

Fluid Inclusions in Petroleum Exploration and Field Development: Case Studies of Successful Application

Don L. Hall¹, S. Michael Sterner², Wells Shentwu², M Ashley Bigge² (1) Fluid Inclusion Technologies, Inc, Broken Arrow, OK (2) Fluid Inclusion Technologies, Inc

Techniques involving documentation and analysis of fluid inclusions have demonstrated their usefulness to the petroleum industry, particularly over the last 10 years. Analytical methods range from classic petrography and microthermometry approaches to more complex but increasingly reliable micro-quantification procedures such as fluid inclusion volatile analysis (Fluid Inclusion Stratigraphy or FIS), GCMS and isotopic methods. These tools, in combination or isolation, are important for understanding virtually all aspects of the petroleum system, as well as reservoir characterization. Although the impact of technology is often intangible, here we will concentrate on instances where it can be quantified. Case studies will include:

- 1) Discovery of a petroleum accumulation from FIS analysis of a down-structure dry hole
- 2) Successful pre-drill prediction of API gravity in an area with variable oil quality
- 3) Pre-test prediction of gas column height and H₂S concentration in a sour gas well
- 4) Recognition of a wet reservoir, paleo-gas-water contact and seal breach to save the cost of a test
- 5) Oil-source rock correlation of inclusion oils in an abandoned well with no conventional fluid samples
- 6) Increased estimate of OIP from fluid inclusion salinity determinations
- 7) Delineation of a fault and successful sidetracking of a well into a productive reservoir