



The Carter County Test Well

Name: KGS No. 1 Hanson Aggregates well

Purpose: Collect subsurface data to assess the geologic carbon storage potential of northeastern Kentucky

Cost: \$1.7 million (approximately)

Funding source: Kentucky Incentives for Energy Independence Act 2007

Well type: Stratigraphic test well

Total depth: 4,835 ft

Primary target: Rose Run Sandstone (Knox Group) at 3,255 ft

Secondary targets: Copper Ridge Dolomite (Knox Group) at 3,695 ft and combined “Basal” and Maryville Sandstones at depths below 4,585 ft

Data collected:

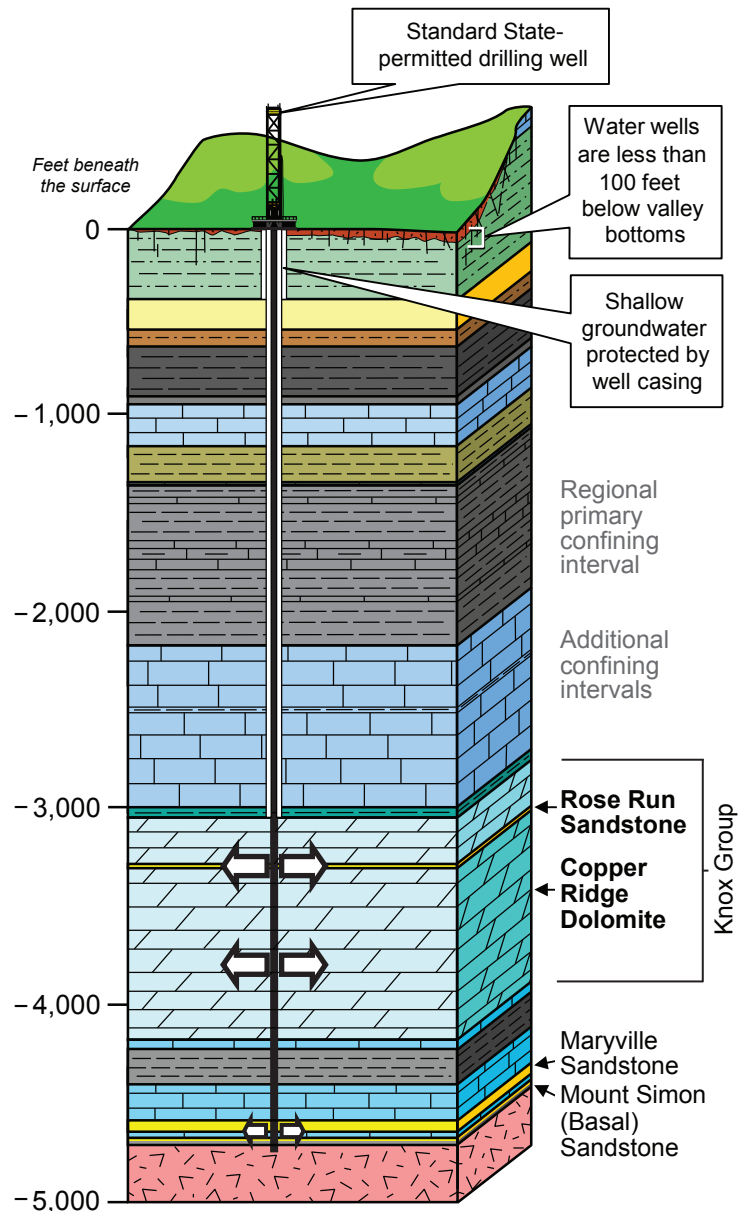
- Full suite of downhole geophysical logs including formation image log
- Downhole pressure and temperature
- 480 ft of conventional rock core
- 30 supplemental sidewall cores
- Subsurface formation water samples
- Standard and advanced lab analyses

Subsurface testing:

- Standard step-rate tests (using fresh water) for each target horizon to determine in-place rock strength

Results:

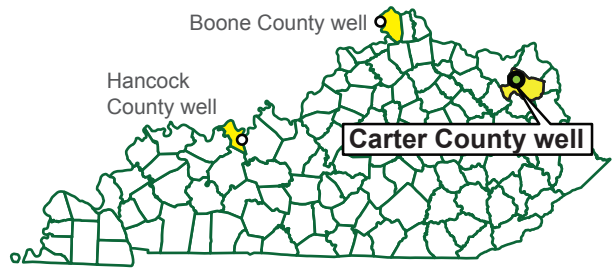
- ➔ Good storage reservoir conditions in the Rose Run Sandstone and Copper Ridge Dolomite
- ➔ Multiple good, thick low-permeability confining intervals in strata above potential reservoirs
- ➔ Well abandoned per State regulations and site reclaimed per landowner’s specifications



Rock units penetrated in the well and intervals tested (arrows). Unit names in black are potential reservoirs. Unit names in gray are confining intervals. The Copper Ridge Dolomite is a thick unit that contains both potential reservoirs and confining intervals.



Drilling the KGS No. 1 Hanson Aggregates well.



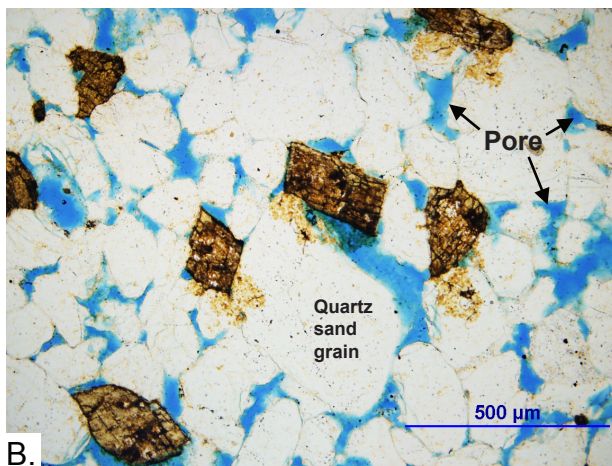
Location of the Carter County well and two other carbon storage data-gathering wells in Kentucky.



A.



C.



B.

The Ohio River is an important industrial and electric generation corridor. Because future regulation may limit CO₂ emissions from these and future sources in the area, it is important to understand potential geologic storage options beneath the surface.

Laboratory analyses, well log analyses, and subsurface testing indicates two potential reservoirs at depth with adequate overlying confining zones for potential CO₂ storage.

The Rose Run Sandstone is 29 ft thick, at a depth of 3,281 ft. Measured porosity from core is 2 to 24% (mean=14.9%); permeabilities range from 1 to 3,150 md (mean=447 md). Step-rate tests were unable to achieve breakdown and showed good injectivity (of fresh water) with little pressure build up, suggesting excellent reservoir conditions.

The Copper Ridge dolomite is 1,860 ft thick. Much of that thickness has little porosity and low permeabilities. However, there are many thin, vuggy intervals with higher porosity (4 to 32%) and permeability (2 to 706 md). Step-rate tests across a 255 ft interval with many vuggy zones at 3,595 ft were unable to achieve breakdown and showed good injectivity (of fresh water) with little pressure build up, suggesting good reservoir conditions; although the lateral extent of these intervals may be variable.

[Left] Core samples. (A) Rose Run Sandstone (3,301 ft). (B) Microscopic view of the sandstone showing porosity (blue) between the sand-size mineral grains (white and brown), which form the rock. (C) Copper Ridge Dolomite (3,796 ft) showing vuggy porosity.