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RADON: THE GOVERNMENT’S APPROPRIATE RESPONSE

Merideth Shannon

Introduction

When public officials first realized how widespread the radon problem is, they became concerned about public panic. People could contract lung cancer simply by living in their homes and working in their offices. A person who led a healthy life and never smoked could die from lung cancer.

What these state officials later found, however, was public apathy. Surveys showed that a fairly large portion of the public was receiving the message that radon is dangerous. A smaller portion of the public was concerned about a radon threat in their homes. An even smaller portion was actually testing. Very few people were trying to control radon in their homes.

If people realized radon could give them lung cancer, why weren’t they doing anything about it? Where does the government’s responsibility end: at making the public aware, or at making sure the public is safe? Should the government stop at a public awareness campaign, or should it make laws to mandate testing in certain situations?

Radon: What It Is and Why It’s Dangerous

The radon scare in the United States was sparked in December 1984 when Stanley Watras, a construction engineer at the Limerick Nuclear Power Plant in Boyertown, Pennsylvania, repeatedly set off radiation detectors at the plant. When he set off the detectors while entering the plant, not while leaving it, Watras knew he was bringing the radiation from home. (Cobb and Kasmauski, p. 425)

His house was found to contain levels of radon gas almost a thousand times higher than the Environmental Protection Agency’s danger standard of four picocuries of radiation per liter of air (pCi/l). Luckily for Watras, the Philadelphia Electric Company offered to control the radon problem in his house as part of a research project on controlling the gas. They discovered the house was built above a uranium deposit and invested $32,000 in sub-slab ventilators, turbines and monitors. (Cobb and Kasmauski, p. 425) Uranium was known to
cause problems for uranium miners, who, as a
group, have a high rate of lung cancer. But
until the Watras incident, cases of radon con-
tamination in homes were not a national issue.

Even before Watras found radon in his
home, the government knew some people were
living in houses with high levels of radon. In
the late 1960s, some houses in Colorado were
found to have high levels of radon because they
had been built on uranium mine tailings. In the
mid '70s, houses in Minnesota and Florida,
built over old phosphate mines, were also dis-
covered to have radon contamination. Later in
the '70s, Pennsylvania Power & Light (PP&L)
measured radon levels in homes as part of a
project to gauge the effectiveness of a new home-
weatherization program. After finding radon lev-
els of 50-60 pCi/l, PP&L notified the Pennsylvania
Department of Environmental Resources (DER).
Unfortunately for these homeowners, Three Mile
Island had a near meltdown before the DER could
look into the problem PP&L discovered. (Granlund interview)

Uranium decays into radium and then
into radon gas. The gas itself then decays into
four radioactive daughter products. These
daughter products are alpha and beta par-
ticles, dangerous because they are radioactive
and can cling to dust or smoke that we inhale
into our lungs. Radon gets into homes and
other buildings through pores in concrete
block walls, cracks in basement walls or floors,
around pipes and even through the water sup-
ply. Outside, radon is not a problem because it
can dissipate, but inside it becomes trapped and

Uranium deposits in the ground occur
naturally in the geological make-up of some
areas. Because radon is a natural contaminant,
it is impossible to assign responsibility for
controlling it. No one can be blamed for nature’s
actions. No one can be forced to clean up radon
or the uranium in the ground because no one
put it there.

The government can’t force everyone to
test their homes for radon contamination.
Because controlling a radon problem can cost
between $200 and $1,500 per home, many
people can’t afford to test or control the prob-
lem. Some just don’t want to know if their
homes are contaminated. The government
can’t afford to test everyone’s homes for them
and certainly can’t afford to mitigate every
home with a problem. There is no easy solution
to the radon problem.

The Reading Prong, which extends from
Reading, Pennsylvania, across northern New
Jersey and into New York state, is a geological
formation known for its high uranium con-
tent. New Jersey was one of the earliest known
radon hot-spots, partly because of unsafe prac-
tices of storing radon-contaminated soil, but
mainly because New Jersey lies on this geo-
logical formation.

One of the worst cases of natural radon
contamination was in Clinton, N.J., where
every home in one development was found to
have a radon level over four picocuries per liter
of air (pCi/l), and some over 3,000 pCi/l. The
homes in this development have since been
mitigated and are now occupied. (Hanley, p. A1) Geological formations similar to the Read-
ing Prong have also been found in the Midwest,
especially where glaciers traveled thousands
of years ago and deposited Canadian clay full of
uranium. (Weisskopf, p. A3)

There have been, however, a few isolated
cases of radon contamination caused by human
pollution. One example occurred in about 200
homes in West Orange, Glen Ridge, and
Montclair, N.J. Sixty years before radon con-
tamination was discovered, soil from a nearby
defunct radium processing plant in Orange was
used as fill before building these homes. The
homes then became so contaminated with radon
gas that the occupants had to move out until
their homes could be mitigated. (Narvaez, p. B1)

According to the EPA, almost every house
in the United States has some level of radon
gas. Houses like the Watras house, built over
uranium deposits, are likely candidates but do
not always have a radon problem. Even some of
Watras’s neighbors had low levels of the gas.
(Cobb and Kasmauski, p. 425) Radon levels in
houses with a problem are not constant either;
levels can depend on factors ranging from
pressure inside the house to the time of year to
moisture in the soil.

The EPA’s standard of four pCi/l is roughly
equivalent, in lung cancer risk, to smoking
half a pack of cigarettes a day or getting 200
chest x-rays a year. (EPA, “To Protect Your
Family...," p. 2) This standard assumes exposure to radon for 75 percent of the time for 70 years. (EPA, "A Citizen's Guide...," p. 8) Because exposure time is so high for the EPA's standard, some other scientists dispute the health risk of the gas. Researcher Dr. Bernard Cohen of the University of Pittsburgh, for example, argues that there is a threshold below which there is no risk of lung cancer. (Browne, p. B7(L)) The EPA does say, in one of its publications, that there is some uncertainty about the health risks of radon. (EPA, "A Citizen's Guide...," p. 2) Uncertainty is a common problem in assessing the health risks of any toxin.

After a survey of classrooms in different parts of the country, the EPA said that children exposed to four pCi/l of radon for only one year have a nine in 100,000 risk of dying from lung cancer. This risk is 90 times higher than the EPA's acceptable risk in regulating toxic chemicals. The EPA's survey also showed that half of the schools tested had at least one classroom with levels above the standard of four pCi/l. Some scientists say that children are at higher risk than adults for contracting lung cancer because children's breathing rates are higher than those of adults, but there is no proof of this theory. (Shabecoff, "New Data on Radon...," p. A1)

Testing for Radon: What the EPA Recommends

The two most popular commercially available testing devices are the charcoal canister and the alpha-track detector. After being exposed to potentially radon-contaminated air for an established period of time, these devices are then sent to a laboratory to be analyzed. (EPA, "A Citizen's Guide...," p. 5)

The charcoal canister costs between $10 and $25 and must be exposed for three to seven days before it is sent to the laboratory. The charcoal canister has the advantage of being cheaper and faster than the alpha-track detector, which costs between $25 and $50 and requires an exposure time of two to four weeks, although it doesn't give as accurate a reading as the alpha-track detector. With the charcoal canister, radon gets into the canister easily, but also gets out easily so this type of test may not give an accurate reading of the radon level in the air. (Granlund interview)

There are also testing firms that will come to homes to test, but they are much more expensive than either device. The Pennsylvania DER keeps a list of all contracting firms that are certified, based on DER criteria, to test and mitigate homes. (Granlund interview)

People suspecting they have radon in their homes should perform short-term screening measurements, using one of the devices listed above. The measurement should be taken in the basement or lowest level of the house, because radon comes in from the ground. All doors and windows should be closed for at least 12 hours before the test, and kept closed as much as possible during the test to allow radon to accumulate. Colder months are a preferable testing time because the doors and windows are likely to be kept closed anyway. This type of measurement is not meant to indicate precisely how much radon is usually in the house, but rather just to give an estimate. (EPA, "A Citizen's Guide...," pp. 6-7)

If levels are less than four pCi/l, follow-up tests probably do not need to be performed. Follow-up tests in several lived-in areas of the home should be performed for any tests that give readings above four pCi/l. For readings between four and 20 pCi/l, mitigation action should be taken within a few months. If readings are between 20 and 200 pCi/l, mitigation should be started within several weeks. For readings over 200 pCi/l, immediate mitigation action is needed. (EPA, "A Citizen's Guide...," p. 7)

Mitigation: What to Do When Radon Is Found

There are several cheap and easy ways to reduce risk of lung cancer from indoor radon. These methods may help lessen exposure to radon, but are not meant to make homes completely safe. Not smoking in the home (because the radioactive particles can cling to smoke), spending less time in areas that have a higher concentration of radon (such as the basement) and opening windows and turning on fans to increase air flow are simple and fast ways to help reduce radon accumulation. (EPA, "A Citizen's Guide...," p. 13)
Long-term actions are recommended for houses with levels above the EPA's danger standard of four pCi/l. The EPA recommends five main methods of mitigation:

1) **Sub-slab suction.** Pipes and fans are installed to pull radon out from under a slab foundation. This method is probably the most effective.

2) **Sealing major sources and entry points.** Exposed earth in basement, storage areas, drains and crawl spaces is covered. This method is effective when used in conjunction with another method.

3) **Forced cross-ventilating.** Fans are used on both sides of the house to keep the air moving and prevent radon from building up.

4) **Heat-recovery ventilating.** Two fans blow old air out and pull fresh air in. This method is recommended for homes that are heated several months out of the year.

5) **Adjusting air pressure.** Pressure inside the house is increased so less radon is drawn up into the house. This increase in pressure is accomplished by providing external sources of air to the dryer, fireplace, furnace and exhaust fans. (EPA, "Reporting on Radon," pp. 24-25)

Radon also comes into a home through the water supply. The EPA estimates that between 5,000 and 20,000 lung cancer deaths per year are caused by radon in the soil and another 100 to 1,800 deaths are caused by radon in the water supply. (EPA, "Removal of Radon...," p. 1) Radon in the water is only a problem when the water hits the air, especially when the water is warm and agitated such as in the shower or washer.

Many times water that had been radon-contaminated is actually safe by the time it reaches a home. Much of the radon can be released during municipal water treatment. Radon in water also decays into non-harmful substances when it is left in storage for an extended period of time. (EPA, "Removal of Radon...," p. 3)

Cold water that has been running for 10 minutes can be tested for radon contamination. The faucet should not have an aerator and the water should be running slowly to prevent air bubbles from getting into the sample. Outside air getting into the sample can ruin it because there will be no way of knowing if the radon came from air in the home or from the water supply. Because radon is released when the toilet is flushed, an alpha-track detector can also be put in the tank of the toilet to check for radon contamination in the water. (EPA, "Removal of Radon...," p. 4)

There are several ways to mitigate radon in water:

1) **Good ventilation in areas where water is used.** This prevents radon build-up in the air when radon is released from the water. Care must be taken not to depressurize the house, because that could draw radon up from the ground.

2) **Storing water for a few days before use.** This method is impractical, and a large storage tank is needed.

3) **Home aeration devices.** Water is sprayed through an air-filled chamber, and a fan is used to dissipate the radon. This method is not widely used or available.

4) **Granular activated carbon.** Water passes through a tank, usually made of fiberglass, that is filled with granular activated carbon. The radon is attracted to the activated carbon and drawn out of the water. This method is usually the cheapest for removing radon from water, although the tank costs about $650 to $1,000. With installation and filter, it costs between $800 and $1,200. (EPA, "Removal of Radon...," pp. 4-5)

Public Awareness: What EPA and DER Have Done

In September 1988, the EPA and the surgeon general issued a national health advisory on radon recommending that every house in the United States test for radon, after estimating that eight million homes nationwide have potentially hazardous levels of the gas. (Shabecoff, "Major Radon Peril...," p. A1) A Gallup Poll published in February 1989 showed that 81 percent of respondents were aware of the advisory, and 24 percent of this aware group were concerned a "great deal" or "quite a lot" that their homes may be contaminated by radon. Only seven percent of the aware group, however, had actually tested, but another 30 percent planned to test. (Gallup Report, pp. 33-35)
In September 1987, the New Jersey Department of Environmental Protection advised all residents of New Jersey to test their homes for radon. However, in a poll taken the next month by the Environmental Communication Research Program at Rutgers University, 92 percent of the respondents said that radon was not a problem and that it was not necessary to test. Only three percent said they had tested or planned to test. (Hinds, p. 56(L))

Why aren't people testing their homes for radon? Information about radon, its dangers and mitigation is available. The people who have tested and mitigated come from mostly the same background: the middle-class. Because the average costs for testing and mitigation are so high, people with very limited economic resources just can't afford it. Some say people from lower economic classes aren't even receiving the message that radon is dangerous. (Shapiro interview)

Only a few of Pennsylvania's residents have tested for radon, certainly not a representative number of Pennsylvania's middle class. What is the government's role in educating and convincing these people that radon is a problem that must be addressed?

The EPA, in conjunction with the Ad Council, TBWA Advertising and the Direct Marketing Group, has sponsored a public information campaign to increase radon awareness. The campaign uses strong words and scary facts to try to motivate people to test for radon.

Risk associated with receiving a certain number of chest x-rays per year is used as the main comparison for describing the risk of contracting lung cancer from radon. Because chest x-rays are a fairly common and well-understood risk, the campaign uses them to drive its point home. The campaign also uses the "protect your family" theme to get people to test because people are more likely to test when other family members are at risk. (Guimond letter, pp. 5, 7)

The campaign uses public service announcements on television and radio to increase radon awareness and to encourage people to call the national radon hotline. The EPA has sponsored a mailing to media advertising directors, supplying them with fact sheets, public service announcements and ad proofs.

After someone calls the national radon hotline, the EPA sends a brochure designed to encourage testing. The EPA will send another brochure with test results to encourage people with high levels to mitigate. One of the ways the EPA will evaluate the public information program is to survey hotline callers to get their opinions of these brochures. (Guimond letter, pp. 6, 9)

The Pennsylvania DER also sponsors a toll-free radon hotline, 800-23-RADON. Pennsylvania is one of only 11 states that sponsors such a toll-free radon information number. (EPA, "To Protect Your Family....", p. 3) Pennsylvania's radon hotline handles between 400 and 1,500 calls a month. The three people who answer this line send information to homeowners about radon and testing. (Granlund interview)

The EPA has printed several pamphlets designed for the homeowner to learn about radon. All pamphlets are written in language very easy for the average person to understand and are usually illustrated to help clarify most of the concepts, such as how radon gets into a home. Basic pamphlets include "Radon in Schools," designed to inform parents about radon so they can convince school officials to test; "Has Your Home Been Invaded by Radon," a very brief summary of risks and mitigation; and "A Citizen's Guide to Radon: What It Is and What To Do About It," a longer discussion of radon, testing and mitigation. The EPA also provides pamphlets for people who are already informed about radon and have probably already tested. These guides explain how to choose a radon reduction method and discuss special problems, such as radon removal from water.

The EPA also provides advice on real estate transactions. The agency states that, legally, it does not require homes involved in real estate transfers to be tested, but it strongly suggests testing in this situation. It outlines the best methods for homeowner, bank and buyer. (EPA, "Advice on Radon....", p. 1)

The majority of problems involving mitigation are related to real estate transfers. People who are selling their homes want to take care of a radon problem before the new owners move in. The mitigation job usually goes to the
lowest bidder, who does not necessarily do the best job. (Granlund interview)

An easy solution to getting homes tested would seem to be mandatory testing in all real estate transactions. Over the next several decades, enough homes will be bought and sold that many people would be forced to find out if they have radon. Some government officials feel that the real estate industry doesn’t want this type of legislation. (Granlund interview)

Many real estate agencies, however, such as those in eastern Pennsylvania’s Lehigh Valley, already include an addendum in the sales agreement that gives the buyer the option of having the home tested. (Waxman interview)

The Pennsylvania OER also sponsors the Radon Assistance Program, which helps Pennsylvania residents who have already tested their homes. The program provides free additional testing equipment to people whose homes have levels of 20-50 pCi/l. A DER staff physicist will go to any home or building having a reading of 50 or more pCi/l to perform additional tests and advise the owner what he or she should do to mitigate the problem. The DER will also confirm results of a test performed by a state-certified testing contractor. (DER, “Radon Assistance Program,” p. 1)

An important part of achieving public awareness is explaining risk. People must understand that radon is a silent, but deadly, risk. But, as with any health risk, people can’t be scared into apathy. Many times people will choose to ignore something that may be dangerous for them because it’s easier not to think about it. When people found out, for example, that cholesterol was a threat, they simply cut back on foods with high cholesterol content. But radon is a passive threat; we’re exposed to it by doing nothing. Involuntary risks are always worse than voluntary risks. Too much frightening information can drive people to ignore the radon threat. Information about radon must be presented in a way that communicates how dangerous it is without scaring people away.

Legislation: What The Laws Are

How far can the government go to make people test for radon? For the same reason seat belt laws are so controversial, there is no easy way to determine the extent of the government’s responsibility. If someone doesn’t want to know if he or she is living with radon, can the government impose mandatory testing?

Mandatory school testing is an issue that has been approached. While it is questionable that the government would be able to force an adult to find out if he or she is living with radon, the government’s responsibility to protect children, especially children spending time in state-run schools, is self-evident.

People who haven’t tested their homes are often the first ones to insist that their local schools be tested. They are also often the first ones to immediately protest that their schools are exposing children to undue cancer risk by not mitigating a radon threat. What people are not willing to do for themselves, they often insist be done for their children.

Several proposals have been made concerning mandatory testing of schools. Rep. Peter Kostmayer, D-Pa., has sponsored a bill that would require each school district to submit a report to the state governor on testing in its district. The test would have to be performed by a firm that is rated under a voluntary proficiency program run by the state or the EPA, and the results of the tests would be available to the public.

Rep. Bart Gordon, D-Tenn., has proposed requiring the EPA to establish a nationwide program to test a sample of schools in each state. Priority would be given to states identified as high risk areas under the Toxic Substances Control Act. School districts would receive funding for up to 50 percent of the testing, according to the Gordon proposal.

Rep. Gordon has sponsored another bill, the Radon Testing for Safe Schools Act, which would require school districts in high risk areas to test for radon contamination. Sen. Kent Conrad, D-N.D., would require the Committee on Appropriations to allot $1.5 million for the EPA to carry out a school contamination study.

The Indoor Air Quality Act, a bill sponsored by Sen. Edward Kennedy, D-Mass., would require the EPA to make standards for measuring the quality of air in child-care facilities. The EPA would have to publish a list of all indoor air
contaminants, the health effects of exposure and methods of reducing these contaminants to safe levels. This act would allow the EPA to provide grants to states for indoor air quality programs. The EPA would also set up a toll-free number for citizens to call with questions on indoor air quality and health risks. Grants to colleges and universities would be made to establish regional training centers for instruction on testing and mitigating radon.

The federal government has already mandated some requirements for dealing with radon. An amendment to the Toxic Substances Control Act, sponsored by Sen. George Mitchell, D-Maine, became law in October 1988. The law requires the EPA to give states grants and technical assistance for radon programs. The law also establishes a national long-term goal for air inside homes to have the same level of radon as the air outside. Indoor air will never be completely free from radon, since radon does exist in the air outside, but the government’s goal is to make indoor air as safe as outdoor air.

The amendment to the Toxic Substances Control Act also requires the EPA to:

- establish construction standards and techniques to control radon in new buildings. The EPA must set up training seminars for private and professional firms, as well as for government officials, that deal with radon. The agency must also have proficiency programs that rate the effectiveness of radon measurement and mitigation devices.
- set up a national radon data base and provide information concerning methods of testing and mitigating to organizations involved in building, design and engineering of buildings.
- provide grants to states for surveys of radon “hot-spots” within each state, for public information programs and for radon control in new or existing buildings. Each state can receive up to ten percent of the total funds available for radon grants. Pennsylvania has used some of its grant money for its public awareness campaign.

- publish a list of school districts with high levels of radon and provide technical assistance and equipment to states when schools districts are tested. (LOCIS search)

Radon: What Is the Government’s Appropriate Response

The government has an obligation to keep people safe and inform them of any imminent dangers. But, living as we do in a free society, most of us feel that we have the right to make our own choices. The government must inform us about radon, its dangers and the ways to remove this threat to our well-being, but we must ultimately make the choice to follow or ignore the government’s recommendations.

Sometimes the government is able to be a little more forceful in helping us make these decisions. Mandatory school testing is necessary because children depend on adults to make informed choices for them. If school district officials choose not to test for radon, the government should then step in and make the informed choice to test.

Mandatory testing in real estate transfers is also a good idea so that buyers may be protected. This type of mandatory testing is necessary because it could affect the buyer’s decision to buy the home. The buyer has the right to know if he or she is moving into a potentially cancer-causing situation.

Because radon is invisible, odorless and has only long-term effects of exposure, people have tended to ignore the EPA’s past warnings. This recent apathy has been due to the lack of an effective campaign to inform the public. The new, more intensive, campaign sponsored by the EPA and the Ad Council will probably encourage more people to test. The effects of this new campaign may not be seen immediately, but can be expected to occur eventually.

With an extensive public awareness campaign but with minimal legislation, the government is fulfilling its responsibility to protect its citizens while still allowing them to make their own choices.
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