DOES RADON POSE A RISK TO NOVA SCOTIA WORKERS?

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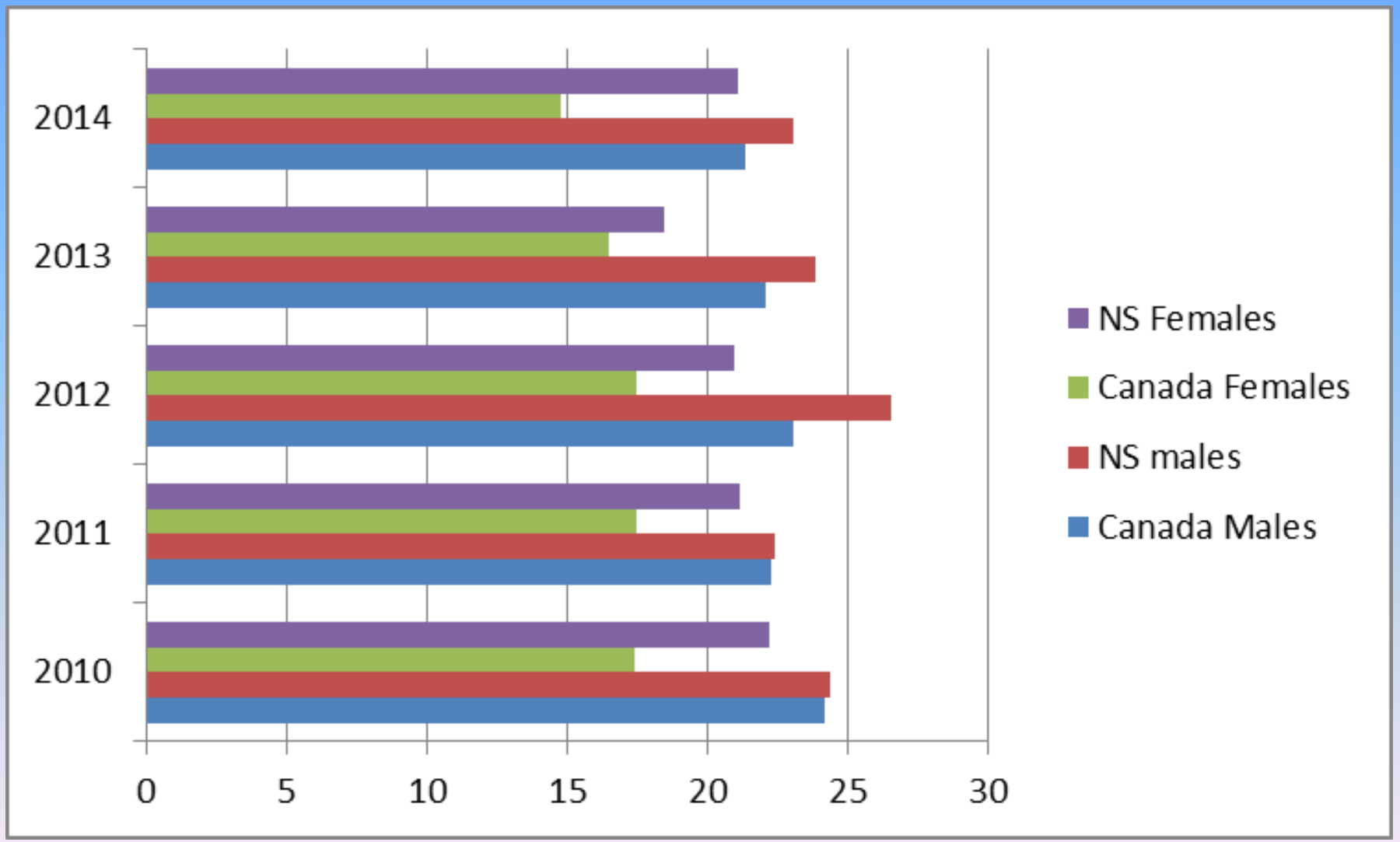
Why was research proposed?

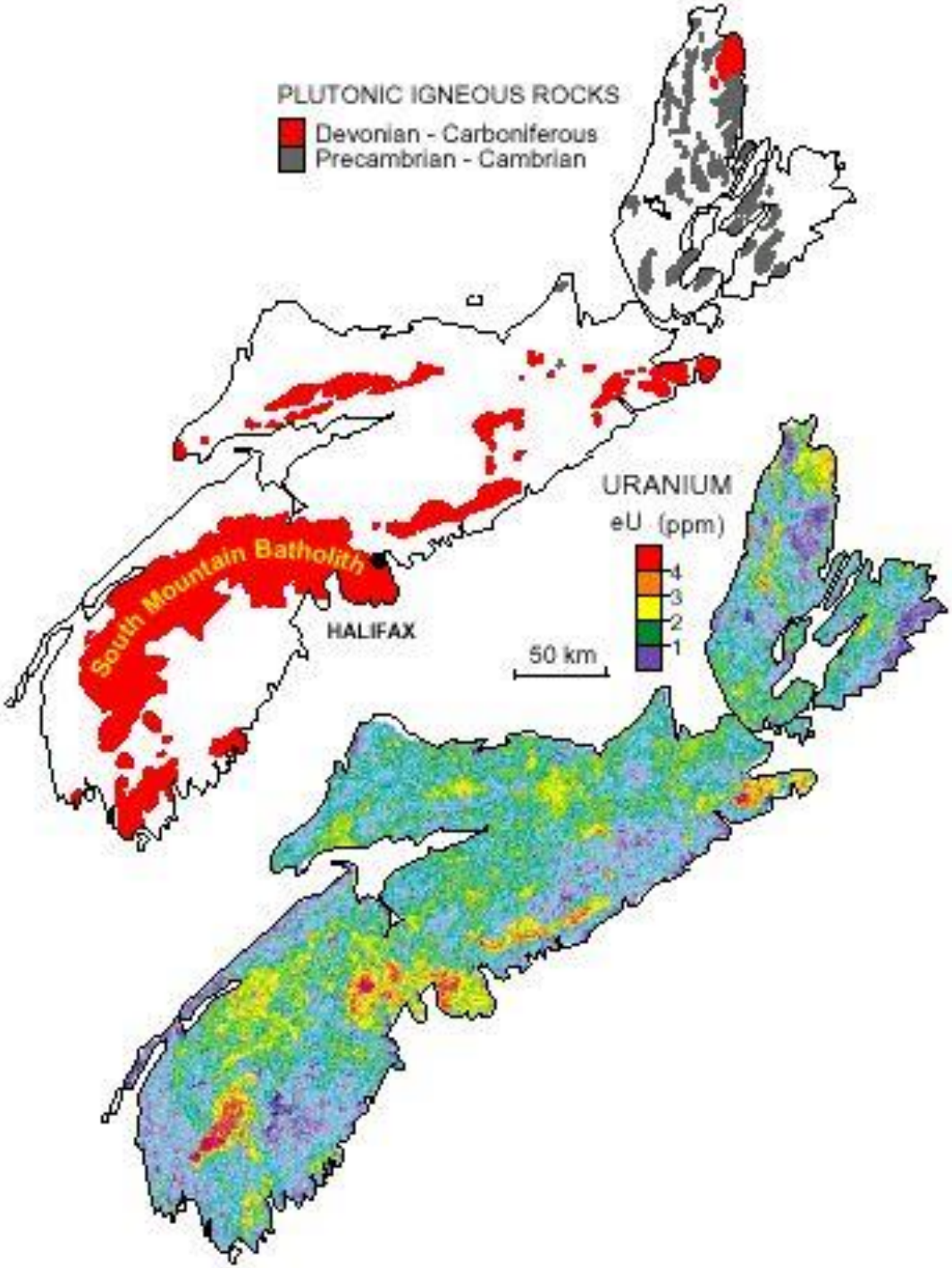
- Lack of general knowledge of Radon in NS
- Lack of workplace radon data
- Evidence of high radon levels present in houses in parts of the province
- Continuing evidence of high rates of lung cancer in province

Why Nova Scotia?

- identified to have higher than the national average of lung cancer incidence
  - 78 per 100,000, compared to National 56 per 100,000
- Lung cancer is leading cause of cancer deaths in NS
  - 31% for men and 20% for women
- identified to have higher than the Canadian average residential radon levels (150 Bq/m^3 vs 50 Bq/m^3)
- Had high rates of smoking
  - 30% in 2000 compared to 19% nationally
  - 22% in 2014 compared to 18% nationally

% of Smokers by Sex




PLUTONIC IGNEOUS ROCKS
Devonian - Carboniferous
Precambrian - Cambrian
South Mountain Batholith
HALIFAX
50 km
URANIUM
eU (ppm)
4
3
2
1

Method: Selection of Workplace Participants

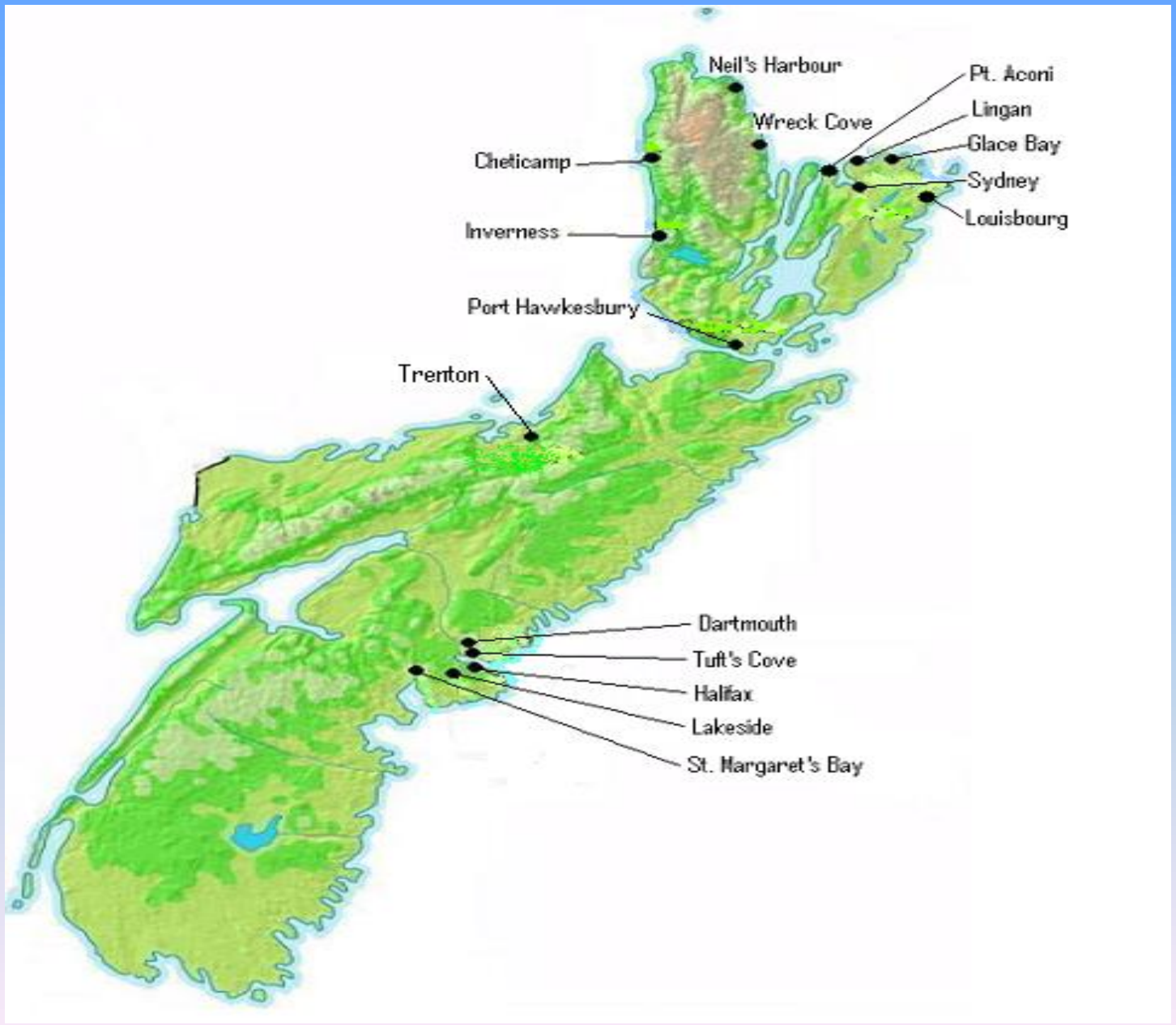
- Contacted workplaces by phone or letter if they met one of these criteria:
  - Coal combustion
  - Water treatment
  - Geographical location
  - Large square footage
  - Large volume cooling water intake
- 21 total workplaces

Methods

- 200 monitors
- Alpha track detectors
- Minimum of three months sampling period
- Occurred between June 2008 and Jan 2009.
- Sent for analysis to LEX Scientific, Guelph, Ontario

Radon Sampling Locations

Nova Scotia



Results

- After subtracting the average exposure indicated by the blanks, all but two workplaces had low radon levels (50 Bq/m^3) Duplicates showed measurement uncertainty at this level of ± 15 Bq/m^3 (30%)
- Two workplaces had rooms with levels above 150 Bq/m^3 but less than 200 Bq/m^3
- Both rooms had low occupancy time, with poor or no ventilation, on slab.

Type of workplace	Range of radon Bq/m^3	Average radon Bq/m^3
Sports facility	10.5 – 91.4	33.2
Manufacturing	9.6 – 33.6	19.3
Hydro facility	3.1 – 31.2	13.1
Hydro facility	**39.1 – 169.1**	**94.0**
Hospital	3.1 – 9.5	6.6
Hospital	1.6 – 13.8	8.6
Hospital	1.2 – 6.8	4.5
Coal power	0.1 – 11.2	4.9
Coal power	-1.9 – 12	3.4
Coal power	-2.0 – 7.7	1.0
Coal power	10.6 – 43.7	22.3
Oil/natural gas power	0.3 – 6.8	3.4
Oil turbine power	21.3 – 40.7	34.1
Warehouse/office	12.9 – 13.8	13.4
Warehouse/office	-0.7 – 75.8	22.7
Warehouse/office	**58.5 – 202.1**	**98.6**
Water treatment	11.8 – 41.0	24.5
Water treatment	53.5 – 70.3	57.0
Water treatment	5.8 – 18.8	10.8
Water treatment	15.2 – 53.8	28.8
Public works	7.6 – 88.1	35.0
Summary	-2.0 – 202.1	25.7

Results: Range of blank corrected radon concentrations by facility type

Location (Nova Scotia)	# of workplaces	Range of Results (Bq/m^3)	Average Result (Bq/m^3)
Sydney	2	10.5 – 91.4	28.9
Lingan	1	0.1 – 11.2	4.9
Wreck Cove	1	3.1 – 31.2	13.1
Neil's Harbour	1	3.1 – 9.5	6.6
Cheticamp	1	1.6 – 13.8	8.6
Inverness	1	1.2 – 6.8	4.5
Port Hawkesbury	1	-1.9 – 12.0	3.4
Pt. Aconi	1	10.6 – 43.7	22.3
Trenton	1	-2.0 – 7.7	1.0
Lakeside	1	-0.7 – 75.8	22.7
Dartmouth	1	0.3 – 40.7	12.1
St. Margaret's Bay	1	39.1 – 169.1	94.0
Glace Bay	2	53.5 – 70.3	57
Louisbourg	1	5.8 – 18.8	10.8
North Sydney	2	9.6 – 53.8	21.8
Bedford	1	12.9 – 13.8	13.4
Coxheath	1	58.5 – 202.1	98.6

Blank corrected Results by Geographic Location

Canadian Workplace Guidelines (NORM)

- Where the estimated annual average concentration of radon gas in an occupied area is more than 150 Bq/m^3 but less than 800 Bq/m^3, the NORM Classification is NORM Management.
- Depending on the source of the radon, application of ALARA may include:
  - introduction of public and incidentally exposed worker access management;
  - changes in work practices
    - Signage & information
  - The work site should be reviewed periodically to verify that conditions have not changed.

Discussion

- Some workplaces were concerned about participating, unsure of how to deal with results
- Low radon levels overall; possibly due to
  - Good mechanical ventilation
  - Good natural ventilation
  - Lack of radon impacted soils
  - Lack of radon impacted water

Conclusion

- Large industrial workplaces were not found to contain levels of radon above background (50 Bq/m^3)
- Smaller, office type complexes were more likely to have higher levels of radon
  - More similar to homes, with less natural or mechanical ventilation than larger workplaces

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