Agbami 5A Geocelluar Model: After First Oil. Getting the Right Level of Detail for an Active Development Program

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Achieving first oil in July 2008 in Chevron's first deepwater operated field offshore Nigeria, Agbami is now producing 250,000 bopd of its estimated 2 billion barrels STOOIP of sweet, light crude. The challenge for the newest geocellular model is to better characterize the now-producing asset with the latest seismic data, create a series of models with a wider range of recovery scenarios, and build a workflow that could rapidly update the model concurrent with the next phase of drilling.

Characterize using the latest seismic- In 2006, a PSDM using tilted transverse isotropy was used on seismic acquired in 2004. This data better imaged the main thrust fault, providing more confidence in its location, shape, geometry, as well as simplifying the grid geometry. The new velocity model resulted in higher net rock volumes for the field. VSH prediction cube extractions were used to distribute sand facies in the property simulation rather than rely on wells only. This was not done in the predecessor model due to a lack of confidence in the reservoir properties estimated from seismic.

Workflow for rapid updates-The 5A is a facies-based model. Most wells drilled prior to 2007 had either extensive coring or OBMI for facies identification. This time-consuming process is not conducive to rapid updates during an active drilling campaign. After facies with similar reservoir properties were grouped, a multiple regression was derived to predict facies at the well utilizing the standard curves of an LWD Triple Combo, the sole planned set of logs for the next drilling phase.

Wider range of recoveries- This goal may seem counterintuitive for a field with 10% of its EUR produced. Ideally range of recoveries is widest before first oil and narrows around the P50 prediction with production. However initial flow simulation at time of first oil showed a limited range of recoveries. Recovery from the "low connectivity" realization of the previous (4A) model was considered too high, so a sweep proxy was applied to approximate lower recovery. This limits decision making ability when recovery ranges are narrower than expected for early field life. Efforts to increase the range include using a less restrictive stratigraphic framework, varying facies proportions while keeping NTG consistent, and incorporating shale drapes. Additional attempts are underway to produce an ultrahigh well connectivity scenario with reduced recoveries from early water breakthrough.