AN UPDATE ON THE NEW CANADIAN RADON GUIDELINE AND ITS IMPLEMENTATION

Naureen M. Rahman, Renato Falcomer, Jing Chen and Deborah Moir

Radiation Protection Bureau, Health Canada, Ottawa, Ontario K1A 1C1, Canada

Abstract

The first Canadian residential radon guideline of 800 Bq/m^3 was set in 1988 and remained unchanged until 2007. Based on new scientific information, Health Canada lowered the radon guideline from 800 to 200 Bq/m^3. For the implementation of the guideline, Health Canada has developed a National Radon Strategy in collaboration with other departments, provinces and territories, as well as health professional organizations and private industry. Since the publication of the guideline, significant progress has been made in the implementation of this Strategy. At this meeting, we will give an update on the progress made in the development and implementation of the National Canadian Radon Strategy and discuss its future goals.

Introduction/Background

Radon is a significant contaminant that affects indoor air quality and is considered to be a health hazard. Radon is recognized as the second leading cause of lung cancer after tobacco smoking. Recent estimates of the proportion of lung cancers attributable to radon range from 6 to 15% (WHO, 2005). The lung cancer burden due to indoor radon exposure is the largest effect of environmental radiation. To effectively reduce radon-induced lung cancer, the World Health Organization (WHO) and many countries have established radon control strategies for dealing with radon reduction in new and existing construction. Current estimates suggest that radon in homes is responsible for approximately 10% of all lung cancer deaths in Canada (Tracy, 2006).

New Radon guideline for Canada

Health Canada collaborated with the Federal Provincial Territorial Radiation Protection Committee (FPTRPC) to review the health risk from exposure to radon and to revise the Canadian Radon Guideline. This committee supports Canadian federal, provincial and territorial radiation protection agencies by co-ordinating their activities and developing recommendations.The risk assessment was based on new scientific information (Darby, 2004, Krewski,2005) and was the subject of a broad Canadian public consultation in 2006. Based on the assessment and feedback from the consultation , the Government of Canada updated its guideline for exposure to radon in indoor air from 800 Bq/m^3 to 200 Bq/m^3. This updated guideline provides advice that is more broadly applicable and more protective than the 1988 guideline (Health Canada, 2007).

The updated Canadian radon guideline recommends:

- Remedial measures should be undertaken in a dwelling whenever the average annual radon concentration exceeds 200 Bq/m3 in the normal occupancy area.
- The higher the radon concentration, the sooner remedial measures should be undertaken.
- When remedial action is taken, the radon level should be reduced to a value as low as practicable.
- The construction of new dwellings should employ techniques that will minimize radon entry and will facilitate post-construction radon removal, should this subsequently prove necessary

This Guideline applies to dwellings including residential homes and public buildings such as schools, hospitals, long-term care residences and correctional facilities.

Development and Implementation of the National Radon Strategy

Following the revision of the Canadian Radon Guideline, Health Canada and the FPTRPC worked collaboratively to develop a strategy for the effective implementation of the revised guideline.
The **National Radon Strategy** led by the Radiation Protection Bureau at Health Canada consists of five basic parts.

- Establishment of a National Radon Laboratory
- Radon testing projects
- Development of a radon potential map of Canada
- Radon research and development
- Development and implementation of a public education and awareness strategy

Establishment of a National Radon Laboratory

The National Radon Laboratory was established in 2007 and is situated within the Radiation Protection Bureau in Ottawa and comprises laboratories for assembly, shipping and reading of radon detectors and for the housing of a radon test chamber for calibrations and testing. The Laboratory possesses a variety of radon detectors including E-PeRM, alpha track and continuous radon and radon progeny monitors. The primary function of the Laboratory is to provide testing and analysis support to Health Canada's radon projects as well as technical advice to other departments, provinces and territories, industry and members of the public.

- Radon Certification Program:

Increasing public awareness of the risks from radon exposure has created a need for radon testing as well as standards or means by which to ensure the competency of providers of these services to the public. As a result, Health Canada decided to include, as a component of the National Radon Laboratory function, the development of a certification program for service providers offering radon testing in Canada.
Health Canada considered two options for the certification program: a government operated program and a program operated by private industry but approved by the federal

government. Ultimately, based on cost and time for the development of a federally operated program, Canada has decided to pursue the second option of having a private organisation(s) operate the program.
In February 2008, the Radiation Protection Bureau began discussions with the National Environmental Health Association (NEHA) and the National Radon Safety Board (NRSB) to expand their current radon proficiency programs to include a Canadian component. These discussions are currently ongoing.

Radon Testing Projects

- The Federal Government Building Radon Survey:

In order to minimize health risks to federal employees due to radon exposure, the Government of Canada decided in 2007 to launch an initiative to measure radon levels in all buildings under its jurisdiction, thereby allowing problems to be identified and addressed through remediation, if necessary. Health Canada is the lead federal department and is coordinating the testing of buildings, with an objective of several thousand buildings to be tested over 4 years.

- Residential Cross-Canada Radon Survey:

Health Canada intends to perform a survey of residential radon concentrations in a minimum of 15,000 homes randomly selected across Canada beginning in the fall of 2009.

The main objectives of the residential radon survey are to:

1. Obtain an estimate of the proportion of the Canadian population living in homes with radon gas levels above the guideline of 200 Bq/m^3.
2. Identify previously unknown areas where radon gas exposure constitutes a health problem.
3. Build, over time, a map of indoor radon gas exposure levels.

Development of a Radon Potential Map of Canada

Health Canada's radon potential map of Canada is a tool intended for use by various levels of government to identify areas of the country where priority should be given to raise awareness of radon risk and promote testing and remediation. Health Canada does not advocate the use of such a map to determine whether a home should be tested. Health Canada is urging all Canadians to test their homes regardless of location.
The map will include data from a number of sources including the radon testing in federal government buildings, the results from the residential cross Canada survey, radon soil permeability and soil gas measurements and aerial and land-based radiation surveys which are currently underway.

Radon Research and developments

Health Canada's Radon Strategy also includes a research component, primarily focussed on two areas: radon health effects and the development of new and improved methods for

detecting and remediating high radon levels in dwellings.

The following are some examples of the research activities conducted since the revision of the Canadian Radon Guideline:

- Performed a preliminary study on soil-radon gas concentration across southern Ontario, results indicated that radon risk could be high in some areas. (Chen, 2008)
- Completed a small scale radon/thoron survey in 100 Ottawa homes and another survey of radon, thoron and thoron progeny in 120 Winnipeg homes in order to assess the levels of these radioactive species in indoor air and the need for a strategy for thoron awareness and action similar to radon. (Chen, 2008)
- Initiated tests of radon emanation rates from a variety of Canadian building materials to assess the potential for contribution to radon levels in homes and public buildings.
- Performed a pilot study to observe the variations in the equilibrium factor between the concentrations of radon progeny and radon gas. The purpose of this study was to observe the variation in ranges of the radon equilibrium factor "F" in Ottawa dwellings.

Development and Implementation of a Public Education and Awareness Strategy

Health Canada has developed a social marketing and public outreach strategy. The strategy will focus on homeowners, commercial building owners, the building industry and public health practitioners. The objective of the outreach campaign is to raise awareness of radon, the potential health risks and to encourage testing and action to reduce levels, where necessary. A combination of public service announcements, print materials, web promotions and partnerships with key stakeholders is being used to achieve the goals (Health Canada, 2008). The development of many of these products is being timed to permit roll-out for the fall of 2008 in an effort to coincide with the fall/winter heating season and the optimum time for homeowners to test for radon in their homes.

Concluding Remarks

Canada's radon guideline for exposure in indoor air was recently updated from 800 Bq/m^3 to 200 Bq/m^3. Health Canada, in partnership with our stakeholders, has developed a National Radon Strategy in support of the Guideline. Health Canada is committed to the effective implementation of the Strategy in order to manage the risks posed by radiation exposure in living and working environments. The Strategy incorporates five basic components that should significantly contribute to the reduction of indoor radon exposure levels for Canadians.

References

Chen, J., Ly, J., Bergman, L., Wierdsma, J. and Klassen, R. A., **2008**, *Variation of Soil Radon Concentrations In Southern Ontario***,** Radiation Protection Dosimetry, Doi:10.1093/Rpd/Ncn192.

Chen, J., Tokonami, S., Sorimachi, A., Takahashi, H. and Falcomer, R., **2008**, *Preliminary Results Of Simultaneous Radon And Thoron Tests In Ottawa* Radiation Protection Dosimetry.

Darby, S., Hill,D., Auvinen, A., Barros-Dios, J. M., Baysson, F., Bochicchio, H., Deo, H., Falk, R., Forastiere, F., Hakama, M., Heid, I., Kreienbrock, L., Kreuzer, M., Lagarde, F., Mäkeläinen, I., Muirhead, C., Oberaigner, W., Pershagen, G., Ruano-Ravina, A., Ruosteenoja, E., Schaffrath Rosario, A., Tirmarche, M., TomáBek, L., Whitley, E., Wichmann, H. E. and Doll, R., **2005**, *Radon in Homes and Risk of Lung Cancer: Collaborative Analysis of Individual Data from 13 European Case-Control Studies,* British Medical Journal, Vol. 330, pp. 223-227.

.

Health Canada 2007, *Government of Canada Radon Guideline* Available at http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/guidelines_lignes_directrice-eng.php.

Health Canada, 2008 Modified, *Environmental and Workplace Health web page*, Available at: http://www.healthcanada.gc.ca/radon

Krewski D., Lubin J. H., Zielinski J. M., Alavanja M., Catalan,V.S., Field, R.W., Klotz, J. B., Le´tourneau, E.G.,Lynch, C. F., Lyon, J. I., Sandler, D. P., Schoenberg, J.B., Steck, D. J., Stolwijk, J.A., Weinberg C. and Wilcox, H.B., **2005**, *Residential Radon and Risk of Lung Cancer: A Combined Analysis of 7 North American Case-Control Studies*, Epidemiology **16:** 137–145.

Tracy, B.L, Krewski, D., Chen, J., Zielinski, J., Brand, K., Meyerhof, D., **2006,** *Assessment and Management of Residential Radon Health Risks: A Report from the Health Canada Radon Workshop*, Journal of Toxicology and Environmental Health **Part A**, Vol. **69**, Nos **7-8**, pp. 735-758.

WHO 2005, *Radon Fact Sheet*, Media Centre, Programmes And Projects, Available at http://www.who.int/mediacentre/factsheets/fs291/en/index.html