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Radon Q&A

During the webinar, the following questions related to radiation safety were asked. Please email info@radiationsafety.ca if you wish to discuss this further or any have any other follow up question arising from the presentation.

Q: In the webinar, you state that a long-term test kit should be used. What about the consumer electronic real-time radon detectors including the ones that couple with your smart phone? Are they as accurate as the test kits that have to be sent to a lab for processing? Are there indoor air quality monitors which can measure radon?

A: Health Canada encourages the use of long-term alpha track or electret measurement devices which are certified, as they are inexpensive and provide reliable measurement.

While there are still no certified consumer-grade digital radon detectors in Canada, in 2020 the Canadian National Radon Proficiency Program (C-NRPP) developed a test procedure and conducted a series of performance tests on devices available in Canada. If consumers choose to purchase a digital radon monitor, they should select one that has been reviewed by C-NRPP, the recognized certification body in Canada. The list of independently assessed detectors can be viewed at: https://iopscience.iop.org/article/10.1088/1361-6498/ab96d6.

Q: What can be done with radon coming in through floor drains that need to be kept open and available?

A: There are drain solutions available, which can be found by searching online for “radon drain seal” or similar terminology.

Q: Respecting 3000 annual radon associated fatalities in Canada, do we know the fraction of such fatalities associated with very high exposure levels, perhaps as indicated by profession like mining? Can we frame the fatalities in terms of exposure levels and if so how do they compare to Health Canada Guidelines?

A: No. This number is a population-based estimate and not a case-by-case counting.

Q: I have a new house and an inspector found radon on the basement with a short time test. How can we force the builder to take measures to solve the issue?

A: The newest National Building Code of Canada includes mitigation for radon in its newest version. Each Province or Territory has their own building code, which may or may not include this new addition. Adoption of building codes and building code dispute resolution varies by jurisdiction.

Q: Are there any areas or municipalities of specific concern for radon in Canada?

A: Yes. That being said, homes in areas with traditionally high levels of radon can test normally and those in areas with low levels of radon can test high. You can have two homes next to each other have very different levels. So every home should be tested.

In terms of areas of the country where please see https://takeactiononradon.ca/take-action-on-radon-preliminary-data-report-november-2021/. It is a summary report on the Take Action on Radon initiative called 100 Radon Test Kit challenge, where they provide free radon test kits to communities to hand out to their residents.

There are also several radon maps available. C-NRPP: https://c-nrpp.ca/radon-map/, Health Canada: https://health-infobase.canada.ca/datalab/radon-blog.html, BC CDC: http://www.bccdc.ca/about/news-stories/stories/2021/new-interactive-radon-map, Quebec Lung Association: https://poumonquebec.ca/sante-pulmonaire/environnement/radon/

Q: Which website had radon levels by postal code in Canada?

A: Please see the C-NRPP map linked above.

Q: Are there any places that people can go to for grants/support to pay for costs related to fixing your home if you have high Radon?

A: There are only a few grants available so far in Canada. In Ontario, the Tarion warranty covers new homes up to 7 years old for radon mitigation if a homeowner conducts a long-term radon test. In addition, Saskatchewan includes radon mitigation in their home renovation tax credit. In Quebec there are some municipalities which provide grants to residents.

Q: Will radon levels be highest in the basement vs other levels of a home? If so, what is the difference?

A: Radon gas is approximately 7.5 times more dense than air and mainly enters homes where they are in contact with the soil and water. If the air circulation in the home is poor, it will tend to accumulate in the lowest levels of a home. Homes with better circulation will tend to have more evenly distributed radon levels.

Q: Do home builders/developers have to assess radon levels prior to developing on the land? if so, do they have to legally disclose the results?

A: Builders don't need to do soil testing prior to construction. In fact, soil testing before construction is not recommended, instead people should test during the first few years of occupancy.

Q: In Ramsar Iran, the annual exposure can be as high as 250msv / yr. How does the radon compare in Ramsar to Canada and how does this effect the health of the people on Ramsar to people in Canada.

A: Ramsar has the highest known level of background radiation in the world, and residents are exposed not only to radon gas, but external gamma and beta doses from radioactive isotopes in the soil and building materials used in the area.

The cancer rates and other health impacts for this and other high-background radiation areas are the subjects of ongoing study. Examples of such studies include https://www.tandfonline.com/doi/abs/10.1080/10256010903084084, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4030667/, https://link.springer.com/article/10.1140/epjp/s13360-020-00306-x, and https://www.sciencedirect.com/science/article/abs/pii/S0265931X17303569.

Q: What about hormesis? It suggests that long term low exposure does help build an immunity to the ill effects of ionizing radiation because of the repair enzymes?

A: When discussing the effects of chronic low dose exposure to radiation, it is difficult to design a study with human test subjects as this would be asking people to volunteer to be exposed to ionizing radiation. Instead, research in this area is based on populations which were exposed during major nuclear incidents such as the Japanese nuclear bomb survivors and emergency personnel at Chernobyl, historical studies done on volunteer populations before the health impacts were understood, animal models, and tests of cells or tissues in a laboratory. None of these datasets fully model using doses and times of exposure on the same scale or under the same conditions as those experienced in Canadian workplaces where radiation sources and devices are used. Therefore, there are some assumptions which need to be made in how human bodies respond to low doses of radiation over time in typical workplace conditions.

The CNSC explains how they utilize the Linear Non-Threshold (LNT) model to base their regulations here: https://nuclearsafety.gc.ca/eng/resources/health/linear-non-threshold-model/index.cfm. A recent review of the use of this model in Canada is found here: https://journals.lww.com/health-physics/Fulltext/2019/09000/Radiation_Biology_and_Its_Role_in_the_Canadian.12.aspx. In those articles they explain that hormesis is another possible model and why they choose LNT over hormesis. That being said, the discussion of what model best describes the health risks of low-dose chronic exposure of radiation is ongoing in the radiation protection community.

Q: How does a person become a radon remediation expert in Canada?

A: Information about becoming a C-NRPP Mitigation professional on the C-NRPP website: https://c-nrpp.ca/how-to-become-certified/

Q: Can you provide some additional information to me about radon? In particular, I could use news articles on Radon and citations for the research referred to in the presentation.

A: Please see the links to additional reference material provided on our website.

Q: I recently moved into a home and have noticed that my eyes are itchy and sinuses filled. Could this be due to radon?

A: The ICRP is a "…community of more than 250 globally-recognised experts in radiological protection science, policy, and practice from more than 30 countries." In ICRP Publication 126 – *Radiological Protection against Radon Exposure*, the ICRP states, "Epidemiological studies confirm that radon in homes increases the risk of lung cancer in the general population. Other health effects of radon have not been demonstrated consistently."

Health Canada attributes lung cancer as the health effect associated with exposure of high levels of radon in indoor air.

The US Agency for Toxic Substances and Disease Registry, part of the US Department of Health and Human Services states, "Lung cancer is the only established human health effect currently associated with exposure to increased radon levels."