CERAMAH TEKNIK TECHNICAL TALK

Maximizing the effectiveness of integrated reservoir studies: Some practical approaches to improving the process and results

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Abstract— An integrated reservoir model comprises a seismically-generated structural framework for a geological architecture that governs the upscaling of petrophysical outputs through to fluid volumes and dynamic behaviour, in a manner that conforms to the engineering performance of the reservoir unit. A functional dynamic model of a reservoir therefore requires a meaningful static reservoir description as a foundation. The real benefits of integration in reservoir geoscience and engineering lie in the ability to optimize this coupling between the static and dynamic components of an integrated reservoir study. In particular, it is important to distinguish between constituent tasks that deliver true multidisciplinary products and those that are solely specific to one of the traditional subdisciplines, such as petrophysics or reservoir engineering. Unless this distinction is made, maximum benefits may not be secured. These concepts are developed by focusing on a number of important issues that underpin integrated reservoir studies. They should all be guided by the available data. Several are highlighted. The most fundamental concerns the way in which a reservoir is described, either deterministically or using probabilistic/stochastic methods, a choice that impacts directly on the way in which reservoir parameters are subsequently upscaled and distributed. Another major issue is how reservoir rocks are subdivided during the evaluation exercise. The traditional practice of using a single reservoir zonation scheme for all purposes is technically inferior to one that allows fit-for-purpose differences between a geological zonation, a petrophysical partitioning, and a hydraulic scheme for flow-unit identification. A third key issue concerns the estimation of permeability, both as a function of scale and within the context of reservoir subdivisions. These considerations include the vexed question of reconciling dynamic well test data with static predictions from core and log analysis. More generally, there is the issue of benchmarking a reservoir-evaluation exercise for purposes of quality assurance. An analysis of this staged process reveals some noteworthy omissions. Attention to issues such as these should contain the scope of iterations required to achieve meaningful history matches with production data.

These issues are illustrated by Asia-Pacific examples that substantiate the key messages for more effective approaches to integrated reservoir studies. Considerable improvements can be achieved by changing the way we do things without increasing expenditure. These improvements include a better use of key wells, changes in data-acquisition culture and the ability to recognise when sufficient data have been acquired for a particular purpose. Not unexpectedly, a prerequisite for greater success is the contemporary technical person who has more than one core skill and can stimulate others by thinking laterally within an integrated team.