

## **Old wells, potable water, and carbon dioxide-enhanced oil recovery and sequestration projects in the Appalachian and Illinois Basins of Kentucky**

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Seventy Paleozoic reservoirs in 51 oil fields were evaluated with data from the Tertiary Oil Recovery Information System for carbon dioxide-enhanced oil recovery (CO<sub>2</sub>-EOR) and sequestration potential. The fields and their respective reservoirs were ranked into quartiles using the reservoir parameters oil gravity, CO<sub>2</sub> storage density, porosity X oil saturation, and permeability X net pay thickness. Our analysis also showed that if maximum allowable EPA injection pressures (0.8 X lithostatic gradient) were attained during CO<sub>2</sub> injection, then near-miscible or miscible conditions could occur in approximately 60 percent of the fields. In doing so, however, reservoir pressures would exceed initial pressure in 92 percent of the fields.

For environmental and project efficacy reasons, repressurization is a concern in older, preregulatory fields (pre-1960) having large numbers of wells, where locations may be poorly documented and plugging integrity suspect. For example, the number of wells in the top-quartile fields ranged from 88 to 802 and discovery dates ranged from 1929 to 1965. An additional concern is possible contamination of potable groundwater as CO<sub>2</sub> migrates upward along improperly plugged wells or breached seal rocks. The former seems to be more likely inasmuch as the average thickness of strata between the top of the oil reservoir and base of the potable water zone equals 1,957 ft.