

Evolution of Spectroscopy Gamma Ray Logging Service Improves the Formation Evaluation in Unconventional Gas Reservoirs.

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Summary

The demand of energy, due to the increase in population and decline of oil production through conventional reservoirs, has caused oil and gas companies to focus on alternative sources for generating energy during exploration, drilling and evaluation, like unconventional reservoirs. Such reservoirs present many challenges, for example; finding the location of sweet spots in the stage of exploration, passing the lithological complexity in the stage of formation evaluation, right through to hydraulic fracturing during production. These challenges have generated a need for service companies to improve their portfolio of products, in terms of workflows, processes and new technologies. And for locating, delimiting, understanding and evaluating the unconventional reservoirs.

In reference to the domain of formation evaluation in unconventional gas reservoirs, the challenges vary. Beginning with the determination of the volumes and types of clay, lithological variations and porosities; and progressing to the volume of organic matter and its corresponding adsorbed gas. To get answers to these questions, it is necessary to obtain relevant information in the early stages of the project or pilot wells, in order to minimize the risks and make appropriate decisions in the following stages. Once the data is acquired, it should be analyzed and interpreted, using a process of workflows developed specifically for unconventional gas reservoirs.

Introduction

Log analysts and petrophysicists study the properties of the rocks and their interactions with the fluids in unconventional gas reservoirs. The porosity and permeability are the most important physical properties because of their capacity to store and transmit fluids respectively. To obtain this information is necessary to understand the physical properties of the material or materials that compose the rock, its distribution and quantity. In the case of unconventional gas reservoirs, the content of brittle minerals (quartz, carbonates, and feldspars) plays an important role in the development of micro fractures, hydraulic fracturing properties, and the effect over the porous space. The variation of these brittle minerals will be controlled by the

environmental deposits, clay minerals and their distribution inside the reservoir. These are important factors for the development of these fields.

One of the services that has evolved with trends in the market and has shown added value, is the acquisition of spectroscopy capture gamma ray logs. What this document briefly describes is the evolution of this technology, theory of measurement, the portfolio of current technologies available for the different environments of well constructions, and most importantly, how this information is used in a workflow of formation evaluation in unconventional gas reservoirs.