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The Role of Natural Fractures in Shale Gas Production: What Does Production Data Tell Us?

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Abstract:

Natural fractures are very common in shale gas plays. It is often presumed that because the formations are so tight gas can be produced economically only when extensive networks of natural fractures exist. The creation of large fracture surface area in contact with the reservoir is regarded as essential to commercial success. This is facilitated by multi-stage hydraulic fracturing of long horizontal wells using large volumes of low-viscosity (low-cost) fracturing fluid. The fracture systems that are created by this process are indeed large and often complex, due essentially to intersection of the hydraulic fractures with the natural fracture network. However, the efficiency of this process in terms of water usage is now coming under close scrutiny, not least because of growing environmental concerns.

The success of these operations is beyond doubt, but what can be inferred about the accuracy of this conceptual picture in light of many years' accumulated production data? What does production data tell us about the role of natural fractures, whether initially closed (mineralized) or open, in the production process? This presentation addresses these issues by using a semi-analytic shale gas production model to analyze and interpret production data from many shale gas wells across several different plays. Among the many inferences that can be drawn from the results of this investigation is a fresh appraisal of the role of natural and hydraulic fractures in the production process.

Take-away message: natural fractures may not, after all, be essential for economic shale gas production and may even be detrimental.

Biography:

Ian Walton is a Senior Research Scientist in the Energy & Geoscience Institute at the University of Utah and an Adjunct Professor in the Department of Chemical Engineering. He holds a Ph.D. in Applied Mathematics from the University of Manchester. Dr. Walton has more than 25 years of petroleum industry experience, most recently as a Scientific Advisor for Schlumberger and more than 15 year's university teaching experience. He has published many technical reports and papers and has been awarded eight patents. He has made many technical presentations at industry conferences, forums and workshops. Current research centers on modeling and forecasting gas and oil production from shales.