

## **Hydrogeologic Analysis of the Oriskany Sandstone of the Appalachian Basin: Implication for Large-Scale Geologic Storage of CO<sub>2</sub>**

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The Oriskany Sandstone of the Appalachian basin is a widely distributed saline aquifer which has produced large quantities of hydrocarbons. Currently the Oriskany is host to numerous gas storage fields and is a potential target for large-scale geologic storage of CO<sub>2</sub>. Published and unpublished data of rock characteristics, pressure, temperature, and formation water geochemistry along with new brine samples were integrated within a geographical information system to better understand the regional-scale hydrogeological regime and its relation to the migration of hydrocarbons and geologic CO<sub>2</sub> sequestration potential. The topographically-driven up-dip flow of the Oriskany Sandstone formation waters is generally controlled by outcrops at high elevation to the east and at low elevation to the west. The up-dip flow is opposed by increased salinity induced buoyancy forces down-dip. The flow pattern is substantiated by the salinity distributions, with relatively lower salinity at recharge to the east and discharge to the west due to mixing with fresh meteoric water and higher salinity between the recharge and discharge zones. This flow pattern is also substantiated by the distribution of Oriskany gas fields that occur in the Central Appalachian basin; the major productive gas fields occur at the boundary between lower salinity and are typically absent in areas of higher salinity. It is believed that hydrocarbon distribution is influenced by basinal variations in buoyancy and entrainment by the formation water flow. Improved containment of large scale CO<sub>2</sub> injection appears to be associated in the Oriskany with convergent flow located in the eastern Appalachian basin.