

## **Constraints on the origin and volume of gas in the New Albany Shale (Devonian – Mississippian), eastern Illinois basin**

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This study investigates kerogen petrography, gas desorption, geochemistry, and micro- and mesoporosity of the New Albany Shale (Devonian-Mississippian) in the eastern part of the Illinois basin. Core analysis from two locations, one in Owen County, Indiana and one in Pike County, Indiana was conducted. The volumes of gas in the locations studied are primarily dependent on total organic carbon (TOC) content and the micropore volume of the shales. Gas origins were assessed using stable isotope geochemistry, whereas maturity assessments utilized both measured and modeled  $R_o$  values. Different depths of burial and formation water salinities are likely responsible for dominant origins of the gas in the two locations studied. The shallower Owen County location (415 to 433 m deep) contains significant microbial methane, whereas the Pike County location (832 to 860 m deep) is characterized exclusively by thermogenic gas. Despite differences in the gas origins, the total gas in both locations is similar, reaching up to 2.2 cm<sup>3</sup>/g (70 scf/ton). The lower thermogenic gas content at the shallower location (probably because of the lower thermal maturity and possibly higher loss of gas related to uplift and leakage via relaxed fractures) is compensated by additional generation of microbial methane most probably stimulated by influx of glacial meltwater causing both brine dilution and microbial inoculation. The characteristics of the shale of the Maquoketa Group (Ordovician) in the Pike County location indicate that the controls on the gas volumes are similar to those in the New Albany Shale.