

Oil Quality in Deepwater Settings – Concerns, Perceptions, Observations, and Reality

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As exploration migrates into deeper water crude oil quality becomes increasingly important. Variations in oil properties such as API gravity, viscosity, sulfur content, and acid number impact both value and producibility. In fact issues of oil quality are commonly more critical than issues of hydrocarbon volume. Problems associated with deepwater are often thought to be amplified largely as a result of the expansion of the “biodegradation-window”. The expanded “window” is a result of the lower temperature at the mud-line. A review of data from the Gulf of Mexico and the Gulf of Guinea reveals that other factors may actually have a greater influence on oil quality. For example, in the Gulf of Mexico there is strong evidence that the nature of the source rock plays a major role in establishing sulfur content and API gravity. Oils derived from an Oxfordian source rock generate oils with higher sulfur contents than those derived from Cretaceous source rocks. In the Gulf of Guinea, although many of the newly discovered pools are shallowly buried and there is evidence for biodegradation, crude oil quality is mitigated by multiple charging events. In both regions there is also evidence for phase segregation and gas flushing introducing light-oils and condensates into the shallow portion of the sedimentary sequence. Both phase segregation and multiple charging events appear to be largely a result of an individual feature’s structural evolution. The available data, therefore, suggest that some of the risks associated with oil quality may be reduced through a more detailed assessment of a prospect’s filling history and structural development and an understanding of the nature of the source facies. However there clearly are such situations as offshore Brazil where the risks associated with oil quality are difficult to mitigate.
