

Success and Failure in Shale Gas Exploration and Development: Attributes that Make the Difference

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Unconventional shale-gas reservoirs are receiving increasing attention, and have revitalized natural gas production for North America. Though costly and manpower intensive, they have less risk of a dry hole, and can hold significant quantities of gas. With the current trend towards unconventional shale-gas plays it is useful to examine the tools we use to explore for them. Attributes such as TOC, vitrinite reflectance, thickness and mineralogy are touted as the path towards success. Using our extensive experience as operators in the Woodford shale in the Arkoma basin, we determined if these recommended properties actually are the main drivers, or if other properties play a larger role in a project's success or failure. In a horizontally-drilled shale-gas play, due to reservoir heterogeneity within the field and stratigraphic section, sweet spots develop where wells with higher than normal IP rates and EUR values are common. We examined the sweet spots and attempted to determine the driving cause for their success. Additionally we examined areas with lower than expected performance to attempt to discern why. Our study resulted in determining that although there are minimum required values for each of the typical exploration attributes, those minimum values are lower than would be expected, and there is a broad range at which highly economic production can be achieved. Additional factors relating to stimulating technique, reservoir temperature gradient, and nearby fault intensity proved to be the first order drivers of well performance. We concluded that current cutoff limits for exploration using TOC, thickness, vitrinite reflectance, and mineralogy are too conservative and should be expanded. Even expanded they are useful as the initial check when examining a play, however, when determining acreage to purchase, better productive fairways, and even individual well pre-drill estimates, our identified additional factors prove more useful.