

Exploitation of a Marginal Heavy Oil Field Using Unconventional Techniques: Enhancing Production with Horizontal Drilling, Middle Magdalena Valley, Colombia

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ABSTRACT

Horizontal drilling in the Turpiales field was used to dramatically increase flow rates. A field that was previously sub-commercial is now economically viable. This technique could and should be applied to other marginal fields in Colombia to optimize production in the current low price environment. Flow rates from the horizontal well were very good, with an initial production rate of ~700 bbls/day and a sustained, long-term rate of ~150 bbls/day. This very significant improvement in production rates has given new life to the development of the Turpiales field, and the updated project economics clearly justify a positive decision on commercial development within the block. Flow rates similar to that of the original Turpiales-1 vertical well are common in the heavy oil discoveries along the western margin of the Middle Magdalena Valley, many of which are undeveloped or partially developed. Application of relatively low-cost technology similar to that utilized in the Turpiales Block is potentially a game-changer for these fields. The Turpiales Block is a large block (450km²) located in the Middle Magdalena Valley, Colombia. The block straddles the Magdalena River and includes the small town of Puerto Boyacá. The northern portion of the block sits between two large established oil fields, Corconá-Teca to the west and Palagua-Velasquez to the east. The primary reservoir in the block is the Oligocene age Guaduas formation (also known as the Mugrosa formation) lying directly on top of the pre-Cretaceous basement, which dips gently to the east-southeast. Hydrocarbons migrate through the block from east to west and are trapped along a series of basement-involved faults and associated splays that permeate the block. An initial discovery well, Turpiales-1, was drilled in 2012 and encountered 62 feet of net pay. The well produced 62 bbls/day of 15° API oil during a short test and was deemed to be marginally economic at best. In 2014, PanAtlantic Exploration became operator of the block and drilled the Turpiales-3 horizontal sidetrack, with the goal of increasing the production rate to economic levels. The Turpiales-3ST is a 1000ft long horizontal, within the same Guaduas reservoir as encountered by the Turpiales-1 well. The horizontal portion of the well was completed with a slotted liner and was drilled in ~24 hours.