

## **Evaluation of Hydrocarbon Saturation and Fluid Contacts using Pulsed Neutron Logging - A Niger Delta Case Study**

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In old and producing wells, there are great challenges when trying to determine the current hydrocarbon saturation and/or fluid contacts. Very often re-entries have been driven by the need to plan new wells or to re-perforate to enhance recovery. Accurate determination of remaining or by-passed hydrocarbon is the key to achieving this. Pulsed neutron capture Sigma and inelastic Carbon/Oxygen logging has been a useful tool in Nigeria's Niger Delta to address the determination in both simple and complex completions.

The lack of accurate production histories and of knowledge of fluid movement within the wellbore gives rise to the need to re-assess the potential of reservoirs, for potential re-completion in the bypassed hydrocarbon zones and also to achieve optimal depletion (by optimal placement of added perforations).

In this paper, we discussed how Pulsed neutron capture Sigma and inelastic Carbon/Oxygen logs were acquired through blast joints, tubing and casing in the study wells. Standard processing workflows were applied in the interpretation of the carbon-oxygen measurement to derive the oil volume and saturation, while the Sigma was used to identify presence of light hydrocarbon or gas. The interpretation results gave a clearer picture of present fluid saturations and fluid contacts, thereby providing the needed information for further development of the field.