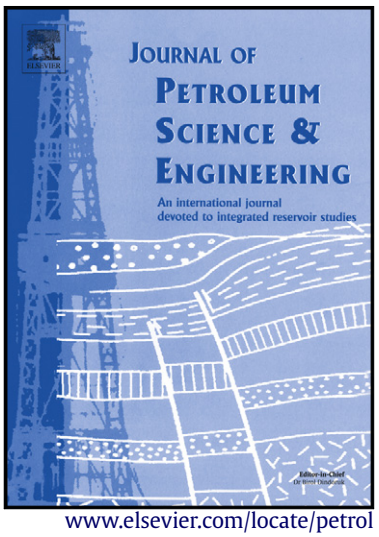

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The Use of Net Pay Concepts in the Exploitation of Shale-Gas Deposits

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Abstract

The role of net pay in unconventional reservoirs continues to evolve as a design criterion for reservoir stimulation and well completions. Unlike conventional reservoirs, shale-gas development is not yet at the stage where longstanding net-pay protocols have been tried and tested. Therefore, any protocol has to be regarded as being at a pilot stage, especially in view of the pronounced complexity of shale-gas systems. This state of affairs is progressed by adopting a set of net-pay criteria and transposing this into a generic petrophysical workflow that interfaces with other key disciplines such as geochemistry and geomechanics. Essential parameters are total organic carbon (in the setting of thermal maturity), fracturability (based on quartz/calcite/dolomite volume fraction and thence brittleness), natural fracture density, effective gas permeability, and total porosity as an input to gas in place. The deliverables in the form of target net-pay intervals are based on functional cut-offs for each given reservoir system and for different appraisal fronts within the same reservoir system. This is important because different methods of reservoir zonation can result in very different zonal characteristics and associated parametric relationships. The estimation of uncertainty in cut-off specifications and its impact on the resulting net-pay intervals has been approached with reference to a commensurate suite of characterizing well logs groundtruthed by core analysis in at least one key well. These considerations lead to specific ranges of cut-offs for immediate application. Thus, the identification of net pay and thence candidate intervals for completion is placed on a quantitative footing. This is an important contribution to development planning in these highly complex unconventional systems.

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