

Indoor Radon Exposure

What is Radon?

Radon is an odorless, tasteless gas that is released as a byproduct of decay of naturally occurring elements such as uranium, thorium, and radium in rocks and soils. After the parent element decays, the radon travels by pressure-driven air flow and diffuses into above-ground air.

Radon accumulates indoors as it seeps through cracks in building foundations and radiates from some building materials if they are made from radon-containing substances. Almost any building material made from natural substances, including concrete and wallboard, may give off some level of radon. As a result, radon is found in higher concentrations in the lower levels of buildings and in uninhabited crawl spaces.

Most exposure to radon comes from being indoors in homes, commercial buildings, schools and other places. It is estimated that 1 in 15 homes in the US have dangerously high radon concentrations. Higher levels of radon exposure are also more likely for people who work in mines, uranium processing factories or who come in contact with phosphate fertilizers.

The Danger of Indoor Radon Exposure

Exposure to high radon concentration has been identified as the second leading cause of lung cancer worldwide.

Approximately 15,000 to 22,000 lung cancer deaths per year are associated with elevated radon exposure, more than 10 percent of which were in non-smokers.ⁱ Radon emits high-energy radiation that damages lung epithelia, increasing the mutation rates in DNA and increasing the risk of lung cancer.^{ii,iii}

Most radon-related lung cancer deaths are smokers.

The risk of radon-related lung cancer is compounded by the use of tobacco products, most notable smoking. Most radon-related lung cancer deaths are smokers.^{iv}

People living in lower

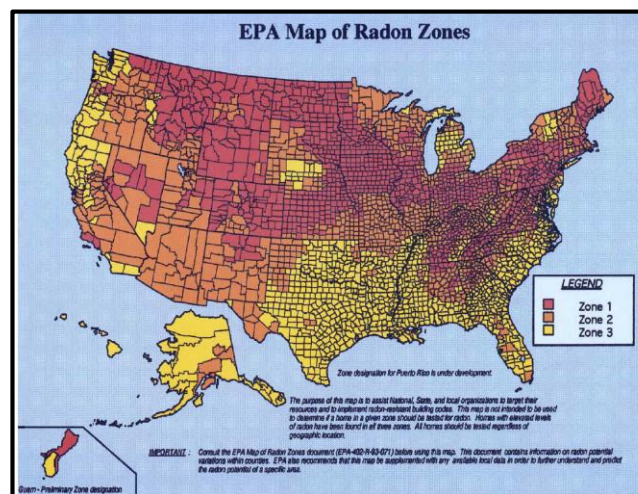
levels of buildings and basements are most at risk for prolonged radon exposure. Radon is found in higher concentrations in the lower levels of buildings and in uninhabited crawl spaces.^v

Map of U.S. Radon Zones

The U.S. Environmental Protection Agency (EPA) is required by law to list and identify areas in the U.S. with the potential for elevated indoor radon levels. The U.S. is divided into three zones: low potential, moderate potential, and high potential.

Federal & State Activities

In 2011, the EPA launched the Federal Radon Action Plan along with the Department of Health and Human Services, U.S. Department of Defense, U.S. Department of Energy, U.S. Housing and Urban Development, U.S. Department of Interior, U.S. Department of Veteran Affairs, and U.S. Department General Services Administration. In partnership with state governments, the federal program aims to make radon awareness a key part of real estate transactions,



school district operations, and daycare and workplace operations. Additionally, the Plan commits to increasing testing and mitigating, especially in government owned buildings where necessary.^{vi} By the end of 2013, the General Services Administration was on pace to test 110 school sites for radon concentration.^{vii}

EPA's State Indoor Radon Grants Program (SIRG) assists States and Federally Recognized Indian Tribes to develop and implement programs to assess and mitigate radon-related lung cancer risk.^{viii} In fiscal year 2014, the program received \$8 million of federal funding.^{ix} The following activities are eligible for funding under SIRG: radon surveys, public information and educational materials, radon control programs, purchase of radon measurement equipment or devices, purchase and maintenance of analytic equipment, training, program overhead and administration, data storage and management, mitigation demonstrations, and toll-free hotlines.^x Despite the CDC's finding that governmentally funded radon reduction programs are cost-effective interventions,^{xi} President Obama's fiscal year 2015 proposal suggested a \$310 million budget cut for the EPA, including all of the funding for SIRG.

There is a high degree of variation between states regarding activities to address indoor radon exposure. State regulations have mostly aimed to address limited public understanding of the risks of radon and availability of certified radon professionals. Thirty-seven states and the District of Columbia have a statute that addresses radon, although they vary considerably.^{xii}

27 National Comprehensive Cancer Control Program (NCCCP) plans included radon-specific activities. These programs aim to improve awareness of radon as a carcinogen and a risk factor for lung cancer as well as increase radon testing rates in homes.^{xiii}

ACS CAN Position

The American Cancer Society Cancer Action Network (ACS CAN) believes that the American public should be made aware of the known information concerning the potential problem of radon contamination in certain housing areas in the United States and how to reduce such a risk. ACS CAN urges federal, state and local governments to approve legislation which reduces the potential health threat posed by radon by implementing public awareness campaigns and requiring disclosure of radon levels by builders, home owners, schools, and daycare facilities.

ⁱ National Cancer Institute. National Institutes of Health. <http://www.cancer.gov/cancertopics/causes-prevention/risk-factors/cancer-causing-substances/radon/radon-fact-sheet>. U.S. Environmental Protection Agency (EPA). Health Risks. Epa.gov 2013; <http://www.epa.gov/radon/healthrisks.html>.

ⁱⁱ Madas BG, Varga K. Biophysical Modelling of Effects of Inhaled Radon Progeny on the Bronchial Epithelium for the Estimation of the Relationships Applied in the Two-Stage Clonal Expansion Model of Carcinogenesis. *Rad. Prot. Dosim.* 2014; 159: 237-241.

ⁱⁱⁱ Darby S et al. Radon in home and risk of lung cancer: collaborative analysis of individual data from 13 European case-control studies. *BMJ*;330: 223-227.

^{iv} Henderson SB, Rauch SA, Hystad P, and Kosatsky T. Differences in Lung Cancer Mortality Trends From 1986-2012 by Radon Risk Areas in British Columbia, Canada. *Health Physics*: 2014; 106(5):608-13.

^v Zeeb H and Shannoun F (2009).

^{vi} U.S. Environmental Protection Agency (EPA). Protecting People and families from Radon: A Federal Action Plan for Saving Lives. U.S. Environmental Protection Agency, Department of Health and Human Services, U.S. Department of Defense, U.S. Department of Energy, U.S. Housing and Urban Development, U.S. Department of Interior, U.S. Department of Veteran Affairs, and U.S. Department General Services Administration: 2011

^{vii} EPA. Federal Radon Action Plan Scorecard. EPA 2013. Available Online at <http://www.epa.gov/radon/progress.html>.

^{viii} http://www.epa.gov/radon/action_plan.html

^{ix} <http://www.bna.com/president-proposes-38-n17179882596/>

^x <https://www.cfda.gov/index?s=program&mode=form&tab=core&id=072451eefbd78a8307824fbefeb8646d>

^{xi} Neri A, Stewart SL, and Angell W (2013).

^{xii} National Conference of State Legislatures. <http://www.ncsl.org/research/environment-and-natural-resources/radon.aspx>.

^{xiii} Neri A, Stewart SL, and Angell W. Radon Control Activities for Lung Cancer Prevention in National Comprehensive Cancer Control Program Plans, 2005-2011. *Prev Chronic Dis* 2013;10:12033.