

Defining the Geologic and Economic Limits of the Marcellus Wet Gas Play

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ABSTRACT

Over the past decade various reservoir models have been used to predict the production potential of the Marcellus shale. Current models benefit from over 8,000 producing well data points and allow operators to focus on offsetting production. However, defining the limits of the wet gas Marcellus shale play has proven difficult despite existing production data sets. The economics of the wet gas play are largely dependent on natural gas liquid yields which are typically not publicly available. The geologic factors that allow for economic production of wet gas are constrained to a specific area with distinct boundaries. The geologic factors are often interrelated and require a systematic approach to properly evaluate. Laurel Mountain Energy recently developed and executed a workflow that extends and further defines the limits of the wet gas Marcellus shale play. The Marcellus play can be segmented into two economic areas based hydrocarbon production. Economics in the dry gas portion of the play are based on production of pipeline quality, methane-rich gas. The wet gas play relies on dry sales as well as revenue received from processed natural gas liquids and condensate. Uneconomic conditions can occur where natural gas liquid yields increase BTU beyond pipeline specification but are insufficient to offset the cost to process-out liquids. Additionally, areas with increasing NGL yields are shown to be limited by overall production quantity. Ultimately, these economic conditions are controlled by specific geologic factors. The wet gas Marcellus play is defined by geologic factors that affect the liquid content of the reservoir and the ability to flow economic quantities of hydrocarbons. The relationship between present day reservoir depth and other critical geologic factors shows the delicate nature of the wet gas play. Depth has an inverse correlation to liquid yield and hydrocarbon molecule size but a positive correlation to reservoir pressure and porosity development. The balance of these geologic factors can be quantified and used to define the economic limits of the play when the proper data sets are obtained. Laurel Mountain Energy recently developed and executed a workflow to delineate a wet gas Marcellus shale prospect near the perceived limits of the play. A systematic approach was developed in order to analyze individual geologic factors and avoid nonessential testing. The results graphically indicate the limits of each critical factor and can be mapped to indicate the margins of economic production. Offsetting well information was used to extrapolate the critical factors across the Marcellus shale wet gas play.