time Total Gamma Ray, Up/Down Gamma Ray, Continuous at-bit inclination, Tri-axial vibration, and static borehole surveys were achieved with ROPs reaching up to 60m/hr.



BitSub Azimuthal Gamma Ray log showing the lateral wellbore transitioning from the sandstone target reservoir and a shale stringer in the middle of the target.

CLIENT VALUE

Scientific Drilling's BitSub tool enabled the implementation of proactive geosteering methods for the project. BitSub's at-bit inclination reduced slide times and minimized unexpected doglegs in the lateral and its azimuthal gamma ray measurements provided the geosteering team with easily identifiable indicators of the well cutting up or down stratigraphically, allowing course corrections to be made confidently and quickly. Because the BitSub's placement is below the mud motor and above the bit, the tool is always rotating and there is no need to go back and re-log azimuthal data over slide intervals. The Short Hop technology between the BitSub and MWD tool worked flawlessly in the oil-based mud system.