The Value of Information: An Integrated Approach to Heavy Oil Exploration in the Rio Ariari Area

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Abstract

The Rio Ariari heavy oil accumulation is located in the southwestern part of the Llanos Basin, Colombia. Oil is produced from the Eocene age Mirador Formation. Oil gravity in the field varies between 7 and 11 API. The exploration contract was acquired in 2007 at the ANH Heavy Oil Bid Round with no X factor. The exploration strategy has evolved through time, as information was acquired.

Initially the exploration strategy consisted of evaluating the eastern half of the block, where only two wells had been drilled in the early 1980s. 417 Km of 2D exploration seismic was acquired to identify the potential of the block and play types present. Initially six play types were identified. Four wells were drilled successfully, leading to the acquisition of a small 50 km^2 3D survey and subsequently a large 374 Km^2 3D survey. With the interpretation of the large 3D survey, it became evident that the main play was a Lower Mirador incised valley system, with large northwest— southeast trending valleys reaching approximately 300 feet in thickness in places. Seismic acoustic inversion has helped identify areas with the best sand quality and best potential.

The next stage in the exploration program was focused on defining the extent of the resource accumulation and a stratigraphic well campaign was initiated. The main challenges in Rio Ariari field are determining net pay from logs, as the formation water is very fresh (< 1000 mgl/l), and determining oil mobility. Low invasions cores were obtained, specialized logs acquired, and viscosity measurements were obtained from core to address these challenges. Extensive core analyses were performed on all the stratigraphic wells to characterize the reservoir and calibrate the petrophysical model. Special core analyses are currently underway to better understand the reservoir.

As Rio Ariari moves from exploration to development, technical work has focused on how to improve productivity. Three types of wells, vertical, deviated, and horizontal, have been drilled in the field from existing pads. The technical work done to date in Rio Ariari forms the basis for the design of the development plan, which includes the construction of 85 additional pads and the drilling of 300 development wells and 21 disposal wells and produce at a plateau of 35,000 bopd for 5 years. This presentation will focus on the evolution of the exploration program to the development stage, the importance of obtaining good data, and some of the pitfalls we encountered along the way.