Tight-gas Sandstone Reservoirs: 25 Years of Searching for ‘‘The Answer’’ James L. Coleman Jr. U.S. Geological Survey, Reston, Virginia, U.S.A.*

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During the past 25 yr, several different tight-gas sandstone reservoirs have been brought into the nation’s productive natural-gas inventory. These include reservoirs of many different ages in many different basinal settings. In this chapter, reservoir discovery and management efforts at select fields in the Silurian Tuscarora, Devonian Oriskany, Pennsylvanian Pottsville and Jackfork, Jurassic Cotton Valley, Cretaceous Frontier and Almond, and Eocene Wilcox sandstones are reviewed, compared, and contrasted. Each of these target reservoirs is unique and both simple and complex. However, from a general understanding of the characteristics and variety of tight-gas reservoirs, a set of common generalities can be developed that may even be developed into rules for discovery.

Although many tight-gas sandstone reservoirs may be classified as continuous-type reservoirs, (i.e., unconventional gas accumulations lacking well-defined field boundaries), tight-gas sandstone reservoirs are complexly subtle, with reservoir properties that are anything but continuous across their extent. Intentional discovery and development of tight-gas sandstone reservoirs requires knowledge, planning, careful execution, flexibility, and patience. A discovery model for the exploration and development of tight-gas sandstone reservoirs is proposed: (1) locate wells within a dry, gas-prone basin or part of the basin to avoid liquid (water, crude oil, or condensate) production, which will hurt gas-production rates; (2) select as intended targets depositionally heterogeneous reservoirs (i.e., channel systems), which are close to organic-rich intervals; (3) target slightly higher-shale-content sandstones instead of lower-shale-content sandstones (quartz arenites) to avoid loss of reservoir storage volume caused by cementation; (4) take advantage of whatever structure there is, and drill as high up on that structure as possible; (5) consider how you plan to manage a fractured, tight-gas reservoir (if fractures are anticipated to be present); (6) try to avoid sandstones with the potential for high water flow and low gas flow; (7) develop a clear petrophysical understanding of the reservoir early in the life of the field; and (8) plan on infill drilling once the initial spacing unit design is approved and implemented.