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FINDING BYPASSED OR OVERLOOKED PAY ZONES USING GEOCHEMISTRY TECHNIQUES

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ABSTRACT

Geochemistry techniques can be used to find bypassed or overlooked pay zones in low resistivity sands, fractured shales, stacked sand pay zones, oil-based muds, fresh water basins or wherever other logging techniques either fail or are not correctly utilized.

These pay zones can be further high-graded by detailing the type of hydrocarbons likely to be produced from these zones. Pay zones can be described as condensate, normal oil, waxy and biodegraded oil or by physical properties such as: API gravity, viscosity, % wax, pour points and cloud points.

Geochemical logging of active or previously drilled wells can aid in the discovery and delineation of pay zones. For example, by use of the SR Analyzer-TPH/TOC instrument to determine the normalized oil content through depth, potential pay zones can be identified. In addition these pay zones can be assessed in terms of the type of hydrocarbons present and the physical characteristics of these hydrocarbons.

These techniques can be applied in a time frame to utilize the results for well testing or completion. Results and interpretation for suites of samples can be provided in a few hours at low cost and high potential pay back. The technique generally requires 2 or 3 different low cost analyses such as TOC, Programmed Pyrolysis, Thermal Extraction Gas Chromatographic (TEGC) fingerprinting, and sulfur analysis.

Case Histories illustrating use of geochemistry techniques to identify productive zones are: A gas reservoir identified in the Sanderfer Oil & Gas Cruson #1 well (Jarvie and Baker, 1984), predication of both an oil productive interval and its API gravity from cuttings samples in the Petroleum Securities Rembush #1 well, identification of two potential shale oil prospects in Arco's Bear Valley #1 well (Jarvie *et al.*, 1995) and a potentially productive zone from Arco Fairfield Fee D48-36 well.

INTRODUCTION

Conventional logging techniques are not always successful in delineating all potential hydrocarbons pay zones in low resistivity sands, fractured shales, stacked sands, fresh water basins or in wells drilled with oil-based muds. Such bypassed or overlooked pay zones can be found through use of geochemistry techniques.

Through measurement of appropriately selected parameters, geochemical logging of active or previously drilled wells can lead to the discovery of by passed or overlooked pay zones. One such parameter is normalized oil content through depth. Assessment of these pay zones in terms of the type and physical characteristics of the hydrocarbons present can then be done. A depiction of the normalized oil content through depth together with the Gas Chromatogram of the present hydrocarbons as well as their API gravity can be portrayed as shown in figure 1 below: