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RADON IN SCHOOLS

Presentation Outline

- A short history: Radon in Quebec
- Steps towards an Action Plan
- Creation of the Quebec intersectoral committee on radon (CIQR)
- Relevance to proceed with Radon testing in schools
- Logistics; an overview
- Knowledge gained (communication issues)
- Future testing in public buildings
- Quebec action plan 2013-2015

A short history: Radon in Quebec

- 1980: high concentrations of indoor radon (Oka)
- 1993: Lévesque et Al. *residential exposure to radon in the province of Quebec* – 900 homes
- 1995-1998: public health intervention
  - Information and extensive screening of residential radon in the Oka municipality and other cities afterward
  - Oka: very high concentrations: some of them were thousand of Bq/m³. Highest 10 000 Bq/m³

A short history: Radon in Quebec

- The 2000s. Increased awareness of risk associated to low doses of radon (BEIR VI, etc.)
- No provincial policy on radon
- MSSS commissioned Institut national de santé publique du Québec (INSPQ) to appoint a working group to asses the radon issue provincially:

A short history: Radon in Quebec

2005: THE FIRST MILESTONE:

Radon in Quebec:

Evaluation of the health risk and critical analysis of intervention strategies.

information

formation

recherche

coopération internationale

LE RADON AU QUÉBEC

ÉVALUATION DU RISQUE À LA SANTÉ ET ANALYSE CRITIQUE DES STRATÉGIES D'INTERVENTION

INSTITUT NATIONAL DE SANTÉ PUBLIQUE DU QUÉBEC

Québec

Radon in Quebec

Evaluation of the health risk and critical analysis of intervention strategies*

SUMMARY DOCUMENT

information

formation

recherche

coopération internationale

GENERAL INFORMATION

Radon is a naturally occurring radioactive gas produced from the decay of uranium in the earth's crust. Its presence is ubiquitous at the earth's surface even though its production, and consequently its concentration, are not uniform. Radon can infiltrate into buildings basically through cracks and other routes of entry in the basement. Also, since it is heavier than air, it tends to concentrate in the lowest and least ventilated areas such as basements of homes.

Several different types of equipment are available on the market for measuring residential radon concentrations. Some give instantaneous measurements or over short periods of time, while others provide results over periods of several months. In general, measurement over a long period is considered as giving a precise picture of the real exposure to radon. Since radon's presence is measured using radiometric methods, its concentration is expressed as a function of the radioactive activity attributable to radon in a defined volume of air. It is generally expressed in becquerels per cubic metre of air (Bq/m^3).

Mitigation measures can be implemented to reduce radon infiltration into homes. Some of the most effective methods are those that promote depressurization under the concrete slab. These measures are however not always easy to implement and their effectiveness over the long term has been the subject of very few studies. It is estimated that only a few hundred dollars would be sufficient to implement preventive mitigation measures during the construction of a house. However, the costs associated with the implementation of depressurization measures in existing homes normally

* This text is a summary of the scientific report "Le radon au Quebec – Évaluation du risque à la santé et analyse critique des stratégies d'intervention," available in French only on the Institut national de santé publique du Quebec Web site at: http://www.inspq.qc.ca. As a result, any reader interested in obtaining more details about a passage, a particular section, or in knowing the bibliographical references is invited to consult the main document.

Québec

A short history: Radon in Quebec

- Main recommendations:
  - Adoption of preventive measures in the Building Code of Quebec
  - Radon testing in public places (schools, daycares, workplaces, etc..).
  - Consider lowering the Canadian guideline

A short history: Radon in Quebec

2007: SECOND MILESTONE:

Lowering of the Canadian guideline of 800 Bq/m³ to 200 Bq/m³

A short history: Radon in Quebec

2007-2008: THIRD MILESTONE:

Creation of the Quebec intersectoral committee on radon (CIQR)

Quebec intersectoral committee on radon (CIQR)

- The MSSS proposed :
  - to bring together the relevant ministries and agencies
  - to participate in the development and implementation of Quebec's Action Plan to prevent the risk of lung cancer related to radon in homes

Action Plan: Province of Quebec

1. Inform the public on the following:
   - Radon exposure poses risks to health;
   - The only way to know the level of exposure is to measure the concentration in buildings;
   - If the measured concentration is superior to the guideline, there are effective corrective actions that can be taken.

Action Plan: Province of Quebec

2. Inform and mobilize stakeholders from different sectors to participate in the provincial action plan to protect public health against radon
3. Promote safe and effective prevention and mitigation of radon in buildings according to the optimization principle ALARA (as low as reasonably achievable)
4. Establish a mapping of radon emission potential and identify risk areas.

Quebec intersectoral committee on radon (CIQR)

Composition of the committee

Institut national de santé publique du Québec (INSPQ)
Ministère de la Santé et des Services sociaux (MSSS)
Ministère de l'Éducation, du Loisir et du Sport (MELS)
Ministère de la Famille et des Aînés (MFA)
Société immobilière du Québec (SIQ)
Commission de la Santé et de la Sécurité du travail (CSST)
Société d'habitation du Québec (SHQ)
Régie du bâtiment du Québec (RBQ)
Santé Canada - Région du Québec
Association pulmonaire du Québec (APQ)
CAA
Société Canadienne d'hypothèque et de logement (SCHL)
Ministère des Affaires municipales, des Régions et de l'Occupation du territoire (MAMROT)

Quebec intersectoral committee on radon (CIQR)

Composition of the committee

- Ministère de l'Éducation, du Loisir et du Sport (MELS)
- Ministère de la Famille (MF)
- Société d'habitation du Québec (SHQ)
- Société immobilière du Québec (SIQ)
- Health Canada
- Quebec lung asociation

Quebec intersectoral committee on radon (CIQR)

Specific Objectives:

- In each sector, establish an information plan and raise awareness for policymakers .
- Develop sectoral plans :

Quebec intersectoral committee on radon (CIQR)

Sectoral plans

- Measure radon in establishments (health network, schools, public buildings)
- Implementation of appropriate corrective measures if needed
- Develop communication plans to adequately inform customers targeted in different sectors

Ministère de l'Éducation, du Loisir et du Sport (MELS)

Was the first ministry convinced of the need to move forward to radon testing in their schools

Relevance to proceed with a pilot project of radon testing in schools

- Exposure to indoor radon is often presented as a problem that only affects owners of private residences
- Discovery of elevated radon levels in some schools in the United States in 1989
- Schools are increasingly targeted in several countries

Relevance to proceed with a pilot project of radon testing in schools

- A cost-effectiveness study conducted in the United Kingdom
  - in homes , schools and health facilities
  - in a region considered at risk
  - showed that it is in schools that the performance of interventions proved to be the highest (Denman et al . 2001).

Relevance to proceed with a pilot project of radon testing in schools

- Several interventions were conducted in schools
- In Estrie region of Quebec
- Elsewhere in Canada (British Columbia , Nova Scotia , Ontario, Saskatchewan)
- In various countries around the world

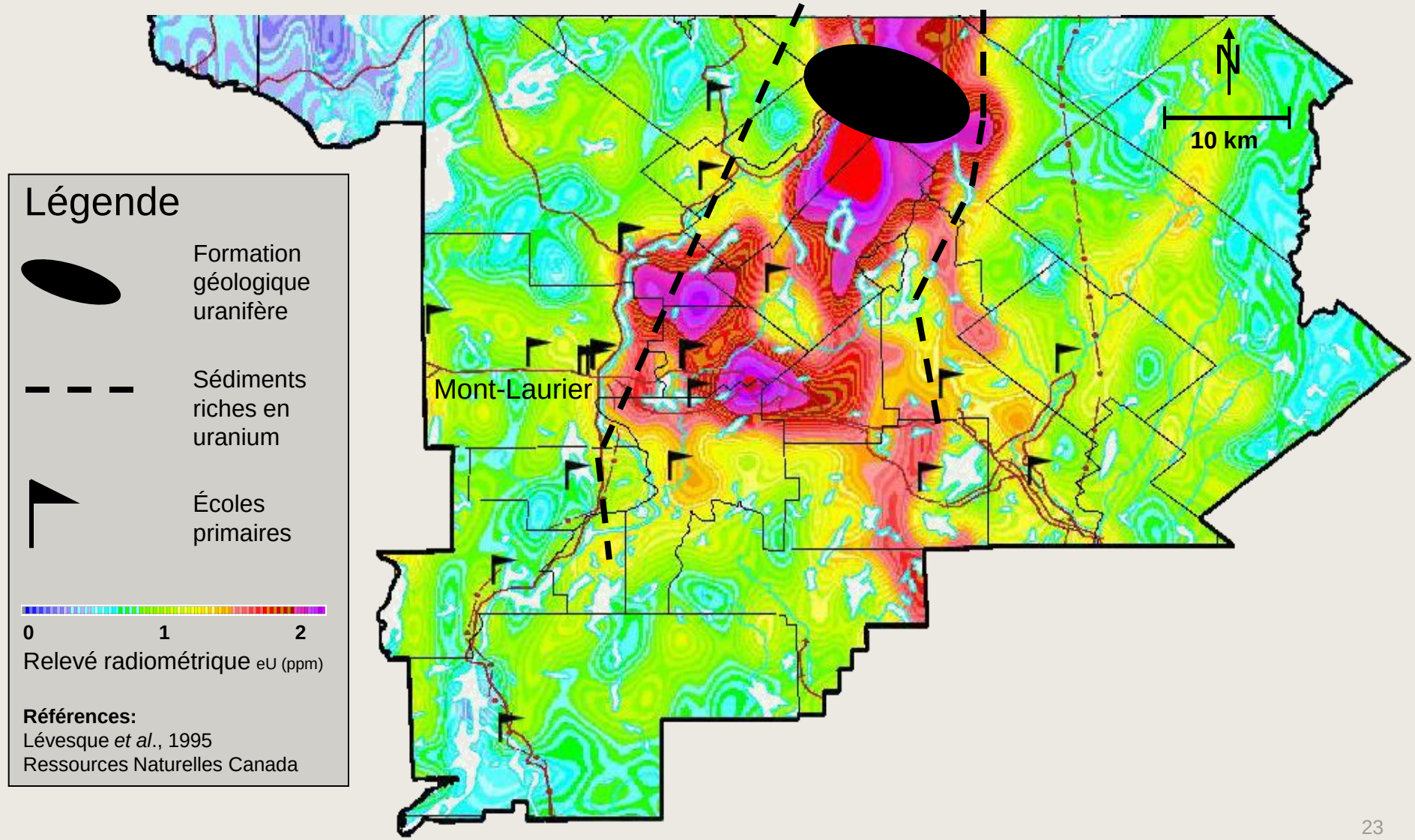
Relevance to proceed with a pilot project of radon testing in schools

- School-age children can spend nearly a quarter of their time at school
- High occupancy buildings where all children will eventually spend 5 to 6 years where they may be exposed early in life
- To reduce cumulative exposure for the occupants, especially children

2009-2011: Research project

- Using indicators of radon-prone areas
  - radioactive districts
  - Uranium geological formations
  - Gamma radiometric surveys (eU > 2 ppm) Lake and stream sediment rich in uranium (eU > 4 ppm)
- Small buildings, relatively simple structurally
- Potential Indicator of surrounding communities exposure

2009-2011: Research project



2009-2011: Research project

Scientific objectives

- Refine associations between geological, geochemical and radiometric indicators and the spatial distribution of areas of high radon emission potential
- Document the effect of different structural aspects of the penetration of radon in selected buildings

2009-2011: Research project

Sanitary objectives

- Decrease when the radon concentration exceeds the federal guideline , the dose of cumulative exposure to radon occupants
- Increase population awareness of the radon problem

2009-2011: Research project

Secondary objectives

- **Refine the approach with the various partners involved**
- **Validate an experimental protocol that can be used subsequently**

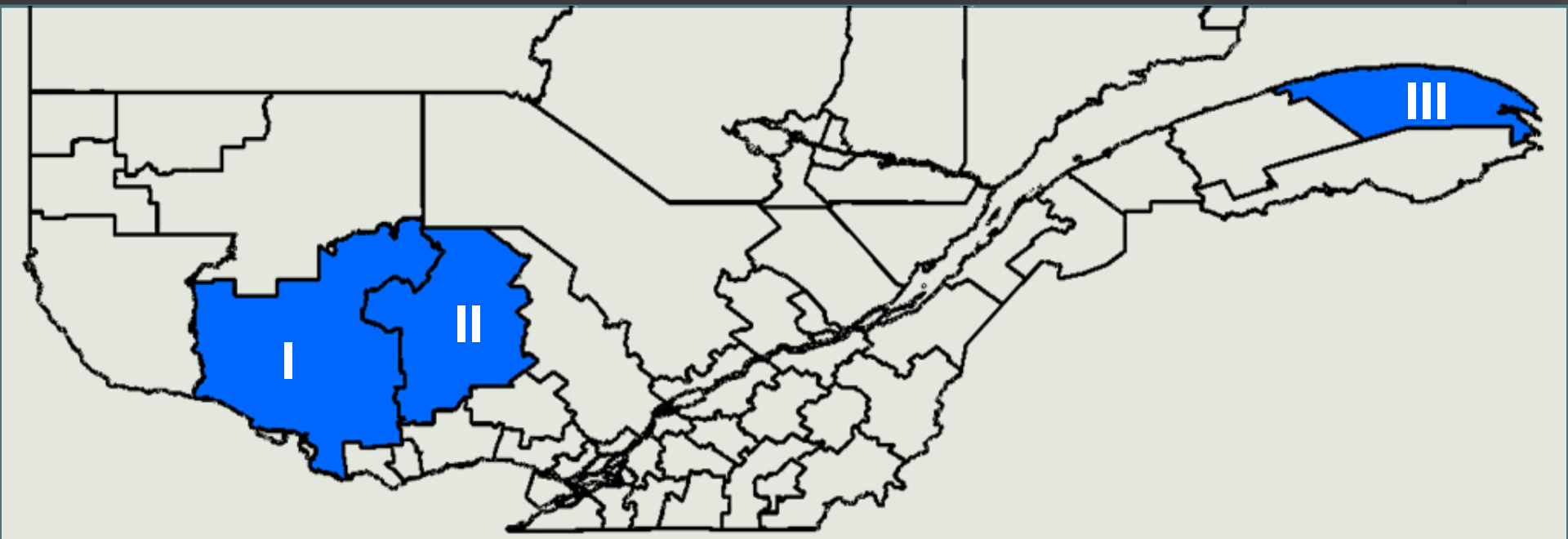
2009-2011: Research project

Targeted school boards:

I) Des Hauts-Bois-de-l'Outaouais & Western Québec (21 + 6 écoles)

II) Pierre-Neveu (22 écoles)

III) Des Chics-Chocs & Eastern Shore (19 + 2 écoles)



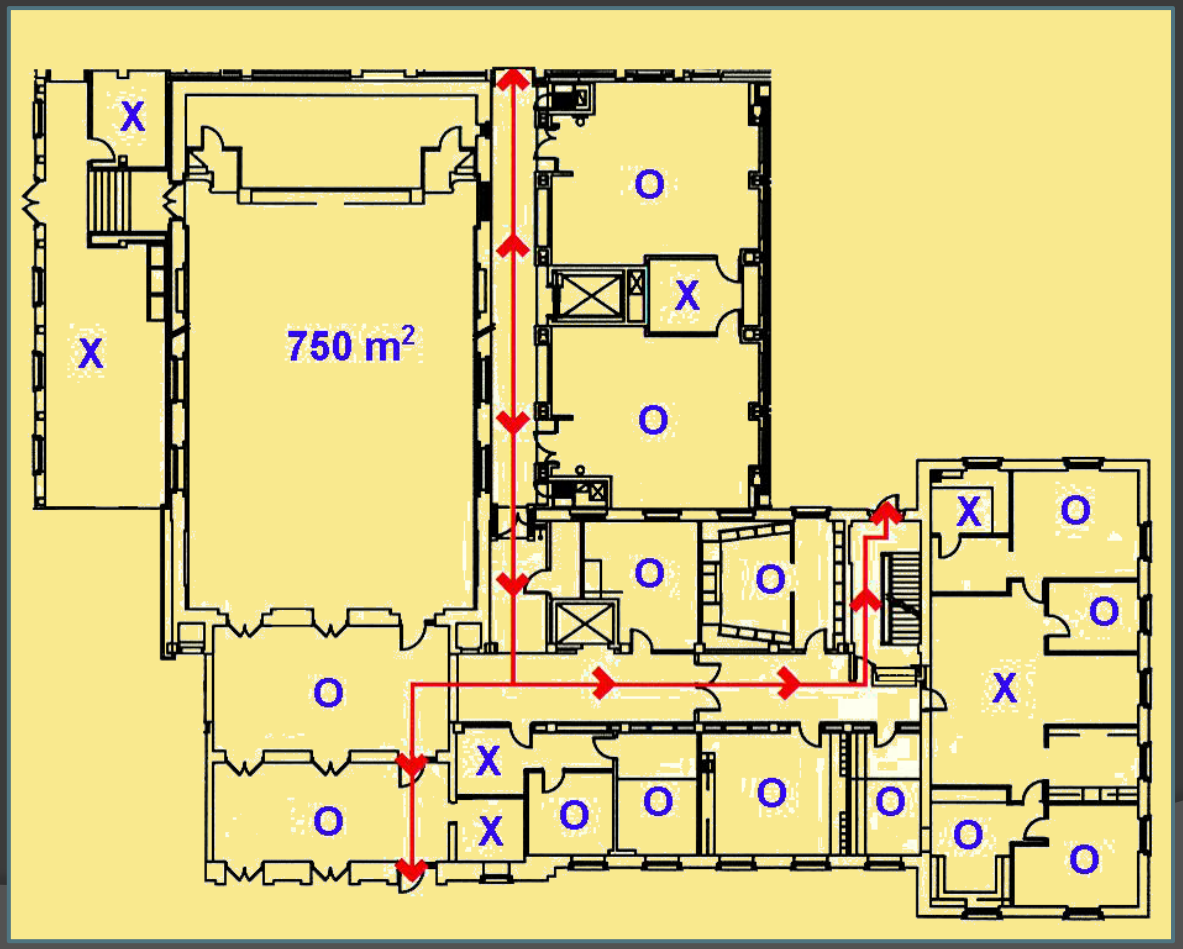
2009-2011: Research project

Methodological aspects:

- Measurement protocol inspired by the approach recommended by Health Canada
- Consideration of structural components
- Use of Alpha-track type dosimeters
- Radon measurements performed in each local normally occupied (> 4 hours per day) located in the basement and the ground floor of the building
- Measurements over 3 months (winter 2010)

2009-2011: Research project

Methodological aspects:



2009-2011: Research project

Interpretation of results:

Radon Concentration (X)	Recommendation
$X \leq 200$ Bq/m^3	No action required
$200 < X \leq 225$ Bq/m^3 ? or Ø	long term Remeasurement (8-12 months)*
$225 < X \leq 600$ Bq/m^3	Mitigation required within two years *
$X > 600$ Bq/m^3	Mitigation required in a period of one year *

* Deadlines recommended by Health Canada

2009-2011: Research project

Timetable

→ Targeted periods → ↓ stages ↓	2009				2010				2011			
	Hiver	Print.	Été	Aut.	Hiver	Print.	Été	Aut.	Hiver	Print.	Été	Aut.
Writing the research proposal												
Meetings and agreements with partners involved												
Preparation and distribution of communication materials												
Training resource staff												
Deployment of the dosimeters												
Measuring period												
Analysis of dosimeters												
Compilation and interpretation of data												
Communication of findings and recommendations												
Development of mitigation estimate or second measurement												

2009-2011: Research project

Partners

- **The Ministry of Health and Social Services (MSSS)**
  - Provides the main financial support
  - Facilitate contacts with the MELS
  - Supports the communication plan
- **Ministère de l'Éducation, du Loisir et du Sport (MELS)**
  - Facilitate contacts with school boards
  - Collaborates in the implementation of the communication plan

2009-2011: Research project

- **Regional public health offices (DSP)**
  - Support school boards, schools and municipalities facing public health
  - Responds to requests of medical or health character
- **School boards**
  - Facilitate the progress of the project and contact with schools
  - Provide logistical support for operations testing
  - They are the owners of the detailed results

2009-2011: Research project

- **National Institute of Scientific Research (INRS)**
  - Supports the mapping component
- **Health Canada (HC)**
  - Provides financial support for the activities of screening and mapping
  - Provides dosimeters
  - Assume the cost analysis
  - Assume the training of technicians

Research project results

Ensemble des commissions scolaires (65 écoles, 561 dosimètres, duplicats, blancs)

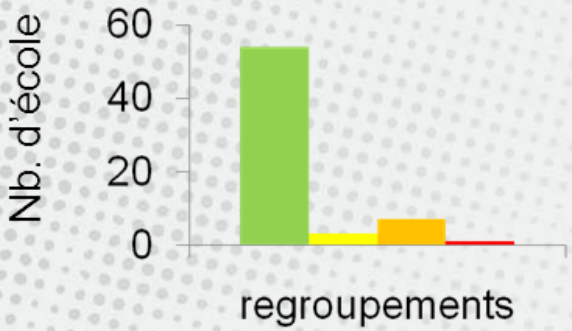
- Peu de dosimètres perdus, aucune donnée aberrante

- Données minimales obtenues: 15 Bq/m^3 (limite de détection)
- Donnée maximale obtenue: 663 Bq/m^3 (Gaspésie)

- Moyenne arithmétique au rez-de-chaussée: 51 Bq/m^3
- Écart-type au rez-de-chaussée: 73 Bq/m^3

- Moyenne arithmétique au sous-sol: 71 Bq/m^3
- Écart type au sous-sol: 72 Bq/m^3

Distribution des écoles selon les catégories de résultats (tous étages confondus)



0-200	54 écoles	(83%)
200-225	3 écoles	(5%)
225-600	7 écoles	(11%)
600+	1 école	(1%)

Institut national de santé publique Québec

* Analyse basée sur la mesure la plus élevée obtenues

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Communication issues

Communication plan

- Supported by the MSSS
- Components of the plan:
  - 3 important time phases (before, during and after the study)
  - Initial centralized approach then gradually decentralized to be adapted to the regional context
- Includes:
  - Information tools
  - Press releases
  - Channels and sequence of disclosure of results
  - Detailed timetable
  - Q/A document

Communication issues

- The radon problem remains, even today, unknown to the general population
- The challenge lies in the ability to inform and reassure about testing in schools so people do not succumb to panic
- When dealing with issues related to children, the emotional side is very important

Communication issues

- The knowledge that children can be exposed to higher concentrations of radon than the guideline raises concern among parents
- The school staff and their unions are also concerned by such a project
- Schools are, for most of them, the workplace in which they evolve throughout their careers

Communication issues

- We must therefore ensure not to alarm the target audiences
  - School boards
  - School principals
  - School staff and their unions
  - Parents
  - Children
  - Municipalities
  - Regional public health offices

Communication issues

- Emphasize the preventive nature of the project and the fact that there are ways to mitigate if high concentrations are encountered
- Important to build on the fact that this is a problem of long-term health
- Only exposure to high levels AND for a long period of time may increase the health risk

Communication issues

- A proactive approach to communication is recommended toward target public
- Before and during the screening
  - Important to give clear and complete information to reassure people. Parents and school staff should be informed by letter
  - Give tools to the regional public offices to help them answer questions about health issues associated to radon coming from the municipalities, the media and the population
  - Information coming from different sources should be as uniform as possible

Communication issues

- After the screening
  - Notify Public health offices, school boards, parents and school staff of the screening results and recommendations suggested by the research group, especially if the result exceeds the Canadian guideline
  - Municipalities where some schools have high concentrations should also be notified.
  - In Quebec, several impacted municipalities have issued a bylaw requiring that new homes are built with methods that reduce radon infiltration

Communication issues

- If the population does not receive timely information to understand the issues of screening, it can cause panic. Such was the case after the measurement results were known, especially at school Terre-des-Jeunes Paquetville (New Brunswick) in September 2009 when parents blocked the doors over worries about radon gas levels in the building.

Communication issues

- The media will be interested to know
  - The results
  - Where are the schools that exceed the guideline
- Each stakeholder should have
  - Press releases readily available
  - A well identified spokesman

Radon testing in all Quebec schools

Operation initiated by the MELS

- Objective:
  - Improve knowledge about radon
  - Protect people from harmful effects of radon
  - ensuring that the occupants are not exposed to radon concentrations exceeding the guideline

Radon testing in all Quebec schools

Operation initiated by the MELS

- Screening more than 3,600 institutions involving 72 School boards and about 270 private schools
- Primary and secondary schools
- Deadline: measurement in all buildings should be done before July 2014

Radon testing in all Quebec schools

Operation initiated by the MELS

- Radon measurement and remedial work if needed are made according to the recommendations of Health Canada
- With support from the network of the Directions de santé publique for communication aspects related to health

Radon testing in all Quebec schools

- In all new school construction projects, preventive measures will be added to prevent radon infiltration

Next Steps

- CIQR members have already made screening pilot projects in daycare and are preparing new ones in low-income housing and some government buildings.

Quebec action plan 2013-2015

- The MSSS wants to join this sub-populations
  - Smokers (due to synergy radon-smoking).
  - Owners of residential buildings in areas prone to radon (particularly in cases where the basement is inhabited).
  - Municipalities (adoption of the National Code 2010 (NBC), which includes several measures to seal foundations in new homes)

Quebec action plan 2013-2015

- The MSSS wants to join this sub-populations
  - Employers
  - Managers of public buildings, in addition to members of CIQR (health facilities. Schools, daycares, etc.).,
  - Prioritizing sectors and most at risk populations by developing our mapping project.

Thank you