

Lessons Learned During the Horizontal Drilling in Thin-Bedded Reservoir Units: Quifa Southwest Field, Llanos Basin, Colombia

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Abstract

The Quifa SW field is ranked by production as the fourth most important oil field in Colombia. The field covers an area of approximately 40,000 hectares with a gross production of more than 50,000 barrels per day of heavy 12° -14° API. The heavy oil reservoir is composed of multi-stacked unconsolidated sand layers deposited in a fluvial-estuarine environment, located in the basal Carbonera Formation of Oligocene age. During the initial phase of the Quifa Field development commencing in 2008, a series of appraisal and development wells were drilled seeking to increase oil production and reserves followed by an the drilling of horizontal well program. At the beginning of the horizontal well program, there was a significant increase in oil production as the wells were draining areas with very low density of wells and penetrating net pay thicknesses of greater than 20 feet. Currently, more than 600 wells have been drilled in the field and the early developed areas are becoming mature, therefore, the development of the field has been focusing more on areas with thinner net pay thickness of between 5-10 feet with thinner-bedded reservoir units. These thinner interbedded reservoir units are impacting the performance of the horizontal sections of the horizontal wells. Therefore, greater precision is required during the drilling of these wells to decrease the potential for increased operational costs and enhance the probability for increased production. In order to achieve greater geological control during drilling, “pilot” holes and geo-steering tools are used to decrease the sidetrack activities, and provide the ability to change the well-bore trajectory when lateral facies are

encountered. Since 2017 an improved drilling methodology has been used using enhanced integration of seismic attributes to predict potential changes of facies in the planned well trajectories, standardization of control points for the landing of the well and continuous monitoring with seismic information and real time geo-steering for rapid decision making to determine required changes in the well-bore trajectory. As a result, an improved efficiency of drilling in areas of the Quifa Field with thin-bedded areas with low pay thickness has been achieved moreover, generating a positive impact increasing production and increasing the recovery factor.