

Geology of Radon in Ohio

In Ohio, a geologic formation known as the "Ohio Shale" is enriched in uranium in amounts commonly between 10 and 40 ppm. This black, organic- and clay-rich rock originally formed 370 million years ago as a muddy sediment on the bottom of an ancient sea. The formation, which is only uraniumiferous west of the longitude of Cleveland, now underlies the surface of Ohio in a narrow belt running westward along the Lake Erie shore from Ashtabula County to Erie County, where it turns south and continues through the middle of the state, including Franklin County, and crosses the Ohio River in Adams and Scioto counties. This formation also underlies parts of Logan County in the west-central part of the state.

A second major source of uranium in Ohio is the soil in much of the western half of the state. This typically has uranium concentrations above 3 ppm, but how much above is not at present known. The soil is developed on top of sediment (called "till") deposited by glaciers during the last Ice Age which ended in Ohio about 14,000 years ago. The glaciers plowed up and incorporated into the till large amounts of the carbonate bedrock (limestone and dolostone) that underlies the western half of Ohio. Also mixed into the till are lesser amounts of the Ohio Shale. Carbonate rocks contain average crustal amounts of uranium but when weathered produce a reddish, calcareous soil that is enriched in this element. Such a soil is especially well developed in the central and west-central parts of the state.

In the bedrock geology map, it can be seen that some of the high radon levels are in areas where the Ohio Shale occurs. However, a much better correlation between geology and radon is observed in the glacial geology map where most of the high radon levels in the state are associated with Wisconsinian and Illinoian glacial till deposits (Wt and It, respectively) in central and western Ohio. Some isolated zip code areas in other parts of the state also have elevated radon levels and result from geologic factors that are not, at present, well understood. Many of these areas are probably associated with relatively permeable and dry sediments (sands and gravels) or soils such as commonly found on hillsides and valley floors. Although such materials may not be enriched in uranium, they can still cause high indoor radon levels by making it easier, by virtue of their permeability and dryness, for radon to get to the surface. This same effect may also contribute to some of the high radon levels in the central and western parts of the state.

For more information on the geology of radon in Ohio see the following publication:

Harrell, J.A., J.P. McKenna and A. Kumar, 1993, "Geologic Controls on Indoor Radon in Ohio," Ohio Department of Natural Resources, Division of Geological Survey, Report of Investigations No. 144, 36 p.