

## **RADON MANAGEMENT IN OWNED AND SUPPORTED INFRASTRUCTURE**

### **WHAT IS RADON?**

Radon is a naturally occurring radioactive gas generated by the decay of uranium in soil, rock, and groundwater. Because uranium is widely distributed throughout the Earth's crust, radon is present in varying concentrations across Canada, with higher levels typically associated with uranium-rich soils and bedrock.

Under normal outdoor conditions, radon disperses rapidly into the atmosphere and is diluted to concentrations that do not pose a significant health risk. However, when radon infiltrates enclosed structures, such as residential, commercial or industrial buildings, it can accumulate to elevated levels and become a potential health hazard risk.

Radon enters structures through openings in the building envelope that are in contact with the ground, including foundation cracks, construction joints, utility penetrations, floor drains, sump pits, window wells, and other below-grade openings. The rate of radon entry is influenced by factors such as soil characteristics, building construction, foundation integrity and pressure differentials between the building interior and the surrounding soil.

### **RADON EXPOSURE AND HEALTH EFFECTS**

Radon was first recognized as a significant residential health hazard in the mid-1980s. Currently, the only known health effect associated with long-term radon exposure is an increased risk of lung cancer.

Research has identified radon as the leading cause of lung cancer among non-smokers and the second leading cause overall after tobacco use.

The risk of developing lung cancer increases with both the concentration of radon in indoor air and the duration of exposure. The combined effects of radon exposure and tobacco smoking are particularly significant, resulting in a substantially greater risk than either exposure alone.

As radon decays it produces radioactive particles known as radon progeny, which can be inhaled and deposited in the lungs. These particles emit alpha radiation that can damage lung tissue and cellular DNA.

Over time, repeated exposure may lead to genetic mutations and increase the likelihood of developing lung cancer.

### **REGULATORY GUIDELINE EXPOSURE LIMITS**

At present, there are no federally regulated maximum allowable radon concentrations for residential or public buildings in Canada. However, Health Canada, in collaboration with provincial and territorial governments, has established a national guideline for radon in indoor air. The current guideline recommends that radon concentrations in occupied areas of dwellings not exceed 200 becquerels per cubic metre (Bq/m<sup>3</sup>).

Health Canada recommends that corrective action be undertaken when the annual average radon concentration in a normally occupied area exceeds 200 Bq/m<sup>3</sup>. The urgency of remediation is dependent on the measured concentration, with higher radon levels warranting more immediate intervention.

Where mitigation measures are implemented, the objective should be to reduce indoor radon concentrations to levels that are as low as reasonably achievable (ALARA), while considering the practical limitations of the building and mitigation system.

Health Canada recommendations for remedial action:

1. Results between 200 and 600 Bq/m<sup>3</sup>, recommend taking steps to reduce the radon level within 2 years.
2. Results greater than 600 Bq/m<sup>3</sup>, recommend taking steps to reduce the level within 1 year.

## HOW ARE RADON LEVELS DETECTED

Indoor radon concentrations are typically assessed through air sampling using alpha track radon dosimeters, which measure cumulative radon exposure over a specified monitoring period. Because indoor radon levels can fluctuate significantly due to changes in weather conditions, building ventilation, occupancy patterns, and pressure differentials, short-term measurements may not accurately represent long-term exposure.

To obtain a reliable assessment of annual radon concentrations, Health Canada recommends long-term testing for a minimum period of three months. Testing is ideally conducted during the heating season, typically between October and April, when buildings are more tightly sealed and natural ventilation rates are reduced. These conditions generally result in higher and more representative indoor radon concentrations, providing a more accurate basis for evaluating occupant exposure and determining whether mitigation measures are warranted.

## RADON MANAGEMENT PROGRAM

In 2015, Alberta Infrastructure implemented a Radon Management Program to provide guidance and support to Facility Managers, Facility Coordinators, Property Management personnel and contractors in the identification, assessment and control of radon exposure within owned and supported facilities.

The program establishes a standardized framework for radon management and regulatory compliance, including requirements for monitoring, documentation, risk assessment, and mitigation activities. The program is intended to serve as a living document and is subject to periodic review to ensure continued alignment with legislative requirements, industry best practices, and operational needs.

A key component of the program is the roles and responsibilities matrix, which defines the duties and accountabilities of all parties involved in the management process. The matrix also includes current contact information and emergency response contacts to facilitate effective communication and incident management.

To maintain accuracy and effectiveness, the roles, responsibilities, and contact information should be reviewed annually and updated as required.

## WHO SHOULD INVESTIGATE

Multiple stakeholders may be involved in the identification, assessment, and mitigation of radon concerns within a building, including property owners, facility managers, employers, occupants, health and safety representatives, and qualified radon professionals.

The radon response process is generally initiated following the identification of elevated radon concentrations through routine monitoring, compliance testing, occupant concerns, or indoor environmental assessments. Potential concerns should be formally reported to building management or the designated authority to ensure appropriate investigation, documentation, and follow-up.

Building management should implement a structured assessment process that may include confirmation testing, evaluation of building conditions contributing to radon entry, and engagement of qualified radon measurement or mitigation professionals where required. The process should also include stakeholder communication, documentation of findings, and development of mitigation or exposure reduction measures consistent with applicable regulatory and occupational health guidance.

Radon investigations should be conducted by qualified professionals with expertise in radon measurement, building science, and mitigation practices. At a minimum, professionals conducting radon testing or mitigation should hold current Radon Measurement Professional or Radon Mitigation Professional certification through the Canadian National Radon Proficiency Program (C-NRPP) and maintain membership in good standing.

For Alberta Infrastructure Owned and Supported facilities, additional project-specific requirements related to sample collection, interpretation of analytical results, evaluation of findings and technical report sign-off may be required to ensure the quality and completeness of assessment deliverables and support Alberta Infrastructure compliance with applicable Occupational Health and Safety legislation.

## COMMUNICATION

Throughout the radon investigation and mitigation process, timely and consistent communication is essential to maintaining transparency and occupant confidence.

Updates regarding investigation activities, testing results, mitigation measures, and corrective actions should be communicated to the individual or parties who initiated the concern, as appropriate.

Occupants and complainants should be advised that reported radon concerns are being formally acknowledged and addressed through a structured assessment process. Communication should include investigation status, anticipated timelines, and any measures being implemented to reduce potential radon exposure.

Where elevated radon concentrations are confirmed, affected stakeholders should be informed of mitigation strategies, follow-up testing requirements, and any interim exposure reduction measures. If concerns persist following investigation and mitigation activities, individuals may be encouraged to consult a qualified healthcare professional regarding potential health-related questions associated with radon exposure.

Effective management of radon-related concerns relies on ongoing coordination and information sharing among building management, occupants, health and safety representatives, and qualified radon professionals throughout the assessment and mitigation process.

## APPLIED ECOSCIENCES UNIT

### Typical Support Services

The Applied Ecosciences Unit provides technical expertise, guidance and program support for the assessment, management, and mitigation of radon within owned and supported facilities. Services are intended to assist facility stakeholders in identifying potential radon concerns, evaluating exposure risks, and implementing appropriate management strategies. Services include, but are not limited to:

- Planning, coordination, and oversight of radon testing and monitoring programs, including survey design and data interpretation;

- Preparation of technical specifications, scopes of work, and procurement documents for radon assessment and mitigation activities;
- Development and delivery of radon management training programs and technical workshops for facility staff and contractors;
- Delivery of radon awareness and educational presentations to support stakeholder understanding of radon risks and requirements; and
- Technical review, consultation, and support for the development and implementation of radon mitigation strategies and corrective action plans.

These services support the proactive management of radon and helps maintain a safe and healthy environment as well as support building operations and integrity of Government facilities while maintaining compliance with applicable regulatory requirements and industry best practices.

## CONTACT INFORMATION

### Technical Services Branch

The above services may be provided by Alberta Infrastructure and/or a private occupational hygiene consultant.

Where the engagement of an external consultant is identified as the preferred delivery model, the Applied Ecosciences Unit can provide technical support in the development of the project scope, preparation of detailed terms of reference, and oversight support throughout project implementation and construction activities.

Additionally, our Unit offers a comprehensive range of applied indoor air quality and occupational hygiene advisory services to support project planning, regulatory compliance, assessment and operational execution.

For information or assistance, contact the Manager of Applied Ecosciences Unit at 780-422-7472.