

## **An Integrated Approach to Shale Gas Evaluation, Horizontal Drilling and Hydraulic Stimulation**

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With shale plays gaining importance in the North American market, the need for an integrated analysis to help operators better understand and produce this complex reservoir has become obvious. Since its intrinsic permeability and primary porosity values are lower than conventional reservoirs, producing hydrocarbons from shale reservoirs depends on successful hydraulic fracturing and horizontal drilling technologies.

An integrated approach of a variety of formation evaluation techniques (including geochemical logging data) along with detailed geological studies from borehole image logs, allows for better understanding of the many geological factors that can potentially affect the successful exploitation of a shale gas reservoir. Furthermore, results of an integrated study can be used to focus completion strategy on high-impact intervals and to design the optimum hydraulic stimulation treatment.

Geomechanical stress models that account for TI anisotropy yield a stress profile which more accurately represents in-situ conditions than the profile suggested by a traditional isotropic stress model. The resultant anisotropic stress model quantifies containment, characterizes a subtle stress change profile which influences perforating and staging strategies, and can help improve stimulation effectiveness, leading to more economic completion decisions.

Finally, this paper presents results of geologic modeling and a reservoir navigation study showing a horizontal wellbore trajectory and its relationship to favorable reservoir facies. Wellbore placement within the targeted reservoir interval is the basis for the well productivity index estimate that can be used as quantitative indicator of well performance and to compare nearby offset wells.