Radon Awareness – Presentation to the Ontario Home Builders' Association Conference

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President and CEO

Radiation Safety Institute of Canada
Institut de radioprotection du Canada



Good Science in Plain Language®

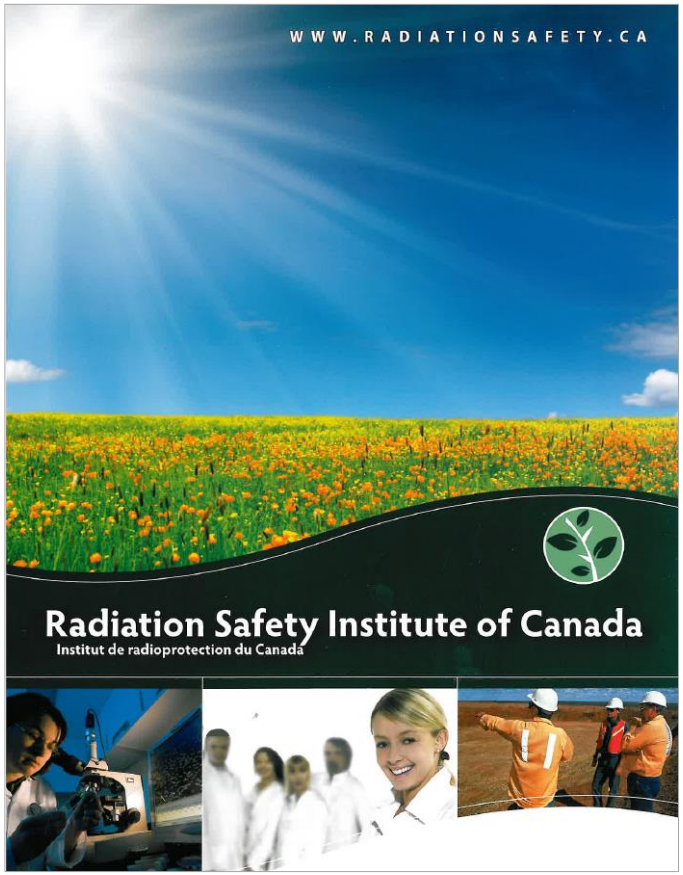
September 29, 2015

Outline

- The Radiation Safety Institute of Canada
  - Who we are
- Radon
  - What it is
  - Why a concern
- MOU between OHBA & RSIC
- OHBA Radon Monitoring

Who We Are

- Independent
- Not-for-profit
- Charitable organization
- Sole concern is radiation safety



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- ***Duncan Hawthorne,*** President and Chief Executive Officer, Bruce Power
- ***Ken Neumann,*** Canadian National Director, United Steelworkers

What We Do

Good Science in Plain Language®

Radiation Safety Institute of Canada
Institut de radioprotection du Canada

Education

- Professional Certificate Courses in Radiation Safety
- Worker and Awareness Education
- Tailor-made Courses

Consulting

- Radiation Safety Workplace Audits
- CNSC Licence Support
- EMF Surveys and X-Ray Equipment Inspections

Laboratory

- Radon testing
- Personal Alpha Dosimetry
- Instrument Calibration
- Leak Testing

Awareness

- Free Information Service in Radiation Safety
- Public Education
- Public Policy

Free of charge information service in radiation safety:

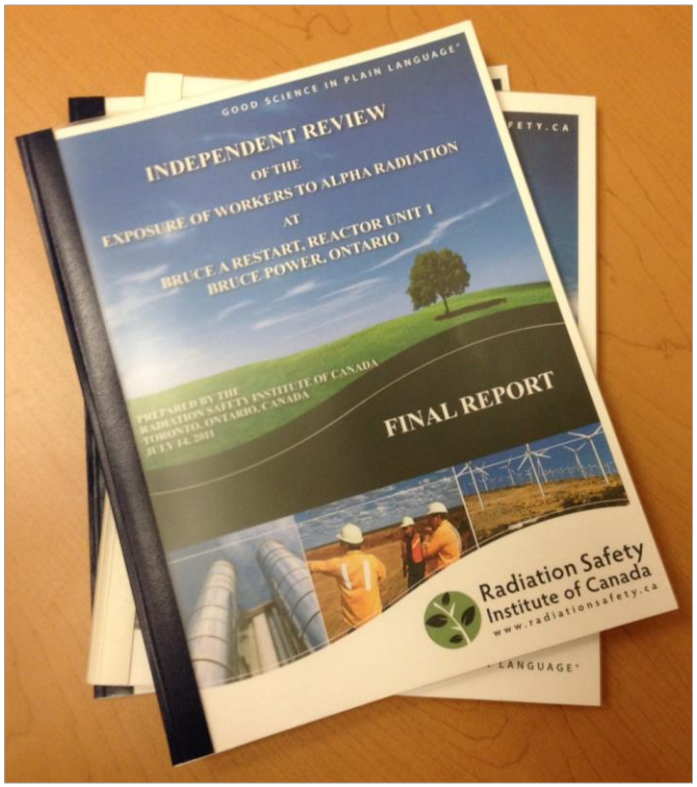
Toll free line: 1-800-263-5803
Website: www.radiationsafety.ca
Email: info@radiationsafety.ca

Educational Services

- We provide educational services that help deepen the understanding of radiation protection
- We offer different levels of education depending upon worker level
  - Certificate Courses
  - Worker Training
  - Awareness Training

Independent Reviews, A Sample

- Environmental
  - Bancroft
  - Port Hope
- Workplace
  - Nuclear Power Plants
    - Bruce
    - Pickering
    - Darlington
  - Hospitals
    - Regina Qu'Appelle
    - Alberta Health Services
  - University Laboratories
    - Guelph
    - Memorial
    - Toronto



Radon

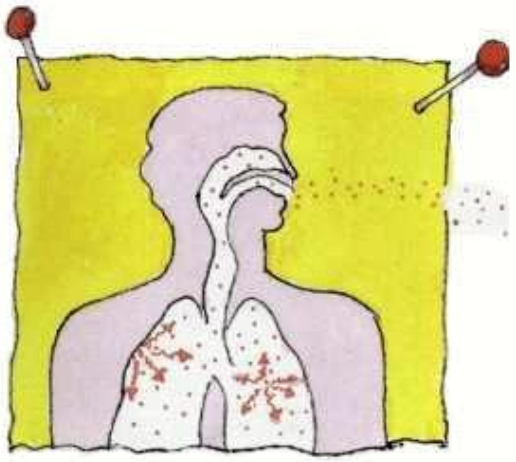
- Radon is an odourless, colourless radioactive gas that is formed naturally by the breakdown of uranium in soil, rock and water.
  - Alpha emitter
  - Half life of 3.8 days
  - Inert gas (non-reactive)
  - Water soluble
  - More dense than air
  - Accumulates in enclosed spaces

Radon Progeny

- Radon progeny are the radioactive daughters of radon gas.
  - For health-effects, only the short-lived progeny are considered
  - Are solids
  - Attach to dust particles in the environment
  - When inhaled, tend to remain in the lungs
  - Two high-energy alpha emitters

Radon – Health Effects

- Radon Progeny attach to dust particles in the air
- When we breath in air, these radioactive dust particles enter into our lungs
- As these decay in the lung, they emit alpha radiation which transfers energy to the cells
- This radiation can damage lung cells
  - No immediate symptoms
  - Mutations possible
- This cell damage leads to an increased risk of developing lung cancer



Radon – Health Effects

- Development of lung cancer is probabilistic
  - Not everyone exposed to elevated radon or radon progeny will develop lung cancer
  - There is no lower threshold below which the exposure presents no risk
- The risk of getting lung cancer from radon depends on:
  - How much radon is in your workplace and home
  - The occupancy time in these areas
  - Whether you are a smoker or have ever smoked
  - Age at exposure (latency period is 5 – 15 years)

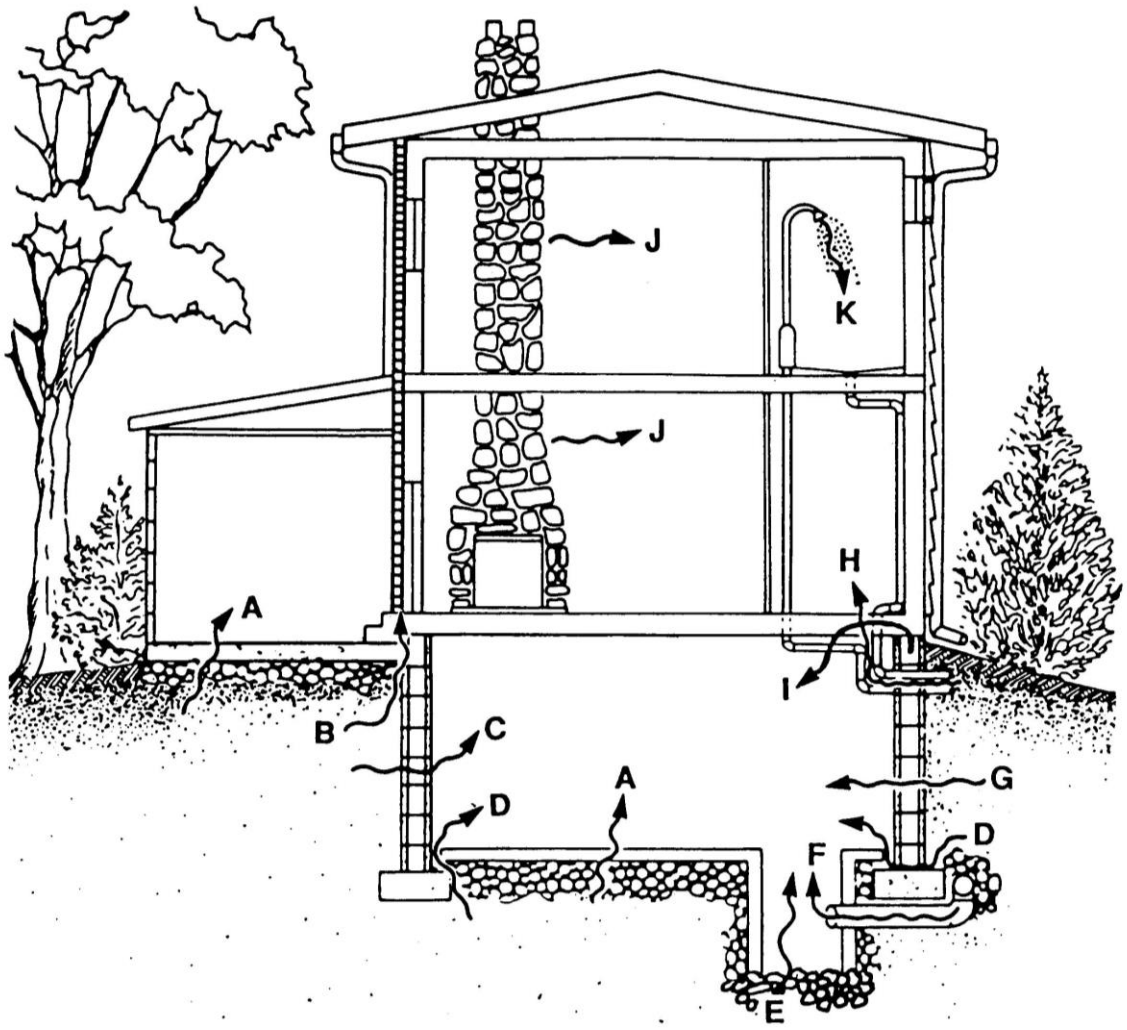
Radon – Health Effects

- The World Health Organization estimates that 10% of all lung cancers are caused by radon exposure
- Health Canada estimates that 14% of Canadian lung cancers are caused by radon exposure
- Radon is considered to be the second leading cause of lung cancer, after smoking

Radon Sources

- Uranium is everywhere in Canada, so Radon is everywhere in Canada
- Radon is in soil and rock, and travels through rock cracks and soil pore spaces
- Radon can enter houses through:
  - Cracks in the sub-slab or walls that are in contact with soil
  - Gaps at floor/wall joints or through porous concrete block
  - Open sump pits and openings around utility penetrations
  - Floor drains with no traps and sump pits
  - Emission from water (particularly ground or well water)
- Radon is in every Canadian home, both new and old

Radon Sources – Building Entry



Indoor Radon Concentration

- Radon concentration in buildings is affected by
  - Local uranium concentrations, and the soil characteristics
  - Radon concentration in water, and amount of water used
  - Heating, ventilation and air conditioning in the building
  - Environmental conditions
    - Temperature
    - Barometric pressure
    - Precipitation
    - Humidity
    - Wind speed
  - Occupancy patterns (doors/windows open or closed)

Radon Levels in Homes

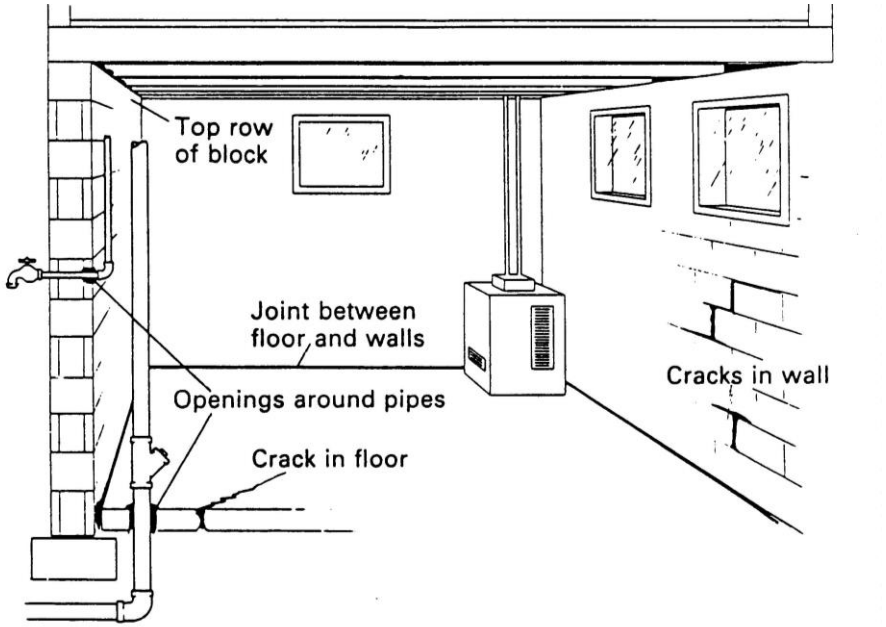
- Radon concentration is affected by
  - Local uranium concentrations and soil characteristics
  - Radon concentration in water, amount of water used
  - Heating, ventilation and air conditioning in the home
  - Environmental conditions
  - Occupancy patterns (doors/windows open or closed)
- The only way to know the level of radon is to test for it!
  - Long term tests of 3 to 12 months are recommended by Health Canada

Radon in Homes

- No Canadian regulation for radon levels in homes
- Health Canada Guideline:
  - Take remedial measures if the average annual radon concentration exceeds 200 Bq/m^3
  - The higher the radon concentration, the sooner remedial measures should be undertaken.
    - If > 600 Bq/m^3, remediate within 1 year
    - If 200 Bq/m^3 – 600 Bq/m^3, remediate within 2 years
  - Remediation should aim to reduce radon to as low as practical
  - The construction of new dwellings should employ techniques that will minimize radon entry and facilitate post-construction radon removal

Control of Radon Hazards

- Prevent radon entry into the building – radon from soil gas
  - Find and seal entry points (cracks, gaps, sump pits, utility penetrations, etc.)



RSIC & OHBA – MOU

- May 2015 – Memorandum of Understanding
- Parties agree:
  - Radon is ubiquitous in Canada
  - Both are dedicated to the prevention of cancer from exposure to radon progeny
  - Both agree to investigate the best strategies for depressurization system rough-in, and recommendations for homeowner remediation to achieve this goal
- OHBA 2015 autumn radon campaign

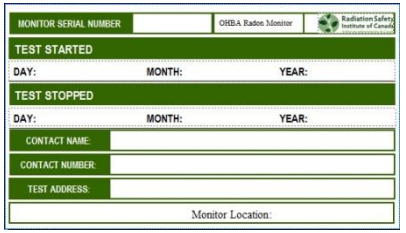
RSIC & OHBA – Radon Campaign

- RSIC has provided the OHBA with 230 radon monitors
- 200 homes to be monitored for radon
  - 20 of these homes get two (duplicate) detectors
    - Per C-NRPP quality assurance requirements
  - 10 detectors for quality assurance during shipping
- OHBA distributes to members, with instruction booklet
- Members deploy monitors in homes, fill out label and information card for each monitor
- After deployed for 90-100 days, return monitors to OHBA, who sends to RSIC for analysis
- RSIC to share results with OHBA

OHBA Radon Monitor Deployment

- Remove monitor from packaging (discard foil)
- Fill in ‘Start Date’ on monitor label
- Fill in deployment card
- Place monitor (e.g., on table or shelf):
  - Lowest lived-in area of home
    - Finished basement or main floor
  - 0.5 to 2 m (1.5 to 6.5 feet) above floor
  - Not near doors or windows, keep 20 cm from walls
  - Not in kitchens, bathrooms, or laundry rooms
  - Not on TV or near another heat source

Radon Monitor



Deployment Card

OHBA Radon Monitor Deployment

- Leave monitor for 90-100 days
- Use house normally
  - No need to keep doors and windows closed
- Fill in ‘End Date’ on monitor label and deployment card
- Package to prevent damage, include deployment card, and return to OHBA
- OHBA collects monitors and sends to RSIC along with spreadsheet summary
- RSIC to compile results and share with OHBA
  - Approximately 4-5 weeks after receipt by RSIC

Thank you

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