Understanding the Risk of Indoor Radon Exposure in the Yukon

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Executive Summary

Indoor radon exposure in residential buildings is a significant public health issue in the Yukon with almost 1 in 4 (24.74%) homes tested having radon levels over the Canadian Exposure Guideline of 200 Bq/m³. Testing behaviour varies between Yukon communities and neighbourhood groups within Whitehorse. Radon testing in residential buildings occurred the most in Whitehorse (844 tests), Dawson City (96 tests), Watson Lake (85 tests), and the greater Whitehorse Area (70 tests). Within Whitehorse, radon testing in residential buildings occurred the most in the neighbourhood groups of Riverdale (172 tests), Porter Creek (149 tests), and Downtown (137 tests).

Indoor radon concentrations can also vary considerably between individual homes, neighbourhoods, and Yukon communities. Of the Yukon communities used in this report, more than 1 in 5 homes had high radon in 9 of the communities (Faro, Greater Whitehorse Area, Marsh Lake, Mayo, Pelly Crossing, Ross River, Watson Lake, Whitehorse). Of the Whitehorse neighbourhood groups used in this report, at least 1 in 5 homes had high radon in 9 neighbourhood groups (Cowley Creek-Mary Lake, Raven's Ridge-Fish Lake, Hidden Valley-Macpherson, Hillcrest-Valleyview, Porter Creek, Riverdale, Whitehorse Copper, Wolf Creek, Pineridge).

Radon data for public buildings must be considered separately from residential buildings. Among the public buildings tested across the Yukon, almost a tenth de radon levels exceeding 200 Bq/m³. Many of these public buildings that initially tested with high radon have received documented radon mitigation systems, reducing their radon levels to well below the Canadian Exposure Guideline. However, the risk for high radon remains for all public buildings, regardless of where they are located or the age of the building.

Please note that this report cannot be used to estimate individual risk of indoor radon exposure. Radon levels vary considerably between buildings, the only way to know if a building has high radon is to test it. Due to low numbers of homes tested in some communities or neighbourhoods, radon data may not be available in this report.

Introduction

The purpose of this report is to highlight the role that radon gas plays in the risk of developing lung cancer. Furthermore, this report aims to communicate the risk of exposure that Yukoners have to radon and to encourage individuals to test their homes for radon. This report compiles data from multiple sources over multiple years, although it is not exhaustive. Therefore, these results can be seen as a snapshot of the best estimate of radon risk across the Yukon today. Health Canada highlights surveillance, guidelines, and reduction strategies as three important components of a provincial and territorial radon action plan [1]. This report fits under the surveillance component of a radon action plan, and its results may inform the other components. The contents of this report may be useful for public health professionals and decision makers when increasing radon awareness and developing radon mitigation strategies, such as policies supporting mitigation funding sources. This data can be used to highlight gaps in radon testing, and increase awareness of mitigation needs, particularly when looking at the data on a community or neighbourhood level. In addition, members of the public may find the contents of this report useful for learning more about radon gas, including understanding their own risk of exposure. Individuals could be more likely to test their home for radon if they see how prevalent high radon is in the Yukon. The figures in this report are interactive; hovering your cursor over them will display additional information about the data being presented.

What is Radon?

Radon is a naturally occurring radioactive gas that forms when uranium within the ground breaks down. As a gas, radon travels up through the ground and gets released into the air. Exposure to radon gas in outdoor air is not a concern because it gets diluted down to harmless concentrations. However, radon gas can seep into buildings and homes, where it may accumulate into dangerous concentrations [2]. Although radon gas is natural, the accumulation of radon gas within homes is dangerous and can be minimized through mitigation.

Radon in Homes

The air pressure inside a home is often lower than in the ground it is in contact with. As radon gas escapes up from the ground, the difference in pressure draws the radon gas into the home [2]. During this process, radon gas can enter a home through cracks in foundation walls and floors, construction joints, gaps around service pipes, support floors, floor drains, or sumps. Radon can also enter a home through water if a house is on a private well, but this route contributes very little to the overall radon level within a home. Radon levels tend to be the highest in the lowest level of a building, but any part of a home could have high radon levels [3].

Radon concentration levels are unpredictable without testing. Homes in low-risk regions could still have high levels of radon and two homes that are right beside each other could have very different radon levels [2]. Every home in the Yukon that is in contact with the ground is at risk of high radon levels, and testing is recommended.

Radon Causes Lung Cancer

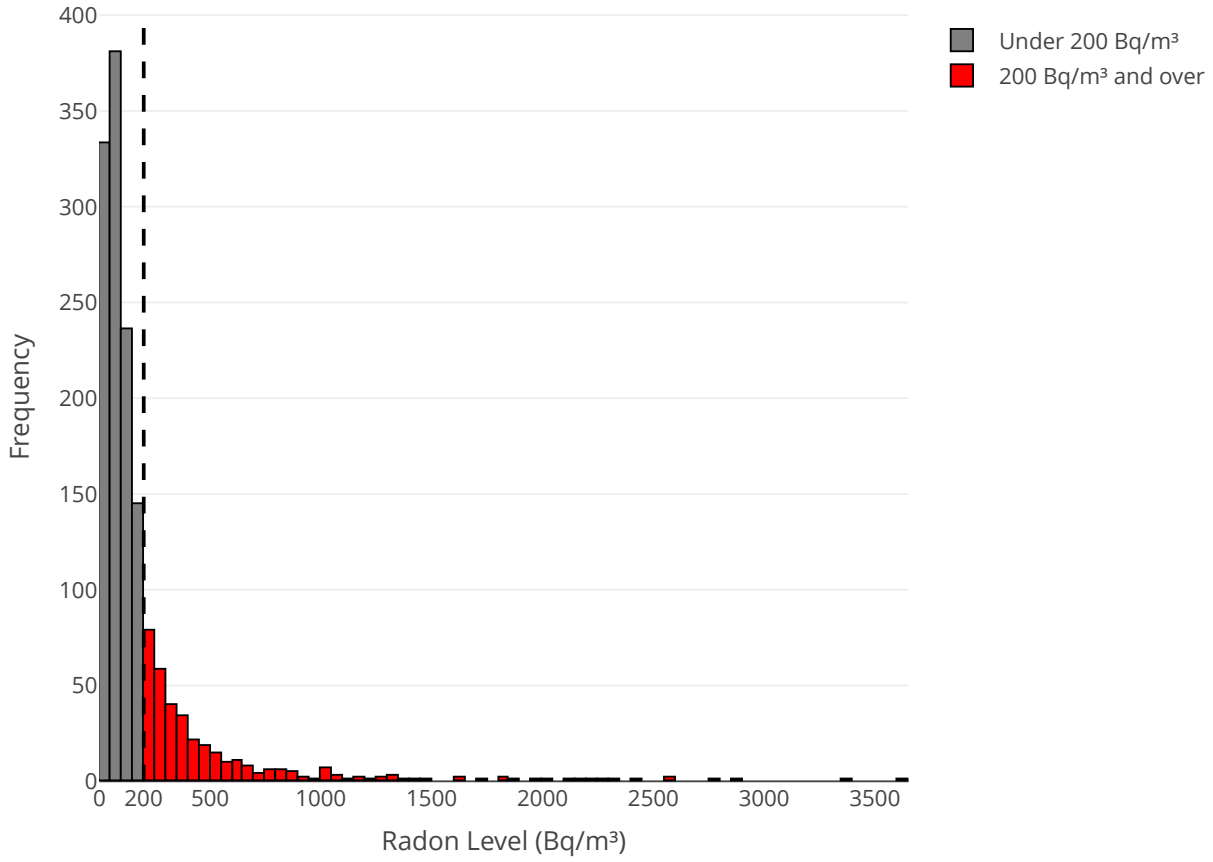
When people inhale radon gas, it breaks down within their lungs and releases radiation which severely damages DNA, leading to mutations that can cause cancer [2]. The International Agency for Research on Cancer classifies radon as a Group 1 human carcinogen [4]. Radon exposure accounts for about 16% of all lung cancers and results in approximately 3,200 lung cancer deaths in Canada each year. As such, it is a significant public health issue [5].

Radon in Residential Buildings

Radon Levels Across the Yukon

Radon levels in the 1,455 households tested across the Yukon ranged from 0 to 3,605 Bq/m³ with a geometric mean of approximately 106 Bq/m³. Figure 1 shows the distribution of radon levels among Yukon households that were tested. Among the households tested, 24.74% had radon levels over the Canadian Exposure Guideline of 200 Bq/m³. That means nearly 1 in 4 homes in the Yukon had high radon. The World Health Organization sets their radon guideline lower at 100 Bq/m³ [6]. Within the Yukon, 50.93% of households had radon levels over 100 Bq/m³. This means that approximately 1 in 2 homes in the Yukon have radon levels above the World Health Organization radon guideline.

Figure 1: Radon levels from household radon tests across the Yukon, 2016-2019



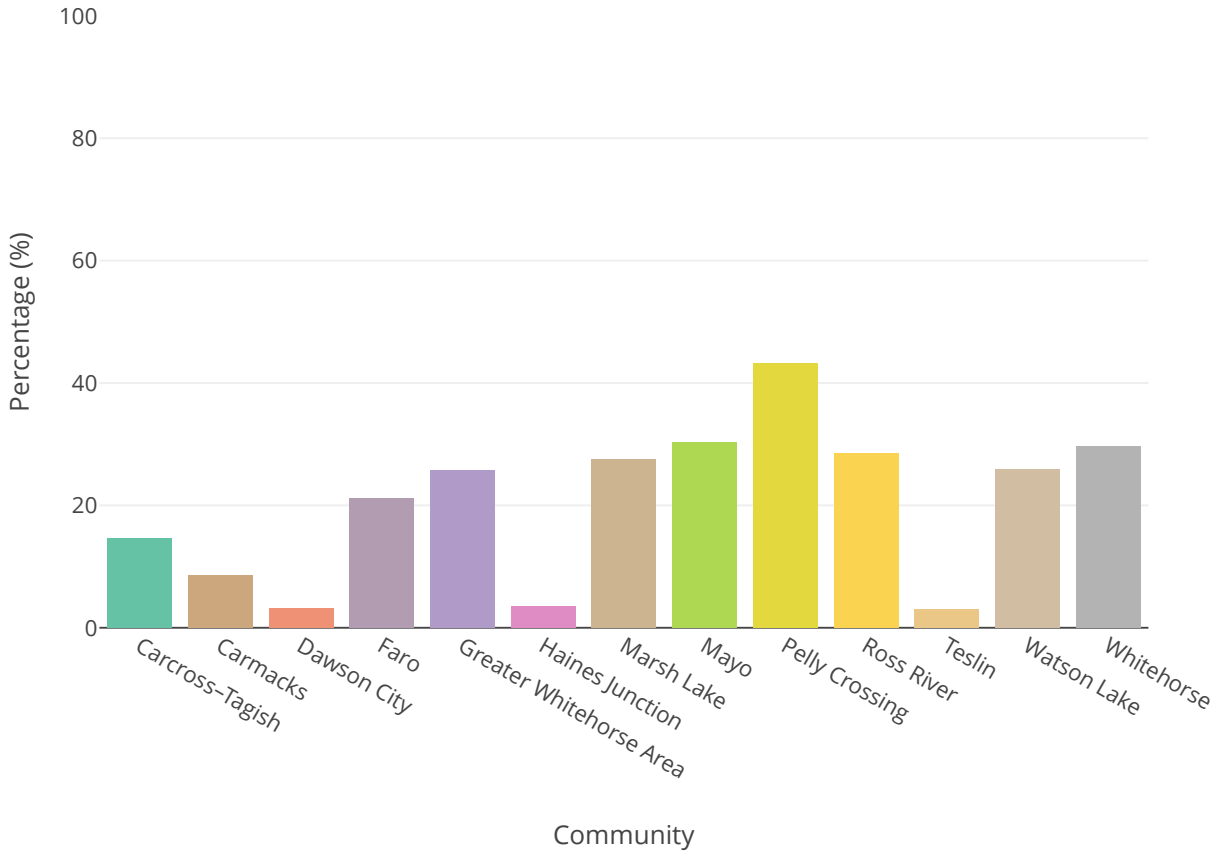
Note: The dashed line represents the Canadian Exposure Guideline at 200 Bq/m³. Exposure to radon below this threshold is considered low risk by Health Canada.

Radon Levels by Community

Since most of the Yukon's population lives within Whitehorse, most homes tested for radon occur within Whitehorse as well. Some communities across the Yukon have had very few homes tested for radon, and data is not available for this report. Due to small numbers, the Greater Whitehorse Area includes the regions of Golden Horn, Mount Lorne, Ibex Valley, Grizzly Valley, Mayo Road, Lake Laberge, Hotsprings Road, Deep Creek, Fox Lake, Jackfish Bay, and Mendenhall. The level of radon risk may differ by community in the Yukon and will depend on the local geological composition of the ground and community context, such as building characteristics or age of the homes [7-9]. In Old Crow, many of the buildings are built on stilts due to the permafrost in the ground. Since these buildings are not in direct contact with the ground, it is likely that they will have a lower risk for radon exposure [10].

Radon levels are reported as the percentage of homes tested within a community that are over the Canadian Exposure Guideline of 200 Bq/m³ (Figure 2). The communities with the highest percentage of homes with high radon include Pelly Crossing (43.2%), Beaver Creek (40.0%), and Mayo (30.3%), acknowledging that not all homes in the communities were tested.

Figure 2: Homes with high radon levels by community, 2016-2019



Note: Radon data was not available for all Yukon communities.

The difference in the number of homes tested for radon across communities may be due in part to population differences between communities. Even in communities where the radon risk appears

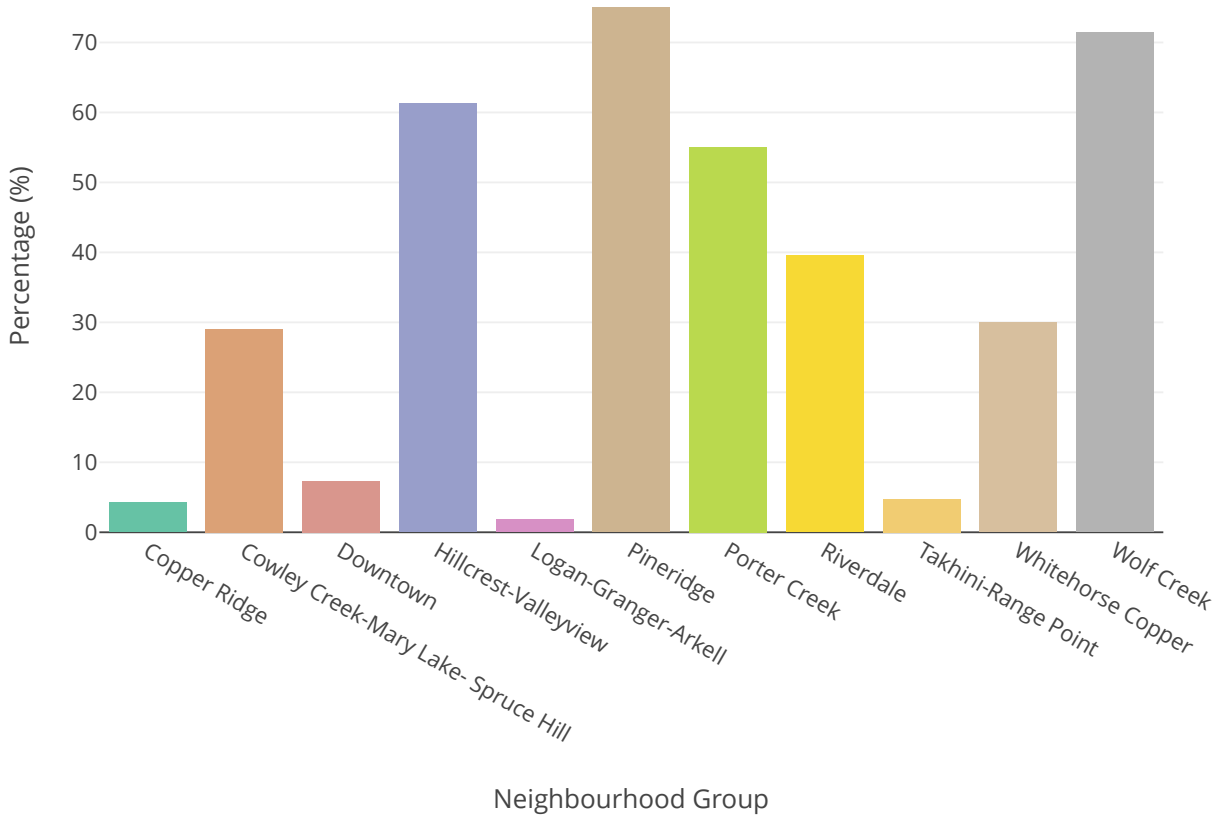
to be lower, such as Dawson City, some homes had radon levels up to 461 Bq/m³. Therefore, this data should not be used by individuals to estimate their own in-home risk of radon exposure.

Radon Levels by Whitehorse Neighbourhood Groups

The majority of homes tested for radon exist within the Whitehorse area. Neighbourhoods in close proximity and a low number of tests have been grouped together. The number of homes tested varies between neighbourhood groups, and results for some neighbourhood groups cannot be reported due to a very low number of homes tested.

Figure 3 shows the percentage of homes within each Whitehorse neighbourhood group that had high radon. The neighbourhoods or neighbourhood groups with the highest percentage of homes with high radon include Hillcrest-Valleyview, Wolf Creek, Pineridge, and Porter Creek. The range of radon test results shows the variability of radon levels between homes that are in close proximity. For example, in Riverdale the lowest observed test result was 2 Bq/m³ while the highest was 2,045 Bq/m³.

Figure 3: Homes with high radon by Whitehorse neighbourhood groups, 2016-2019



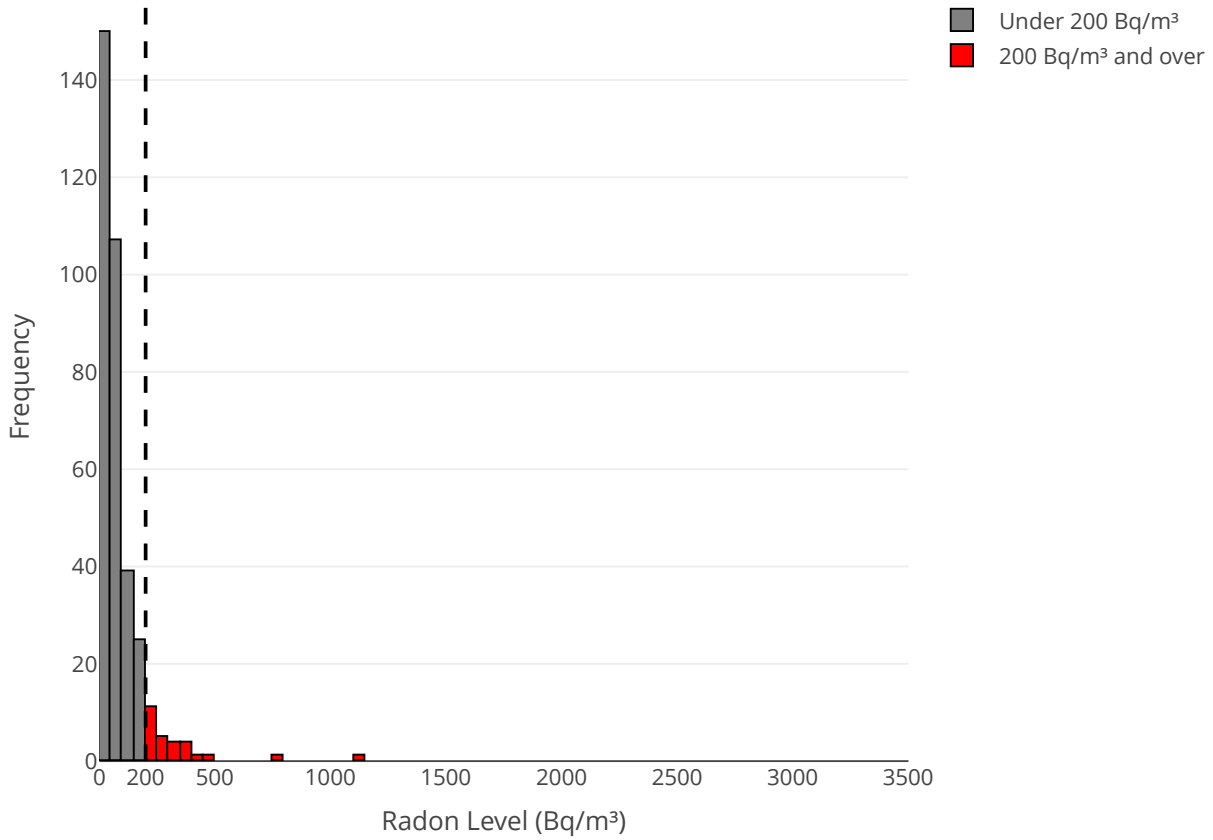
Note: Neighbourhood groups that cannot be reported due a low number of homes tested are excluded from this figure, as well as neighbourhoods with no test results over 200 Bq/m³.

Homes of all ages are at risk of radon gas exposure, and evidence suggests that newer constructed homes may be at risk for higher radon concentrations [11].

Radon in Public Buildings

The public building data set contains radon data for 349 public buildings across the Yukon between the years 2016-2021. Radon levels in public buildings across the Yukon ranged from 0 to 1,121 Bq/m³ with a geometric mean of 58.24 Bq/m³. Figure 4 shows the distribution of radon levels among Yukon public buildings that were tested. Among all buildings tested, 8.02% of public buildings had radon levels over the Canadian Exposure Guideline. That means about 1 in 13 public buildings in the Yukon had high radon. Within the Yukon, 26.36% of public buildings had radon levels over the World Health Organization guideline of 100 Bq/m³ [12]. This means that just over 1 in 4 public buildings in the Yukon had radon levels above the World Health Organization radon guideline. As mentioned previously, only pre-mitigation data was included to estimate the radon risk in public buildings in this report. Many of the public buildings that initially had radon levels exceeding 200 Bq/m³ had documented radon mitigation efforts which reduced their radon level to well below the Canadian Exposure Guideline.

Figure 4: Radon levels from public building radon tests across the Yukon, 2016-2021



Note: The dashed line represents the Canadian Exposure Guideline at 200 Bq/m³. Exposure to radon below this threshold is considered low risk by Health Canada.

Resources

The following links are provided as extra resources for individuals seeking more information about

radon or where to buy radon testing kits and how to test their homes.

Learn More About Radon

Health Canada – About Radon https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/radon/about.html (https://www.canada.ca/en/health-canada/services/health-risks-safety/radiation/radon/about.html)

Health Canada – Radon Factsheet https://www.canada.ca/content/dam/hc-sc/documents/services/health/publications/radon/radon-what-you-need-to-know-factsheet.pdf (https://www.canada.ca/content/dam/hc-sc/documents/services/health/publications/radon/radon-what-you-need-to-know-factsheet.pdf)

Take Action on Radon https://takeactiononradon.ca/ (https://takeactiononradon.ca/)

Get A Radon Test Kit

CNRPP Radon Testing Kit Consumer Report 2025 https://c-nrpp.ca/consumer-grade-electronic-radon-monitors/ (https://c-nrpp.ca/consumer-grade-electronic-radon-monitors/)

Take Action on Radon – Order A Radon Test Kit https://takeactiononradon.ca/test-for-radon/radon-test-kits/ (https://takeactiononradon.ca/test-for-radon/radon-test-kits/)

Yukon Public Libraries radon screener lending program https://yukon.ca/en/housing-and-property/home-and-property-maintenance/test-your-home-radon (https://yukon.ca/en/housing-and-property/home-and-property-maintenance/test-your-home-radon)

Participate in the Evict Radon National Study https://evictradon.org/order-kits/ (https://evictradon.org/order-kits/)

Testing Your Home

Health Canada – Long-Term Test Instructions Factsheet https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/radon-long-term-test-instructions.html (https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/radon-long-term-test-instructions.html)

Health Canada – Guide for Radon Measurements in Homes https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/guide-radon-measurements-residential-dwellings.html (https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/guide-radon-measurements-residential-dwellings.html)

Health Canada – Guide for Radon Measurements in Public Buildings https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/guide-radon-measurements-public-buildings-schools-hospitals-care-facilities-detention-centres.html (https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/guide-radon-measurements-public-buildings-schools-hospitals-care-facilities-detention-centres.html)

Radon Mitigation

Health Canada – Radon Reduction Guide for Canadians https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/radon-reduction-guide-canadians-health-canada.html (https://www.canada.ca/en/health-canada/services/environmental-

workplace-health/reports-publications/radiation/radon-reduction-guide-canadians-health-canada.html)

C-NRPP – Find A Professional https://c-nrpp.ca/find-a-professional/ (https://c-nrpp.ca/find-a-professional/)

Canadian Lung Association - Home Radon Mitigation Grant Program https://www.lung.ca/air-quality/radon/lungs-matter-radon-mitigation-support (https://www.lung.ca/air-quality/radon/lungs-matter-radon-mitigation-support)

Yukon Housing Corporation's Home Repair Program https://yukon.ca/en/apply-funding-repair-home (https://yukon.ca/en/apply-funding-repair-home)

Yukon Government - Enhancement Fund https://yukon.ca/en/health-and-wellness/work/apply-enhancement-fund-your-child-care-program#nav-radon-mitigation-funding (https://yukon.ca/en/health-and-wellness/work/apply-enhancement-fund-your-child-care-program#nav-radon-mitigation-funding)

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12. World Health Organization: WHO. Radon [Internet]. World Health Organization. 2023 [cited 2025 Nov 3]. Available from: https://www.who.int/news-room/fact-sheets/detail/radon-and-health (https://www.who.int/news-room/fact-sheets/detail/radon-and-health)