D002

Shale Gas Sweet Spot Identification Using Play Fairway Analysis and Shale Gas Reservoir Simulation

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SUMMARY

To quote from a 6/25/11 New York Times article on resource plays:

"...data show that while there are many active wells, they are often surrounded by vast zones of less-productive wells that in some cases cost more to drill and operate than the gas they produce is worth."

It is therefore critical to high-grade sweet spots in shale gas plays to ensure profitability. This must begin in the domain of Play Fair Analysis performed by geoscientists.

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Because of the expensive cost of shale gas wells the usage of conventional analysis and statistical techniques in unconventional plays could be economically dangerous and quickly create negative cash flow.

Using both a geologic and an engineering approach we have created a workflow that identifies sweet spots within sweet spots. We applied this workflow to the New York Utica Shale. .

The New York Utica Shale is an organic-rich, thermally mature black shale which thickens to the southeast as a function of fault activated mini-basins. Total organic carbon values increase to the southeast and range from 4 to 7 volume %, indicating an initial TOC of approximately 7.5 to 14 %. The burial depth of the organic-rich Utica Shale increases to the south. These factors result in fairways of considerable size in the New York State area.

The objectives of this study were to: (1) geologically identify sweet spots with both Petroleum System Modeling and Play Fairway Analysis, (2) economically identify the reserve potential coupled with the hydrofracking potential within these geologically defined sweet spots, (3) apply a Shale Gas Production Model (SGPM) that calculates the production reserves and rates for both vertical and horizontal wells, (4) vary the input distribution to the SGPM by Monte Carlo techniques such that multiple realizations were performed, and (5) create P10, P50, and P90 maps of cumulative methane production.

The model predicted that the gas production from the hydraulically-fractured horizontal well (4,000 ft and 10 stages) was at least an order of magnitude greater than the production from the vertical well (approx. 4 BCF as opposed to 0.24 BCF).

The highest cumulative P50 production was located in the southeast corner of New York State, corresponding to a region of higher methane adsorption potential and higher organic carbon content.

The Utica Shale coupled with the Marcellus Shale could potentially satisfy New York's energy needs through the next century.

If permission is granted by the time of the meeting, we will present the application of some of these techniques in the Bakken Shale oil play of North Dakota, U.S.A.