

Unveiling Radon Risks in Residential Settings:

A Case Study in La Prairie, Quebec

RadonX™

RadonX™ soil gas venting is a complete Schedule 40 PVC piping system that addresses the need for collection and venting radon gases from low-rise dwellings.

- CSA B181.2; ASTM D2665 (Tolerances, Dimensions, Material and Testing Requirements)
- ULC S636 (Gas Venting System Performance Tests)
- ASTM D2564 (Solvent Cement)
- CAN/ULC S102.2 (Flame Spread Rating Not Exceeding 25)



The Challenge

Located along the picturesque Saint Lawrence River on Quebec's South Shore, the municipality of La Prairie exemplifies a harmonious blend of historical charm and modern living. The Beauchemin family moved into their La Prairie residence in 2014, transforming their single-family residence into a hub of joy. The single-family home is located in the Montérégie region, where approximately 1 in 5 homes test above Health Canada's 200 Bq/m³ radon guideline.

Radon is a gas that is undetectable by human senses – tasteless, colorless, and odorless. As radon gas is inhaled, it breaks down to form radioactive particles which damage the DNA in lung tissue, increasing the likelihood of developing lung cancer. Health Canada estimates that radon gas is culpable for nearly 16% of all annual lung cancer deaths in Canada, establishing itself as the predominant cause of this ailment among non-smokers.



The paradigm shift towards hybrid work models has seen a surge in home office setups. Empirical research conducted in 2023 underscores a worrisome trend, indicating a 19.2% increase in the annual radiation dosage from residential radon exposure in Canada since the onset of the COVID-19 pandemic [1]. Patrice Beauchemin,

Region	Number of tests	# of Results > 200 Bq/m ³	% of Results > 200 Bq/m ³
Abitibi-Témiscamingue	164	1	1
Lower St. Lawrence	471	168	36
National Capital	2279	422	19
Centre-du-Québec	334	32	10
Chaudière-Appalache	457	67	15
North Shore	170	6	4
Eastern Townships	1074	233	22
Gaspé-Magdalen Islands	104	51	49
Lanaudière	518	37	7
Laurentides	1661	543	15
Laval	531	105	20
Mauricie	298	2	1
Montérégie	3437	590	17
Montreal	2042	242	12
Northern Quebec	2	0	0
Outaouais	1100	247	22
Saguenay-Lac-Saint-Jean	208	14	7

adapting to hybrid work, converted his basement into a home office, echoing the choices of many Canadians.

His concerns about potential radon gas in his home highlight the urgency of addressing this issue. Motivated to ensure his family's well-being, he pursued radon testing and consulted with Lyne Brouillard, owner of RADON EXPERT LM, a specialized and certified business in radon mitigation solutions.

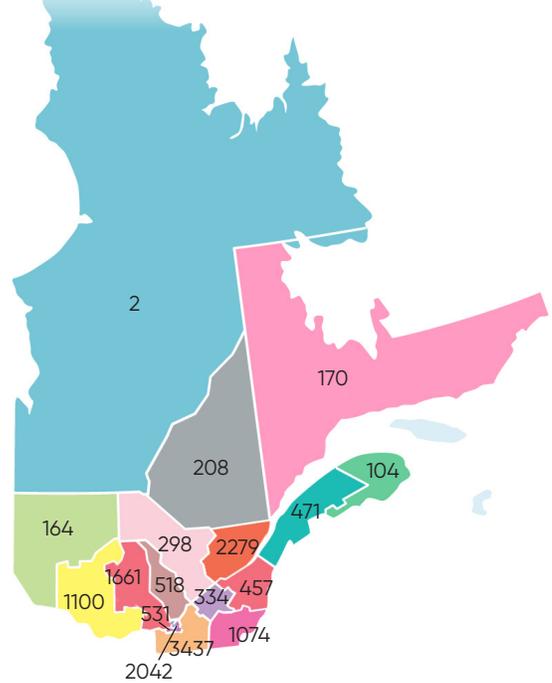


Figure 1: Radon testing map The Lung Association of Quebec. [1]

The Assessment

During the initial consultation, RADON EXPERT LM evaluated the average radon levels in the residence to ascertain the concentration of radon indoors and determine if remedial action was necessary to safeguard the homeowners. Health Canada recommends conducting radon measurements at the lowest livable level of the home using a recognized measuring device.

Ultimately, it is the homeowner's decision to determine the level of risk they are comfortable with regarding radon exposure. Several factors alter day-to-day radon levels in a home, including soil type, age/type of house, geographical areas, etc. RADON EXPERT LM employed a continuous radon monitor, specifically the Corentium Pro by Airthings™, to conduct the radon test. The results indicated an elevated radon level of 265 Bq/m³ in the residence, exceeding Health Canada's guideline of 200 Bq/m³.

The initial phase of installing a Level 3 Active Radon System consists of conducting a site assessment to determine the specific characteristics of the buildings.

This assessment includes testing for radon levels, performing precise pressure tests in strategic test points, identifying potential entry points for radon, and assessing the building's foundation, structure and soil characteristics.

Each home has specific considerations such as:

- Building architecture (e.g. load bearing wall, home renovation);
- Plumbing and electrical infrastructures under the building floor;
- Seal of sump pump, water capturing basin and openings;
- Concrete slab cracks and other points of entry for radon gas;
- Heating floors and other technical considerations.

Addressing these challenges and adapting each specific consideration is crucial for ensuring the effectiveness of the radon mitigation system and maintaining a healthy indoor environment for occupants.



Figure 2: Front view (left) and aerial view (right) of the home to be mitigated.

The initial reading with a micro manometer provided continuous field data throughout the entire area under the concrete slab. RADON EXPERT LM designed the optimized radon mitigation system by identifying the placement of the radon suction pit, fan location, pipe routing, and other necessary components. Technical aspects, including compliance with provincial construction code regulations and adherence to radon professional standards, as well as practical installation considerations, were carefully evaluated to determine the system's optimal location.

RADON EXPERT LM chose RadonX™ from IPEX Inc., a PVC piping solution for radon mitigation, for several reasons that set it apart from other options. RadonX pipe and fittings have undergone rigorous material and performance testing to ensure strict product quality standards. RadonX's durability, labeling features, ease of installation, and reliable performance make it the preferred choice for radon mitigation projects conducted

by RADON EXPERT LM. By utilizing RadonX, they can provide their clients with peace of mind, offering a high-quality radon mitigation solution that effectively safeguards indoor air quality and promotes a healthier living environment.

The radon fan is another crucial component of the mitigation system. For over three decades Fantech® has been researching, designing, and bringing to market reliable and efficient solutions that ensure better indoor air quality. The Rn2EC model from Fantech's family of radon mitigation fans was chosen for this installation. The fan features an electronically commutated (EC) motor, which is inherently efficient and operationally stable at both full and reduced speeds. The EC motor features variable speed which equips radon professionals with installation methods not previously practical, allowing adaptability for different radon mitigation configurations. The Rn2EC saves lives while saving energy. Dial up or dial down. Picking the right fan for the job!



Figure 3: RadonX system utilized for a Level-3: Active System radon mitigation system

Following the system installation, RADON EXPERT LM professionals calibrated the system to run as efficiently as possible while drawing minimal power to save energy for the homeowner. To validate the installation, RADON EXPERT LM proceeded with conducting continuous radon measurements using the Corentium Pro.

The average radon concentration was 1.7 Bq/m³, indicating a reduction of 99.4%.

The following diagrams illustrate the radon measurements during the following weeks after installation:

MEASUREMENT SUMMARY			
MEASUREMENT	MINIMUM	MEDIUM	MAXIMUM
 RADON LEVEL	0.0 Bq/m ³	1.7 Bq/m ³	14.0 Bq/m ³
 TEMPERATURE	12.2 °C	19.1 °C	22.4 °C
 HUMIDITY	40.5 %rH	44.7 %rH	47.0 %rH
 ATMOSPHERIC PRESSURE	99.4740 kPa	100.9629 kPa	103.1380 kPa

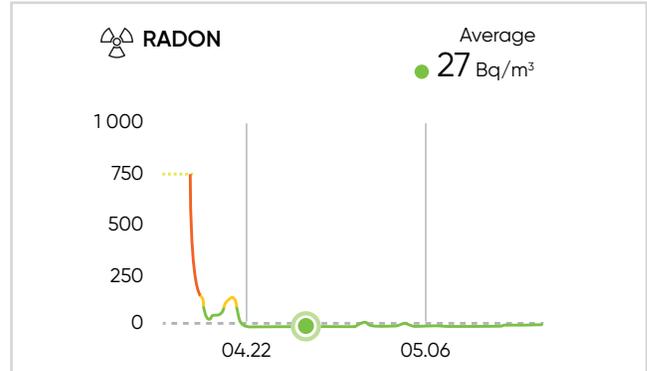


Figure 4: Chart of data obtained post-radon mitigation, and pre- and post-radon mitigation system being installed graph.

The Recommendation

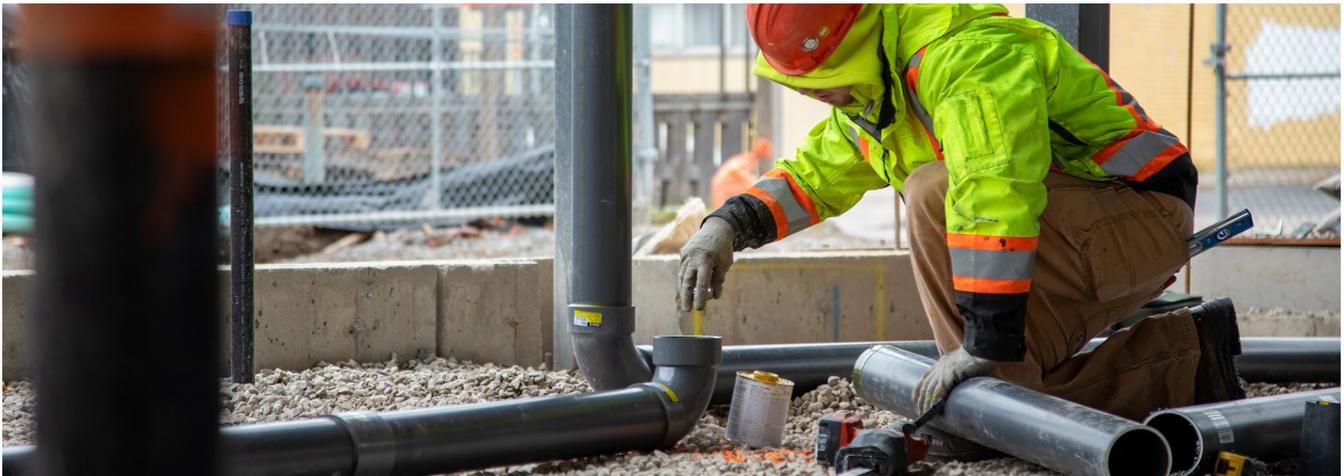
Radon mitigation is a crucial, life-safety issue because homes are where people spend a significant amount of their time, and prolonged exposure to elevated radon levels can increase the risk of developing lung cancer. Implementing effective radon mitigation measures ensures a healthier indoor environment for residents and reduces the potential long-term health risks associated with radon exposure.

1. Health Risks: Radon is a known carcinogen, and prolonged exposure to high levels of radon gas increases the risk of developing lung cancer. Testing for radon levels in homes can identify elevated levels, prompting mitigation measures to reduce exposure.

2. Peace of Mind: Radon, being silent and invisible, poses a threat to indoor air quality. Testing for radon levels provides homeowners with peace of mind, assuring them of a safe environment for themselves and their families.

3. Property Value: Radon testing and mitigation are crucial for maintaining or even increasing property value. Potential buyers often request radon testing during home inspections, and low radon levels can be a selling point for a property.

4. Legal Requirements: Certain jurisdictions may enforce regulations for radon testing and mitigation in residential homes, particularly in areas with high radon levels. Compliance with these regulations ensures safety and minimizes legal risks.





“Radon is naturally occurring everywhere in the world. There is no home in the world that we can say has zero radon. Every home in Canada has a certain amount of radon. Taking precautions during construction with an experienced radon specialist can greatly reduce the amount of radon that infiltrates into our homes. Additionally, using good quality products such as IPEX’s RadonX piping can make it easy and cost effective to correct if it is determined that the radon levels still exceed Health Canada’s guidelines after occupancy” says Marcel Brascoupe, the owner and founder of MB Radon Solutions.

Marcel is a radon mitigator that has played a supporting role in the development of Health Canada’s National Radon Program. He is also one of the founding members of the Canadian Association of Radon Scientists and Technologists (CARST). “There are also many advantages to using RadonX piping to mitigate existing homes with radon problems. Future building codes will be focusing their attention on this fact to ensure the health and safety of all new homeowners in the future.”

The Solution

This case study delves into the significance of radon testing and mitigation, shedding light on its pivotal role in preserving health and ensuring peace of mind. Choosing high-quality, tested for purpose, radon mitigation products, such as RadonX soil gas venting system and Fantech® radon fans, is essential for ensuring the long-term effectiveness of radon mitigation systems.

The Beauchemin family’s journey underscores the critical importance of employing tested and proper radon mitigation systems in residential settings. Through the diligent efforts of professionals like RADON EXPERT LM, families like the Beauchemin’s can ensure the safety and well-being of their loved ones. Marcel Brascoupe, a respected figure in the radon mitigation field, emphasizes the importance of proactive measures in construction and retrofitting to minimize radon infiltration.

Collaboration between homeowners, radon professionals, and innovative industry solutions, we can mitigate radon risks effectively, promoting healthier living environments for present and future generations.

RADON EXPERT LM are certified specialists dedicated to installing radon mitigation systems that protect lives throughout the Quebec region.

With 20 years of experience in home building, Lyne Brouillard focuses on delivering effective radon gas solutions. She collaborates with Réjean, who brings over 20 years of expertise in residential design and structures.

