

Early Assessment of Reservoir Compartmentalization Using Geochemical Analysis of Wireline Formation Tester Samples

Kaufman, R. L.¹, S. C. Teerman², M. E. Cribbs² (1) Chevron Energy Technology Company, San Ramon, CA (2) Chevron North America Exploration and Production Co, Houston, TX

An important issue in field development is the connectivity of the reservoirs to be produced. This impacts both the economics and design of the development plan. The analysis of the reservoir fluids is an important component of this assessment. Oil and gas samples have traditionally been obtained from drill stem tests, but in deepwater settings these are more frequently obtained from pumpout wireline formation testing tools (PWFT). The ability to collect fluid samples using a PWFT in conjunction with pressure tests increases the number of hydrocarbon bearing zones that can be sampled. These discrete single zone samples are also important calibration samples for future reservoir surveillance techniques such as production allocation.

Analysis of these samples includes conventional PVT and compositional analyses in conjunction with geochemical techniques such as hydrocarbon and isotope fingerprinting. By combining these datasets with reservoir pressure data, an improved interpretation of reservoir continuity is obtained including communication of gas and oil columns. A related and complimentary analysis is geochemical mud gas logging. This method is an extension of standard mud logging techniques and uses a combination of gas composition and isotopic ratios of the hydrocarbon gases for correlation purposes. In this way it is possible to assess the vertical and lateral connectivity of hydrocarbon zones during or shortly after drilling. By combining all the above data the value of this information is maximized. The success of this methodology will be illustrated using examples from deepwater fields in the Gulf of Mexico and Angola.