

Assessing the Structural and Stratigraphic Framework of A/B 0001 Reservoir of Páez-Mingo Field as a Step to Building an Enhance Oil Recovery Plan

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Abstract

Páez Mingo field is located 45 km SE of Barinas, Venezuela. It was discovered in 1958, currently has 78 drilled wells, and holds the third place in remaining oil reserves within Barinas District. The official reservoir model was built using three seismic lines and well data; the faults were interpreted using production data and the behavior of the oil water contacts (OWC).

Due to the high level of uncertainty and the great amount of remaining reserves, in February 2012 began an acquisition campaign of 157.5 km² of 3D seismic over the field. This paper presents the interpretation of this recently acquired data, which made possible the construction of the geocellular model of one of the reservoir of the field (A/B 0001), allowing us to define the reservoir architecture and the fluid distributions, and reduce the uncertainty in the reserves estimation.

The step by step process started with data collection to build a base map and select key wells (wells with hard data and checkshots) to build 1D models that were then calibrated with the seismic data. The key wells, together with the seismic data, were converted to a master section representing the main events of the area. Later, conventional amplitude and well correlation was performed to build a 3D time model. As a mean to depth convert the structural elements, a velocity model was built and finally the thickness maps drawn.

Six horizons and 65 faults were interpreted (Top Paguey, Paguey basal sands, top Gobernador A/B, K/T unconformity, Escandalosa O and P). The main faults were interpreted as reverse, trending NW-SE, with throws from 15 – 50 ft. These faults are interpreted to be of Palaeocene to Middle Eocene age with subsequent reactivation. The main structure of the model is represented by a faulted anticline heading west- east, with a gentle dip of 5 degrees.

Sedimentologically, the current model for the field establishes that the Gobernador Formation was deposited in a transitional deltaic environment, with distributaries channels being the main deposits. They are usually vertically stacked, giving to the sand good thickness and good properties as a reservoir. The integration of information as petrophysical properties, API gravities, behavior of production, sedimentological facies and direction of sediments transport, together with the new structural interpretation (which defined the sealant character of some faults), allowed division of the reservoirs into five compartments with their respective OWC.

As a result of this study, we have identified three exploratory locations with favorable structural positions. These locations will be subjected to an extensive review for determinate feasibility.