A New Page in the History of Reservoir Characterization in the Andes Sedimentary Basin Area, with the Introduction of State of the Art LWD Formation Evaluation Services

A Case History in South America – Ecuador

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ABSTRACT

The continuous increase in demand of HC resources and the exhaustion of the simplest reservoir deposits have forced the oil industry to focus on the development of more complex reservoir targets and drilling profiles. This scenario becomes even more challenging in Sub-Andean sedimentary basins, given the diversity of depositional environments and the active history of tectonic stresses that brings into view the additional complication of drilling safety.

In this area, the history of logging operations with conventional technology has often been marked by difficulties in completing data acquisition, resulting in increased costs, additional rig time and the high risk of sticking tools.

Given the complexity of the sedimentary sequences, on many occasions the basic suite of logging measurements is insufficient to provide an accurate interpretation of fundamental reservoir properties. Therefore, operators can not make proper decisions on completion and production strategies of important reservoir targets.

The introduction of the newest Schlumberger EcoScope Logging While Drilling (LWD) technology in two deviated wells in Ecuador, for City Oriente Limited, provided an opportunity to eliminate the risks of data acquisition, save time and reduce costs. The measurements acquired from this service provided an integrated interpretation solution, which significantly improved the reservoir characterization.

The utilization of the unique spectroscopy and sigma measurements in addition to the conventional set of measurements provided a major contribution to minimizing interpretation uncertainties, permitted the identification of hydrocarbon (HC) zones, and allowed the estimation of permeability properties to help define zones with the best productive potential.

INTRODUCTION

The complexity of depositional sequence in the young Sub-Andean sedimentary basins is often marked by difficulties with drilling operations and wireline based formation evaluation data acquisition.

Well bore stability issues are often encountered and bring a significant level of risk during logging operations with conventional cable conveyed technology. The problems are reported by most of the operators in the area of Peru, Colombia and Ecuador. It generally results in long time with open hole logging operations, repetition of wiper trips for hole conditioning, sticking pipe events and frequency of situations where logs are not acquired, leaving important reservoir zones without proper characterization.

The application of a new Logging While Drilling Formation Evaluation technology in two wells for City Oriente provided the proper solution to a history of difficulties with wireline logging operations. In addition, the unique characteristics of this new LWD technology brought remarkable benefits for reservoir evaluation that helped solve important interpretation questions related to lithology and hydrocarbon production potential. The technology also provided an important contribution for drilling optimization, cementing and stimulation optimization, which can be clearly translated into significant time and financial savings.

The information presented in this article is intended to demonstrate the benefits of these technologies in terms of reservoir characterization in the Blanca 04 and Blanca 05 wells. Detailed information about the EcoScope service physics and measurement principles can be found in the papers listed in the references at the end of this document.