IPTC 10109

Novel Device for Organic-Solid Deposition and Control: Development and Case Study

M.I. Zougari and A. Kharrat, Schlumberger

This abstract was prepared for presentation at the 2005 International Petroleum Technology Conference held in Doha, Qatar, 21–23 November 2005.

Abstract

Organic solids (waxes, asphaltenes, hydrates and/or diamondoids) are encountered in all facets of petroleum production and transportation. Deposition of these solids can have detrimental effects on the profitability of production systems, especially in offshore operations. It is imperative that the potential and severity of organic solids deposition problems be assessed early in the design process. If deposition is likely, provisions for control and remediation must be incorporated into both the system design and operating strategy at an early stage. The risk and cost of these measures can influence the decision to proceed with the development of a prospect. Therefore, this decision must be based on sound laboratory data obtained from representative samples. Typically, changes in pressure, temperature and/or composition often induce precipitation and potentially deposition of these organic solids.

This paper summarizes the work performed using a novel Organic Solid Deposition and Control (OSDC) device, based on Couette flow in a concentric cylinder geometry. This device mimics production conditions of temperature, pressure, composition, turbulence and shear. These key parameters can be accurately and independently controlled, allowing the deposition tests to be conducted over a wide range of conditions. Uniquely, this new device can simulate reservoir thermal-hydraulic conditions and produce fully developed turbulent flow for the live fluids investigated. Heat transfer and fluid dynamics in the device were characterized through careful and detailed experimentation; these results will be presented. The paper will also discuss the results of deposition tests conducted with live waxy and asphaltenic crude oils. To date; reproducible deposits have been generated under consistent test conditions. As anticipated, the tendency and extent of organic solids deposition were found to be governed by test parameters and crude oil type.