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Extended Reach Horizontal Well Drilling and Placement Using 3D - Visualization and Integrated Geosteering Techniques

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Abstract

The emergence of extended reach horizontal drilling technology offers unique opportunities for improved hydrocarbon recovery. There has been a steady progression in the vertical depth and horizontal departure length of ERD wells. In Saudi Arabia, development drilling programs increasingly require directionally drilled well trajectories to reach the bottom hole targets. Recent developments in horizontal well-placement and drilling technology enabled us to successfully drill and geosteer one of the longest openhole power water injector wells in Saudi Arabia. Complexities in the placement of this extended reach well located on the flank of a field included : 1) a target that was characterized by high formation dip and 2) no offset well control, leading to the reservoir having unknown structural dip and azimuth. It is also common for ERD-well paths to cross faults, sometimes with unfavorable displacements and orientations. Advance geosteering methods using 3D visualization and real-time borehole images were utilized to detect a sub-seismic fault, and successfully side track and steer the well to remain in good porosity for the entire horizontal section. Real-time images enabled an accurate depiction of the formation dip. Combined with 3D structural modeling updates, this approach proved invaluable in successfully placing this extended reach borehole.