

Many homes in the Lehigh Valley have high levels of radon. Here's why you should care

By [LEIF GREISS](#) | lgreiss@mcall.com | The Morning Call
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Bill Brodhead talks about devices used to detect radon including a radon chamber in his small radon lab in his basement Tuesday, April 18, 2023, in Riegelsville. Brodhead, one of the longest-practicing radon mitigators in the state, also teaches at Rutgers and has written papers and has done research on radon for the government. (April Gamiz/The Morning Call)

Brian Yang first became aware of radon when his family moved from New Jersey to Center Valley two years ago.

“We got a letter in the mail from the Pennsylvania Department of Environmental Protection, which basically told us we could have high levels of radon because of the area we live in,” 16-year-old Yang said. “That was curious to me because I didn’t at the time know what radon was. What is this gas that can cause somebody these health problems? And we tested our home and we found that we had high levels of radon.”

A test of their Center Valley home found about 10 picocuries of radon per liter of air, 2.5 times the Environmental Protection Agency's action level for radon.

Radon is a colorless, odorless and tasteless gas which, after smoking, is the top cause of lung cancer. It is a naturally occurring radioactive element that results from the decay of uranium.

Since the discovery of radon at his home, Yang, a student at Moravian Academy, has dedicated himself to learning about radon and how to keep others safe from it.

He's on his way to becoming a state-certified radon tester and is part of [Premier Youth Ambassadors for Radon Reduction](#), a group of young people who seek to address radon in their communities.

Yang also completed a research project to identify radon hotspots in Lehigh, Northampton, Bucks, Montgomery and Philadelphia counties. Using data from over 500,000 short-term radon tests, he found that Lehigh County has the highest average radon levels among those counties.

"The goal of our project is to help policymakers and scientists really determine where they could direct resources toward mitigation and other campaigns or policies to raise awareness," Yang said.

Yang said he hopes to do even more work tracking radon levels in other parts of the state. His hope is that lawmakers will use his information to take actions that protect those vulnerable to radon, such as children in schools and day cares.

What is radon?

Radon is a gas that seeps up through soil. Often it escapes into the air outdoors, but it can enter homes through cracks or porous areas of cement into people's basements. It is undetectable in the air without the right equipment and doesn't show up in blood or similar tests.

Radon decays rapidly, turning into solid particles that also decay over time. If the gas escapes outside there is little to worry about. But if it is trapped indoors, people and animals can breathe in radon, which will continue to decay in the lungs, or radon's offspring can attach to dust particles and then get lodged in lung tissue.

Bill Brodhead, owner of WPB Enterprises and a certified radon tester and mitigator, said generally, radon levels on the first floor of a home will be about half of those in the basement. In some more compact or airtight homes, however, radon levels on the first floor may be almost the same, he said.



Brian Yang, 16, a local advocate for radon testing and reduction in Center Valley on Sunday, April 30, 2023. Yang's work has allowed him to meet with local lawmakers and do a research project on areas with high levels of radon in the Lehigh Valley.
(Jane Therese/Special to The Morning Call)

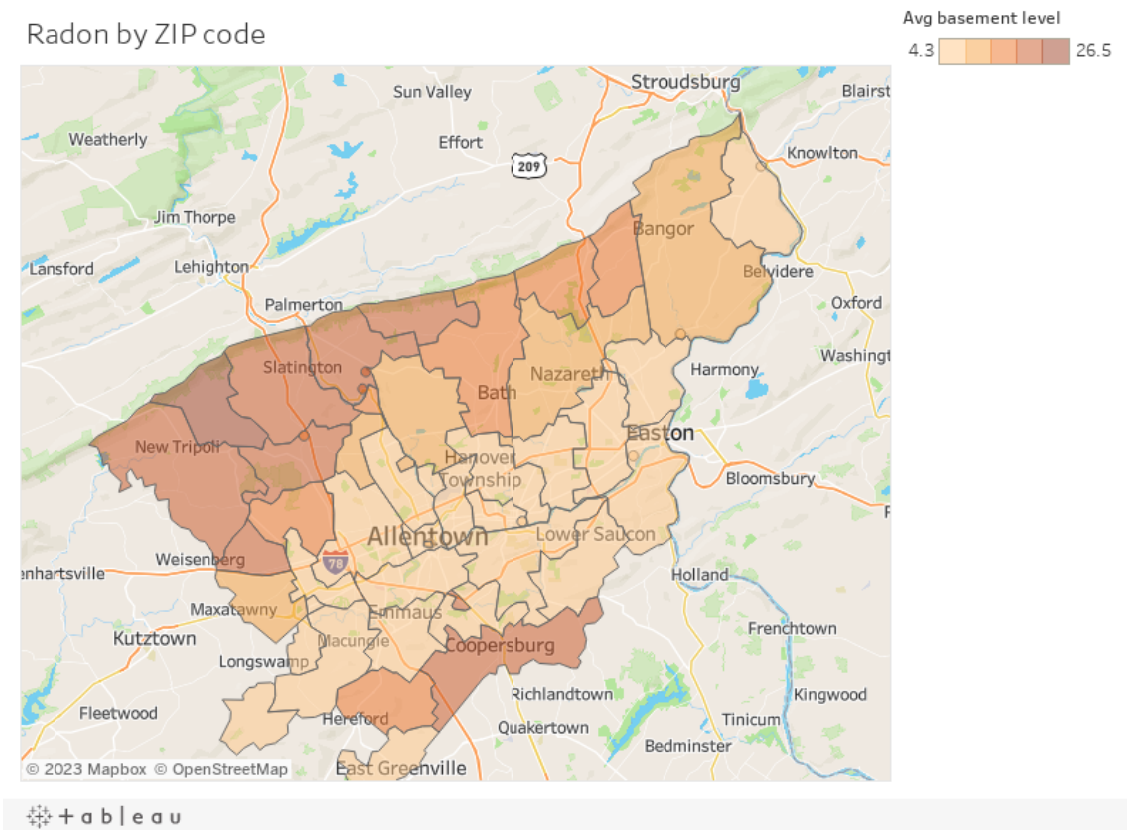
The EPA's action level for radon, the point where mitigation steps should be taken, is 4 picocuries per liter. A curie is a measurement of the rate atoms in radioactive material decay or disintegrate over time. A picocurie is one trillionth of a curie.

Brodhead said it is important to note that the EPA's guideline isn't a level that indicates safety. The World Health Organization recommends radon action levels of 2.7 picocuries per liter.

Roughly 40% of all homes in Pennsylvania have radon levels above the EPA action guideline, according to the Pennsylvania Department of Environmental Protection. Forty-nine of Pennsylvania's 67 counties have average indoor radon levels above the action guidelines, according to the EPA.

Yang's project showed Lehigh County's average radon levels are higher than other, more densely populated counties in the area. The highest levels of radon ever recorded in Pennsylvania were in [a vacant Upper Saucon Township home in 2016, where 6,176 picocuries per liter were detected](#) by the DEP. In 2014, the DEP found a large number of Center Valley homes had radon levels greater than 1,000 picocuries per liter.

Elevated levels of radon are typical throughout Lehigh and Northampton counties. Depending on ZIP code, the average basement radon levels range from about 4 picocuries per liter to nearly 27, DEP data shows.



Click on the map to see radon levels in each Lehigh Valley ZIP code.

Chrysan Cronin, director of public health at Muhlenberg College, said one reason for the high radon levels in the Lehigh Valley is that it is under a massive metamorphic rock formation called the Reading Prong, which stretches from the Reading area into Connecticut. The ancient rocks that make up much of the Reading Prong contain elevated levels of uranium that eventually decay into radon.

The [Reading Prong is not the most significant factor](#) though, the type of soil in the Lehigh Valley also matters, Brodhead said. In Lehigh County, particularly in the northern part, shale-heavy soils allow radon to pass through far more easily than clay-heavy soils.

Brodhead, who has done radon testing and research across the country and around the globe, added that radon is found throughout most of the world. You can even buy cement mix at the store that has detectable traces of radon, he said.

“Uranium exists everywhere,” Brodhead said. “It’s ubiquitous everywhere in the entire world. And it has a 4 billion year half-life, so half of it’s gone since the beginning of the earth. But it’s going to take 4 billion more years before another half of that is gone. It’s with us for a long, long time.”

Radon and lung cancer

Jackie Nixon believes radon is the reason she got lung cancer.

The 74-year-old vice president of marketing and communications of [Citizens for Radioactive Radon Reduction](#), lived a healthy life. Nixon, who lives in Bridgeville, just outside Pittsburgh, said she always ate healthy, never smoked, stayed active, rarely caught colds and never broke a bone or had the flu.

There were no noticeable symptoms before her 2015 cancer diagnosis. The only reason she thought anything might have been wrong was that she couldn’t hold a note as long when singing, which is why her doctor asked her to do an X-ray. At age 67, doctors found a cancerous tumor, about an inch in diameter, just outside the upper lobe of her left lung. She said the physicians and surgeons who treated her were as baffled as she was.

In 2016 Nixon had a lobectomy, removing the tumor and part of her lung. After the surgery, she was still haunted by the question of what had caused her cancer.

Then during a Rebuilding Together Pittsburgh meeting, she spoke with a radon inspector.

“He said the magic words to me. He said one sentence, ‘Did you ever hear of radon?’ I said ‘No. What’s that?’ And so he explained it to me,” Nixon said. “I don’t know what it was, but something hit me and said, ‘That’s it.’”

She bought an electronic radon detector and along with some of her neighbors tested their condominiums. One neighbor’s condo came out to 9 picocuries per liter, another’s came out to 18. Nixon, who lived on the third floor, had a reading of 3 picocuries per liter.

Nixon had lived in the building for 32 years, which is why she said she’s confident radon was the primary cause.

Now Nixon is an advocate for efforts to reduce radon. She’s worked with both the Pennsylvania DEP and the Centers for Disease Control and Prevention on outreach and education efforts.

Lung cancer kills more people each year in the U.S. than any other cancer and less than 15% diagnosed with it live past five years. While smoking accounts for about 80% to 90% of lung cancer deaths, [the EPA estimates that about 21,000 people per year die from radon-induced lung cancers](#). This makes radon the top cause of lung cancer for nonsmokers and the No. 2 cause of lung cancer overall.



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While lung cancer cases have been decreasing overall, thanks to many people quitting smoking or never taking it up, [lung cancer cases have been increasing among people who have never smoked](#). About 2,900 lung cancer deaths attributed to radon each year occur among people who have never smoked, according to the EPA. Anyone who lives in a home with elevated levels of radon is at heightened risk of lung cancer; being a smoker drastically increases that risk.

Consistent exposure over a lifetime to 4 picocuries per liter of radon would cause seven additional lung cancers per 1,000 non-smokers or 62 additional lung cancers in 1,000 smokers, according to the EPA.

Brodhead said this risk is linear, which means someone who was consistently exposed to 16 picocuries per liter of radon for 17 years is at the same risk as someone who was consistently exposed to 2 picocuries per liter over a lifetime.

The lung cancer risk posed by radon to children is almost twice as high as the risk to adults, [according to the CDC](#). Lab testing also has shown that small mammals like [dogs and rats can develop lung cancer following exposure to radon](#) and its byproducts.

“Children are more radon sensitive, they’re still developing so they are more affected by radiation and by the problems that can cause to development as well as having higher rates of respiration, so they inhale more radon compared to adults,” Yang said.

Radon mitigation: How it works

The good news is, radon is easy to test for and relatively inexpensive to mitigate.

Radon tests are available at most hardware stores. The kits cost \$10 to \$20, though some require mailing the test in for lab analysis at an additional fee, which can exceed the cost of the test itself.

The Pennsylvania DEP offers free confirmation test kits for state residents who have already tested their homes or another building and found screening levels greater than 100 picocuries per liter.

There also are electronic monitors that continuously check for radon, though these typically cost \$100 to \$250. Brodhead said these types of devices can be very accurate and some even perform comparably to detectors that cost thousands of dollars.

If you have a radon level at or above 4 picocuries per liter in your home, the EPA recommends reaching out to a professional to get it mitigated. Radon mitigation work in Pennsylvania must be completed by state-certified professionals. The work usually costs between \$1,000 to \$2,000 and in most cases won’t even take an entire day of work, Brodhead said.

The most common mitigation method is to alter the normal airflow below a house with a depressurization system. This usually involves drilling below the concrete slab under most homes and installing a fan attached to a pipe that runs up along the

house to the roof, Brodhead said. This reverses the flow of air below the house from upward to downward and prevents infiltration of radon from the soil.



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Radon and the law

There are no federal laws that mandate testing of radon or the abatement of radon in buildings with high levels, though [the EPA recommends people test their homes, schools and businesses](#).

Pennsylvania has laws regulating how radon mitigation can be done and who is qualified to do it, but no laws requiring testing or abatement of radon in private residences, schools, public buildings or workplaces, Brodhead said.

Rep. Mike Schlossberg, D-132, in past sessions, has cosponsored radon testing and mitigation legislation, but those bills were unsuccessful.

He said in an interview that he would like to introduce radon legislation to protect renters. Schlossberg said during real estate transactions, homebuyers can request that homes be tested and mitigation systems be installed before they move in, but renters don't have those same options. He said landlords shouldn't have to test for radon every time a rental unit changes hands, but testing should be required at some point and renters should be aware of the results or appropriate mitigation measures should be required.

There is a [Senate bill introduced during the current session, SB339](#), that would accomplish something along these lines but it is currently under review by the Senate Environmental Resources & Energy Committee.

State Rep. Tim Briggs, a Montgomery County Democrat, and state Sen. Devlin Robinson, an Allegheny County Republican, recently announced they are working on a bipartisan bill that will require radon testing in schools. At a Monday news conference, Briggs said the yet-to-be-introduced bill would require radon testing of schools every five years; if tests show levels exceeding the EPA guidance, mitigation measures must be taken.

Briggs added there are federal funds earmarked for use on improving children's health in schools that could be used to help shoulder some of the burden testing and mitigation may put on schools.

Municipalities in Pennsylvania also have the power to add some radon mitigation regulations. [The optional Appendix F of the International Residential Code](#) requires the tubing, but not the fan, for a depressurization system to be put in place during

construction of new homes, but not all municipalities add that requirement to their building codes.

Both Easton and Hanover Township in Northampton County are among the few municipalities in Pennsylvania that have chosen to adopt Appendix F.

Allentown City Council member Ce-Ce Gerlach said she's had her own experience with radon: Her cat, Oreo, died several years ago from lung cancer and she believes radon was likely the cause.

"Someone suggested that I test for radon. I did so and lo and behold my levels in the basement were sky high," Gerlach said.

The reading she got was about 47 picocuries per liter, so she took out a loan to pay for the \$2,000 mitigation system.

Gerlach said she supports taking action on radon in Allentown, but believes City Council should have data in front of them before drafting or adopting ordinances so that efforts can be targeted.



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Public health versus radon

Though many radon experts and radon reduction advocates want to see laws around radon implemented or strengthened, they also recognize the general lack of knowledge and apathy about radon is another barrier against protecting people from the gas.

Cronin said she has seen this ignorance and lack of concern toward radon in person. About five years ago she conducted a survey in English and Spanish on radon across much of Allentown. She said most people told survey takers they knew about radon but when they were challenged on that knowledge with a short true or false quiz, most performed poorly.

“For those people who did know and understand what it was, we asked, ‘Have you ever tested your house for radon?’ And they said, ‘No.’ And when we asked them why, they said ‘I just haven’t gotten around to it,’ or ‘I don’t know how to do it,’ or ‘I got other things to worry about.’ It wasn’t a priority.”

Nixon said health care providers could play an important part in educating people on radon by asking patients if they’ve ever tested for it and providing basic educational materials.

“When I was diagnosed, you have to go to the doctor and you have to fill out this five-page form. Did you smoke? Did anyone in your family smoke? How many packs a day? They ask you all the stuff on smoking.” Nixon said. “On that intake form, there’s not one question about, did you ever test your home for radon?”

Cronin said this may be a hard sell to some doctors unless there is a requirement, something she knows from experience.

“I’ve tried to get doctors on board. I’ve tried. I’ve met with pediatricians, I’ve met with pulmonologists. I tried to get pediatricians to add it to their new parents form where they talk about ‘Is there smoking in the home?’ and ‘Do you have pets?’, all that stuff.

They said, ‘We’re not required to do that.’ and frankly, they didn’t even know what it was,” Cronin said.

Homeowners, landlords and renters aren’t the only ones who should be testing. The EPA estimates one in five schools, about 70,000 nationally, have at least one classroom with short-term radon levels above the action guideline.

Brodhead said some schools, like Lehigh University, which he worked with in the past, are proactive with testing and mitigation. But according to the EPA, only about 20% of schools nationwide have done some testing.

Yang said he believes many schools are hesitant to test because mitigation may be costly and out of concern they may open themselves up to public backlash from parents or even lawsuits. Brodhead said that liability does exist, but the smart move for districts is to test their schools and mitigate if necessary.

“Compared to asbestos, radon is a lot easier to fix,” Brodhead said.

Where to learn more about radon

Radonlehighvalley.org: Information on radon in English and Spanish
Pennsylvania Department of Environmental Protection Radon Division: call 717-783-3594 or email ra-epbrpenvpvt@pa.gov

Purchase radon tests over the phone: 1-800-SOSRADON or 1-800-767-7236

Get answers to radon over the phone: 1-800-55RADON or 1-800-557-2366

Radon Fix-It Hotline: 1-800-644-6999

Find a certified radon tester and mitigator in
Pennsylvania: <https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/Certification/pages/servicesdirectory.aspx>

Become certified to perform radon
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Leif Greiss | Reporter

Leif Greiss is a reporter covering hospitals and health care in the Lehigh Valley.

lgreiss@mcall.com

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