

# DR2016109 B.L. Overfield et al.

## Radon Levels (pCi/L) in a Geologic Context, Boyle County, Kentucky

Bethany L. Overfield, Daniel I. Carey, and Matthew M. Crawford  
Kentucky Geological Survey  
University of Kentucky



### Purpose:

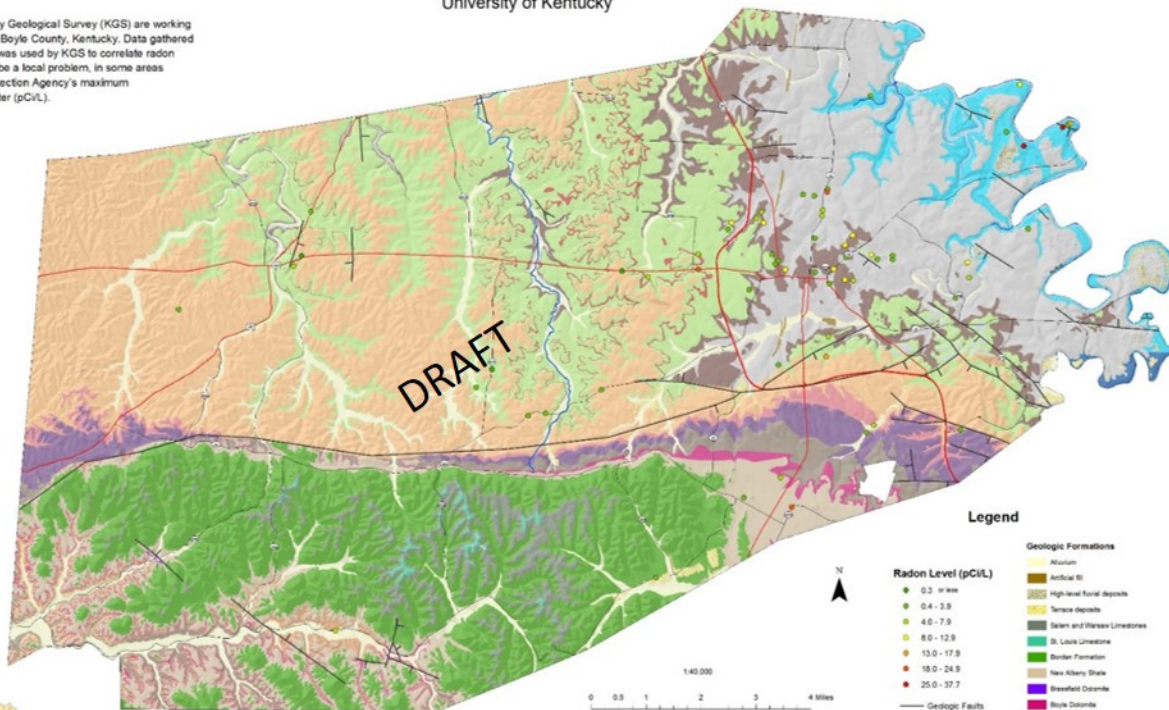
The UK College of Nursing and Kentucky Geological Survey (KGS) are working in conjunction assessing radon levels in Boyle County, Kentucky. Data gathered and provided by the College of Nursing was used by KGS to correlate radon levels to geologic units. Radon gas can be a local problem, in some areas exceeding the U.S. Environmental Protection Agency's maximum recommended limit of 4 picocuries per liter (pCi/L).



A ventilation system removes radon from the basement of this home. Photo by Dan Carey.



An outcrop of the Tanglewood Limestone, a producer of radon. Photo by Bethany Overfield.



### Legend

#### Geologic Formations

- Alumina
- Artificial fill
- High-level fluvial deposits
- Terrace deposits
- Salem and Warsaw Limestones
- St. Louis Limestone
- Borden Formation
- New Albany Shale
- Breadfield Dolomite
- Boyle Dolomite
- Leavelle Dolomite
- Artichoke Formation
- Calverton Creek Limestone
- Clays Ferry Formation
- Chalks Formation
- Glennville Shale
- Barnes Member
- Lower part of Lexington Limestone
- Upper part of Lexington Limestone
- Tanglewood Limestone Member No. 1 (lower tongue)
- Tanglewood Limestone and Oregon Formation
- Tyrone Limestone

#### Radon Level (pCi/L)

- 0.3 or less
- 0.4 - 3.9
- 4.0 - 7.9
- 8.0 - 12.9
- 13.0 - 17.9
- 18.0 - 24.9
- 25.0 - 37.7

Geologic Faults

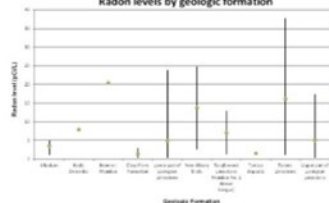
### Radon Hazard



Radon is a colorless, odorless gas. It is produced by the radioactive decay of naturally occurring uranium in the soil and water. Kentucky has geologic units that are often high radon emitters: the oil and gas producing Devonian-age black shale (see map) and a number of limestones of various ages, especially the limestones in the Bluegrass Region that were once mined for phosphates. In limestones, it is not the limestone itself that is problematic, but the thick clayey soils that develop from the limestone and concentrate small amounts of uranium in clays and phosphate minerals.

(from Geologic Hazards in Kentucky, KGS MGS-181, 12, 2008)

### Radon levels by geologic formation



Geologic Formation	Number of data points	Min. Radon level (pCi/L)	Max. Radon level (pCi/L)	Avg. Radon level (pCi/L)
Alumina	1	1.1	1.1	1.1
Artificial fill	1	7.9	7.9	7.9
High-level fluvial deposits	2	24.9	24.9	24.9
Terrace deposits	9	1.9	9.9	5.0
Salem and Warsaw Limestones	2	1.9	1.9	1.9
St. Louis Limestone	2	24.9	24.9	24.9
Borden Formation	1	1.9	1.9	1.9
New Albany Shale	1	1.9	1.9	1.9
Breadfield Dolomite	1	1.9	1.9	1.9
Boyle Dolomite	6	1.9	1.9	1.9
Leavelle Dolomite	6	1.9	1.9	1.9
Artichoke Formation	6	1.9	1.9	1.9
Calverton Creek Limestone	6	1.9	1.9	1.9
Clays Ferry Formation	6	1.9	1.9	1.9
Chalks Formation	6	1.9	1.9	1.9
Glennville Shale	6	1.9	1.9	1.9
Barnes Member	6	1.9	1.9	1.9
Lower part of Lexington Limestone	6	1.9	1.9	1.9
Upper part of Lexington Limestone	6	1.9	1.9	1.9
Tanglewood Limestone Member No. 1 (lower tongue)	6	1.9	1.9	1.9
Tanglewood Limestone and Oregon Formation	6	1.9	1.9	1.9
Tyrone Limestone	6	1.9	1.9	1.9