

Predicting Cumulative Production of Devonian Shale Gas Wells from Early Well Performance Data, Appalachian Basin of Eastern Kentucky, Brandon C. Nuttall, Kentucky Geological Survey, University of Kentucky, Lexington, KY 40506-0107, bnuttall@uky.edu

Middle and Late Devonian strata of the Appalachian Basin in the eastern United States are dominated by black and gray shales. These low-permeability, organic-rich units are both hydrocarbon source beds and reservoirs. These shales are not ubiquitously productive, and there are areas with more prolific gas production and “better” wells. Two sets of gas production volumes by well are available: yearly data (GTI, proprietary) and monthly data (Kentucky Division of Oil and Gas, public). These production data, initial open flows, and reported rock pressures are being analyzed to classify shale wells and investigate their performance. The spatial relation of production to geologic controls will also be investigated.

Devonian shale gas initial open flow and cumulative production data are log normally distributed. Data indicate that over 10 years, 50 percent of shale wells produce at least 100 MMcf. Cumulative shale gas production data for 1, 5, 10, 25, and 50 years suggest classification into four groups at the 25th, 50th, and 75th percentile breaks. For the first year, these breaks are at 5.35, 10.04, and 18.83 MMcf. Both 5-year and 10-year cumulative production demonstrate statistically significant relations with first-year cumulative production. The initial open flow exhibits a weak, but statistically significant, relation to 5- and 10-year cumulative production. No relationship is observed between initial open flow and rock pressure. Most shale wells exhibit hyperbolic decline. A Python script has been developed to investigate the best-fit hyperbolic decline parameters; the objective is to develop a type decline curve.