Living 2D Reservoir Models

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ABSTRACT

At Saudi Aramco, the pace of drilling activity with predominantly high-angle and horizontal wells makes the task of updating 3D reservoir models particularly challenging. Living 2D Reservoir Models are essential for rapid 3D model updates and as a leading indicator for real-time geosteering well placement. All downhole data received while drilling are inherently a lagging indicator, and the only data that sees ahead of the bit is the 2D structural grid framework. Modifying the 2D model in real-time is quite challenging when applying antiquated, and imprecise, isopaching techniques to high-angle and horizontal wells. Aramco has designed a new workflow to enable Reservoir Modelers to update 2D structural models in real-time, thus improving chances to properly place the drill bit. This has led to an increased net-to-gross reservoir contact and reduction in costs associated with landings, unplanned sidetracks, and use of advanced geosteering tools. In addition to more efficient well placement, 2D structural models are no longer stagnant and have become living relative to the last well drilled. This allows for rapid 3D static model updates. The new workflow allows for high-resolution adjustments to our reservoir geometries and internal architecture relative to the borehole. We accomplish this by conformal gridding an initial seismic reference grid using all available markers for the seismic surface, including Grid Control Points (GCP), which adjust the seismic reference grid correctly relative to the drilling well. This reference grid is then used to conformably grid surfaces above and below. This workflow has the advantage of using all markers in the project. Validity of the updated structural model is achieved by blind testing the drilling well by removing the newly interpreted well markers from the gridding process and noting whether the grids intersect the relevant marker. The new Aramco 2D modeling workflows are unique and all companies drilling high-angle and horizontal wells would benefit greatly by adopting the Living 2D Reservoir Model strategy.