Precise Wellbore Placement Yields 3X Expected Production in Mature Oil Field

Benefits

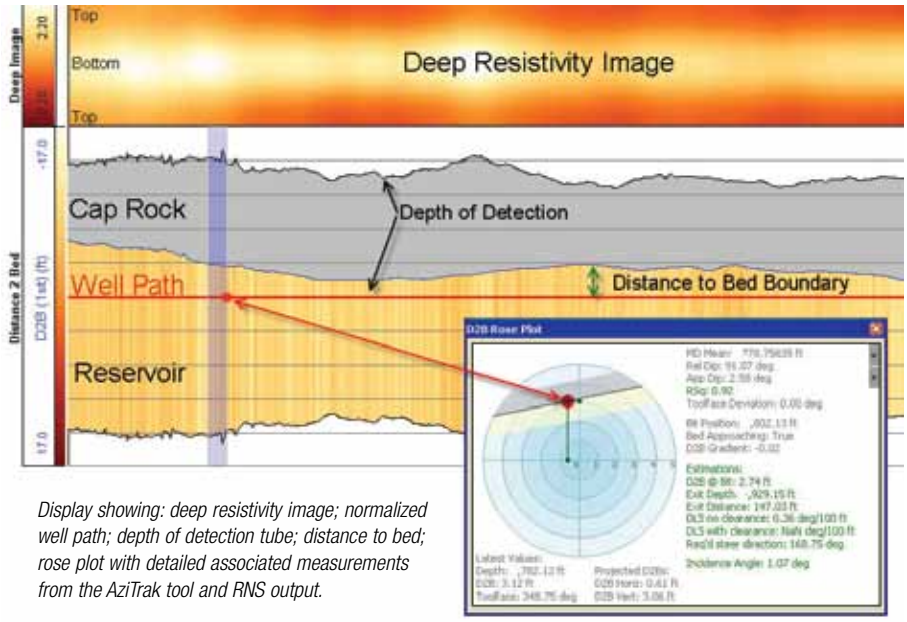
- Accurate well placement enhanced more than three times the expected reservoir production
- Estimated 140 barrels of oil per day (BOPD) and 95% water cut; initial tests resulted 460 BOPD and 64% water cut
- 100% net pay sand over entire lateral
- Single run with no sidetracks and reservoir exits

Background

- Production field, California, USA
- October 2009
- Ideal wellbore placement within the upper seven feet of the target sand to avoid water coning

Baker Hughes Solution and Results

- AutoTrak™ G3 rotary steerable system, AziTrak™ deep azimuthal resistivity tool and Baker Hughes Reservoir Navigation Services (RNS)
- 3D well planning, execution and proactive wellbore placement
- Interactive teamwork and communications among the operator's geologist, the Baker Hughes reservoir navigation service and directional drilling service teams, to optimize the decision-making process to place the well
- First deployment of AutoTrak, AziTrak and RNS in this area



Display showing: deep resistivity image; normalized well path; depth of detection tube; distance to bed; rose plot with detailed associated measurements from the AziTrak tool and RNS output.

The operator's objective was continued production using the existing surface infrastructure, but placing a horizontal wellbore in an area with few production wells, as well as to maximize reservoir exposure along the well path. The goal was to extract attic oil in the reservoir and avoid water coning.

By stepping out on the outward flank of the structure and crossing a major fault, the reservoir was projected to produce similar results to other wells in the field.

After landing the 8¾-in. wellbore in the target sand and setting casing, Baker Hughes used AutoTrak G3 with an AziTrak sub to drill the 6⅛-in. production hole. The formation dip of the structure was greater than anticipated due to the proximity of the fault.

The geologist and reservoir navigation engineer, using the directional resistivity measurements from the AziTrak tool, were able to quickly calculate the distance-to-bed interface of the reservoir and caprock. Per the geologist's instructions, Baker Hughes then geosteered to an average distance of 4.4 ft (1.3 m) along the bed boundary.

The operator was able to identify an optimal pay zone based on the response of the AziTrak tool's multiple propagation resistivity data, while maintaining a distance of two to six feet from the caprock above the well path.

If the original well path had been followed, it would have yielded 30% less reservoir exposure and increased the risk of water coning by placing the well path 14 ft (4.3 m) below the cap rock.

The AutoTrak G3 accurately controlled the path of the wellbore, delivering a smooth well path that facilitated a successful completion operation and reduced time to first oil production.

Initial production delivered three times the originally anticipated rate, producing 460 BOPD.

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