

## **Optimized Development of a Heavy Oil Field: An Integrated Reservoir Management Process at Cerro Negro Field, Orinoco Heavy Oil Belt, Venezuela**

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At Cerro Negro, integrated suites of geoscience and reservoir engineering technologies have been used to optimize development planning, drilling, and production surveillance. A geocellular model was built using sequence-stratigraphic surfaces defined in core, tied to well logs, and seismically mapped. These surfaces helped define barriers, depositional onlap, and truncation, providing a basis for improved sand distribution. Stochastic mobile water, perched water bodies, and the regional aquifer were also built into the model, which was then scaled up for simulation and history matched to 125 producing wells.

The model provides a basis for optimization of the full concession development. Because the geologic model allows OOIP to be mapped by sequence, pad locations and their well trajectories are planned to maximize access to reserves and recovery. Horizontal targets are identified for each well using the geologic model, vertical well control, "slant-strat" wells, and the 3D seismic.

Modeled attributes are routinely utilized as tools in monthly production surveillance and well reviews. By incorporating geologic model backdrops into cross-section displays, asset-teams can clearly identify wells that produce from the same reservoir compartment and others that are isolated. This analysis offers better understanding of wellbore behavior and drainage area. The simulation is history matched to well pressures, oil, gas, and water rates, making it useful for the prediction of production volumes. Looking forward, the models will continue to be updated with new data, which will refine their predictive capabilities and will allow further optimization of production and recovery efficiency throughout the life of the asset.

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