



INFORMATION REPORT

TO:	Mayor and Members Board of Health
COMMITTEE DATE:	November 16, 2020
SUBJECT/REPORT NO:	Radon Prevalence in Hamilton (BOH20022) (City Wide)
WARD(S) AFFECTED:	City Wide
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COUNCIL DIRECTION

Not Applicable.

INFORMATION

Purpose

The purpose of this report is to inform the Board of Health (BOH) of the results of Hamilton Public Health Services' 2019/2020 Household Radon Survey, which was completed to estimate the percentage of Hamilton homes with high radon levels.

Summary

From 2009-2011, Health Canada surveyed households across the country to assess radon levels in residential dwellings. In Hamilton, 100 homes were included in that survey with 5% found to have a radon level above Health Canada's radon guideline of 200 Bq/m³¹. The Ontario Public Health Standards (2018), indicate that:

¹ Health Canada. Cross-Canada survey of radon concentrations in homes; Final report. [Internet]. 2012 [cited 2019 June]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/radiation/radon/survey-sondage-eng.pdf

“The Board of Health shall, as part of its strategy to reduce exposure to health hazards and promote healthy natural and built environments, effectively communicate with the public by addressing...based on an assessment of local needs, exposure to...radon.”²

In the Fall of 2019, Hamilton Public Health Services initiated its annual Radon Awareness Promotional Campaign to:

1. Support radon public education and awareness; and,
2. Encourage radon testing of homes.

This campaign was also used to inform and recruit participants for the Hamilton Public Health Services’ 2019/2020 Household Radon Survey, which was being completed to obtain a more precise estimate of the percentage of Hamilton homes with radon levels greater than Health Canada’s radon guideline.

Findings from the Survey found 14.3% (42/294) of participating homes had radon levels exceeding Health Canada’s current radon guideline of 200 Bq/m³. This percentage is three times greater than the Ontario provincial percentage of 4.6% reported by Health Canada in its 2012 Cross-Canada Survey of Radon Concentrations in Homes Final Report¹ and indicates the need for radon intervention, such as “outreach and education efforts, and to encourage testing and remediation where necessary”.¹

In Hamilton, these interventions will include continuation of the annual Radon Awareness Program, increased promotion to Hamilton homeowners to test the radon level in their home if they have not yet done so, and Hamilton’s Chief Building Officer requiring that all new homes include an approved radon mitigation system listed in the Ontario Building Code for communities found to have an elevated percentage of homes exceeding Health Canada’s radon guideline.

Further Information

Radon is a colourless, odourless gas produced by the decay of natural uranium in rocks and soils throughout the earth’s crust.³ As radon breaks down, it forms radioactive particles that can get lodged into lung tissue during the normal breath cycle.³ The radon particles then release energy that can damage lung cells. When these cells are damaged, they have the potential to become cancerous.³ Outdoors, radon is quickly diluted and is of no further concern, but in confined spaces, such as residential homes,

² Ministry of Health and Long-Term Care. Ontario Public Health Standards: Requirements for Programs, Services, and Accountability. [Internet]. 2018 [cited 2018 Aug 14]. Available from: http://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/docs/protocols_guidelines/Ontario_Public_Health_Standards_2018_en.pdf

³ Health Canada. Radon reduction guide for Canadians. [Internet]. 2014 [cited 2019 June]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/radiation/radon_canadians-canadiens/radon_canadians-canadien-eng.pdf

radon can accumulate to harmful levels.⁴ Radon is considered to be the second leading cause of lung cancer behind exposure to tobacco smoke and a main cause of lung cancer among those who have never smoked.³ A person with long-term exposure to high levels of radon has a 1 in 20 lung cancer risk, while a smoker who is also exposed to long term high levels of radon is estimated to have a 1 in 3 risk of developing lung cancer.⁵ Radon is linked to approximately 16% of all lung cancer deaths in Canada.⁶ There is no known safe level of radon exposure and the interior of all homes are exposed to some level of radon.⁶ Cancer risk is directly related to radon concentration and length of exposure.⁷

Radon gas is drawn into buildings when the air pressure inside the house is lower than in the ground beneath.⁸ Drains, cracks in the foundation, gaps around pipes and other openings provide points of entry.⁸ Energy efficient methods that make a building more air tight (e.g. sealing around windows and doors) reduces passive ventilation and can lead to higher indoor radon concentrations unless complementary radon-reduction strategies are in place.⁹

Health Canada's current guideline for acceptable exposure to radon is 200 Bq/m³, whereas the World Health Organization's (WHO) recommended level is 100 Bq/m³.⁴ Health Canada and the Federal Provincial Territorial Radiation Protection Committee reviewed and discussed the WHO's recommendation and decided not to lower the Canadian guideline as it still falls within the International Commission on Radiation

⁴ Chen J. Canadian lung cancer relative risk from radon exposure for short periods in childhood compared to a lifetime. *Int J Environ Res Public Health* [Internet]. 2013 [cited 2019 June]; 10(5): 1916-1926. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3709356/>

⁵ Health Canada. Radon - Another Reason to Quit. [Internet]. 2014 [cited 2019 June]. Available from: https://www.canada.ca/content/dam/hc-sc/documents/services/health/publications/radon/27-P_1107-Another-Reason-to-Quit-Jan2018-EN-FINAL.pdf

⁶ Zeeb H, Shannoun F, World Health Organization. WHO Handbook on indoor radon: A public health perspective. World Health Organization. [Internet]. 2009 [cited 2019 June]. Available from: http://apps.who.int/iris/bitstream/handle/10665/44149/9789241547673_eng.pdf?sequence=1

⁷ Cancer Care Ontario. Ontario cancer facts: Risk of residential radon exposure varies geographically. [Internet]. 2017 [cited 2018 June]. Available from: <https://www.cancercareontario.ca/en/cancer-facts/risk-residential-radon-exposure-varies-geographically>

⁸ Gue L. Revisiting Canada's radon guideline. David Suzuki Foundation. [Internet]. 2015 [cited 2019 June]. Available from: <https://davidssuzuki.org/wp-content/uploads/2017/09/revisiting-canada-radon-guideline.pdf>

⁹ Health Canada. Radon: Reduction Guide for Canadians. [Internet]. 2014 [cited 2019 June]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/radiation/radon_canadians-canadiens/radon_canadians-canadien-eng.pdf

Protection's recommended range of 100-300 Bq/m³.¹⁰ According to the Canadian Radon Guideline, if radon concentrations in a building are higher than 200 Bq/m³, Health Canada recommends taking remedial action to reduce the levels of radon. If exposure is in the range of 200-600 Bq/m³ mitigation within two years is advised, and if exposure is above 600 Bq/m³, mitigation should occur within one year.¹¹

The only way to determine if a home has high radon levels is to test. Testing is safe and simple. Long-term tests recommended by Health Canada¹ involve placing a radon detector in the lowest occupied floor of a building for a minimum of three months. These detectors use a small piece of special plastic enclosed in a container. When the radon in the air enters the chamber, the alpha particles produced by decay leave marks on the plastic. At the end of the test the detector is sent to the laboratory for analysis, and the average radon concentration is calculated.¹¹ If radon levels are high, there are several effective methods to reduce radon levels in the home. With the help of a Canadian National Radon Proficiency Program certified professional, elevated radon can be reduced to a level as low as reasonably possible at a cost to the homeowner.³

Additionally, in the Ontario Building Code¹², Section 9.13.4.1., under Required Soil Gas Control the following measures are outlined:

“Where methane or radon gases are known to be a problem, construction shall comply with the requirements for soil gas control in Ministry of Municipal Affairs and Housing (MMAH) Supplementary Standard SB-9, "Requirements for soil Gas Control".”

Furthermore, the Ontario Building Code, Section 9.13.4.2. outlines the following measures:

- a) Where soil gas control is required, it shall consist of one of the following at floors in contact with the ground;
- b) A soil gas barrier installed according to MMAH Supplementary Standard SB-9, "Requirements for Soil Gas Control"; or,
- c) for houses, a subfloor depressurization system installed according to MMAH Supplementary Standard SB-9, "Requirements for Soil Gas Control".

¹⁰ Health Canada. Radon: Frequently asked questions. [Internet]. 2009 [cited 2019 June]. Available from: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/radiation/radon/government-canada-radon-guideline.html>

¹¹ Health Canada. Radon: Reduction Guide for Canadians. [Internet]. 2014 [cited 2019 June]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/radiation/radon_canadians-canadiens/radon_canadians-canadien-eng.pdf

¹² O. Reg. 332/12: Building Code. Available from: <http://www.buildingcode.online/1585.html>

Survey Methods

Hamilton's 2019/2020 Household Radon Survey consisted of the following two components:

1. A survey on home characteristics (e.g., construction year, build type, foundation type, and floor and room of deployment of the radon detector) to examine how any of these might be associated with radon levels; and,
2. Testing for radon levels in volunteer households in Hamilton.

Survey Participants

Participants in the survey were required to:

- Be 18 years of age or older;
- Read and follow instructions in English;
- Have their primary residence in the city of Hamilton;
- Be the homeowner of their primary residence;
- Have a ground floor or basement in their primary residence;
- Not have tenants living in their primary residence;
- Not use their primary residence as a home business in which customers; clients, colleagues or employees spend four or more hours per day in their home (this includes children in a home day-care);
- Not be planning to renovate or sell their home in the next 6 months; and,
- Have not already tested or are currently testing their primary residence for radon.

Participants in the survey were limited to one per household and must have had a reasonable expectation that the detector would be placed in the lowest lived-in room where four or more hours are spent per day and that the detector would remain in place for 91 days.

APPENDICES AND SCHEDULES ATTACHED

Not Applicable.