Radon Concentration in Workplaces across New Zealand

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EXPANDING THE SCOPE OF RADIATION PROTECTION

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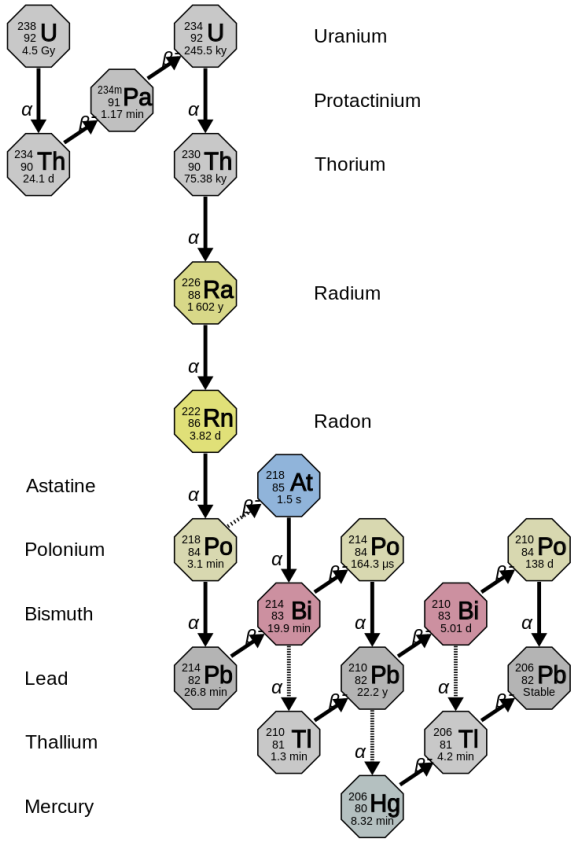
Radon origin

- Naturally Occurring Radioactive Material (NORM)
- Originates from Uranium decay series
- Uranium is present in various concentrations in different rocks and soils
- Noble gas



Radium

- Radium is a legacy radioactive material
- Emits Radon gas
- Used extensively throughout WW2 for luminesce paint on aircraft dials, watches, compasses, etc
- Legacy material is not under strict regulatory control in New Zealand

Radon Buildup

- Builds up in enclosed spaces with limited ventilation
- Typically, underground locations such as mines and caves

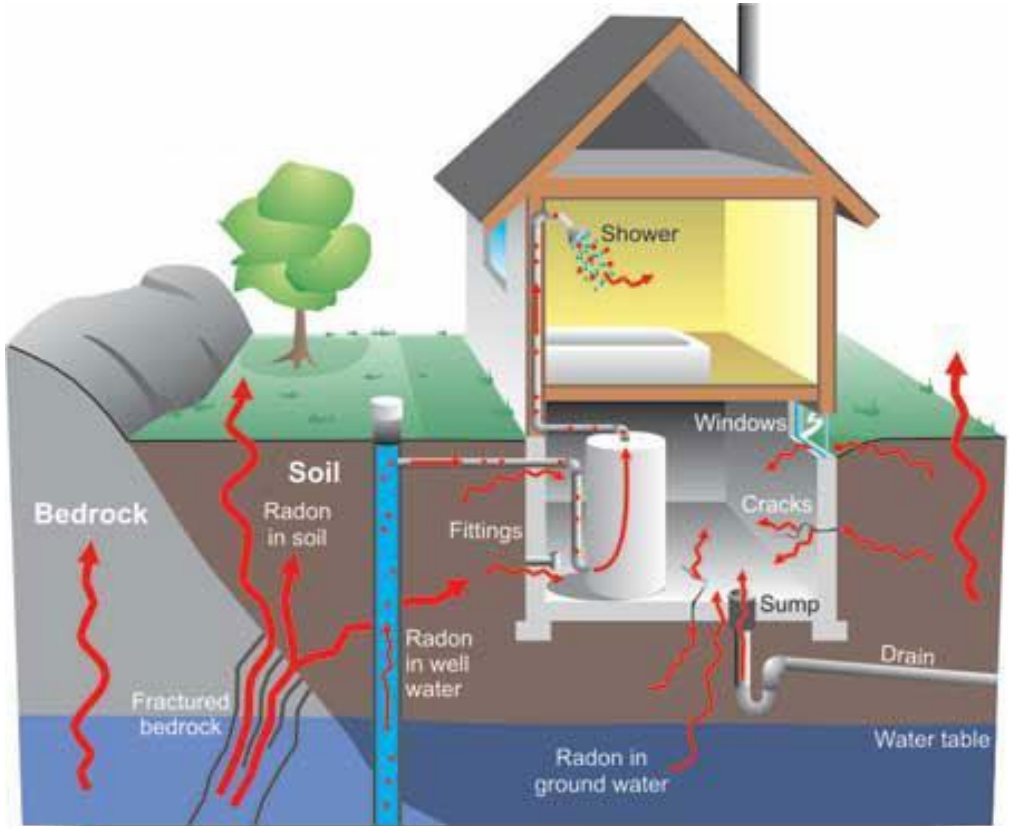


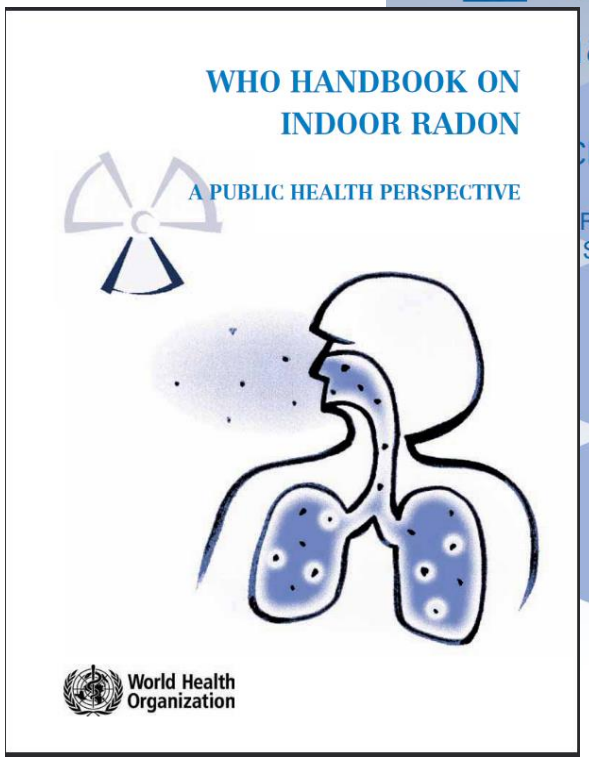
Figure 1: How Radon enters housing [3]

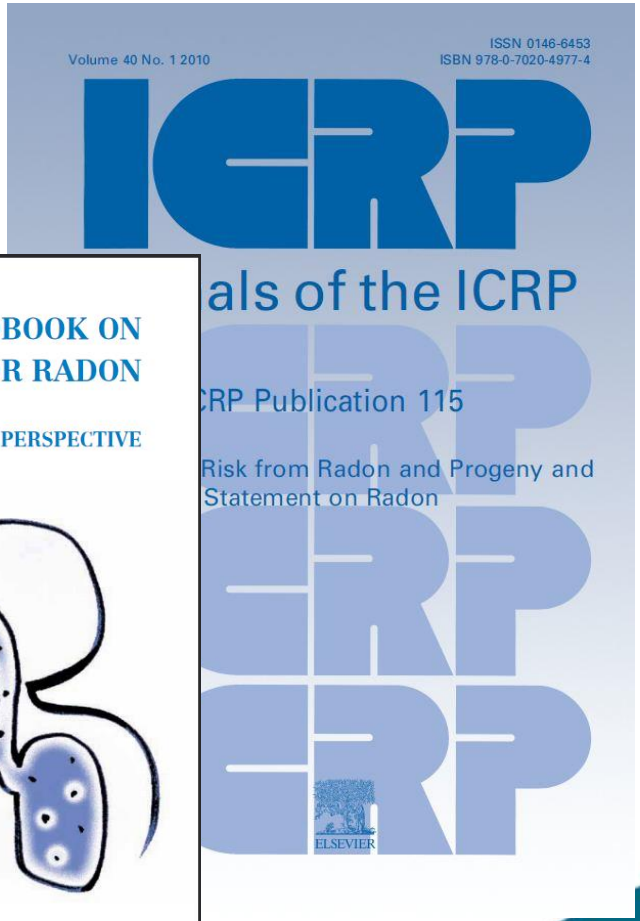
Health effects

- Radon has been demonstrated to be the second largest cause of lung cancer behind smoking
- Lung cancer death is the most prevalent cancer related cause of death in New Zealand
- The World Health Organization (WHO) recommends that indoor radon levels are no more than 100 Bq/m3
- Radon is estimated to be the highest contributor to an average New Zealanders yearly radiation dose from all natural sources of radiation

Renewed interest in Radon in NZ

- DS519 “Protection of Workers against Exposure due to Radon”
- WHO handbook on indoor radon: a public health perspective
- International Commission on Radiological Protection (ICRP) 2010. Lung Cancer Risk from Radon and Progeny and Statement on Radon, ICRP Publication 115.





Previous work

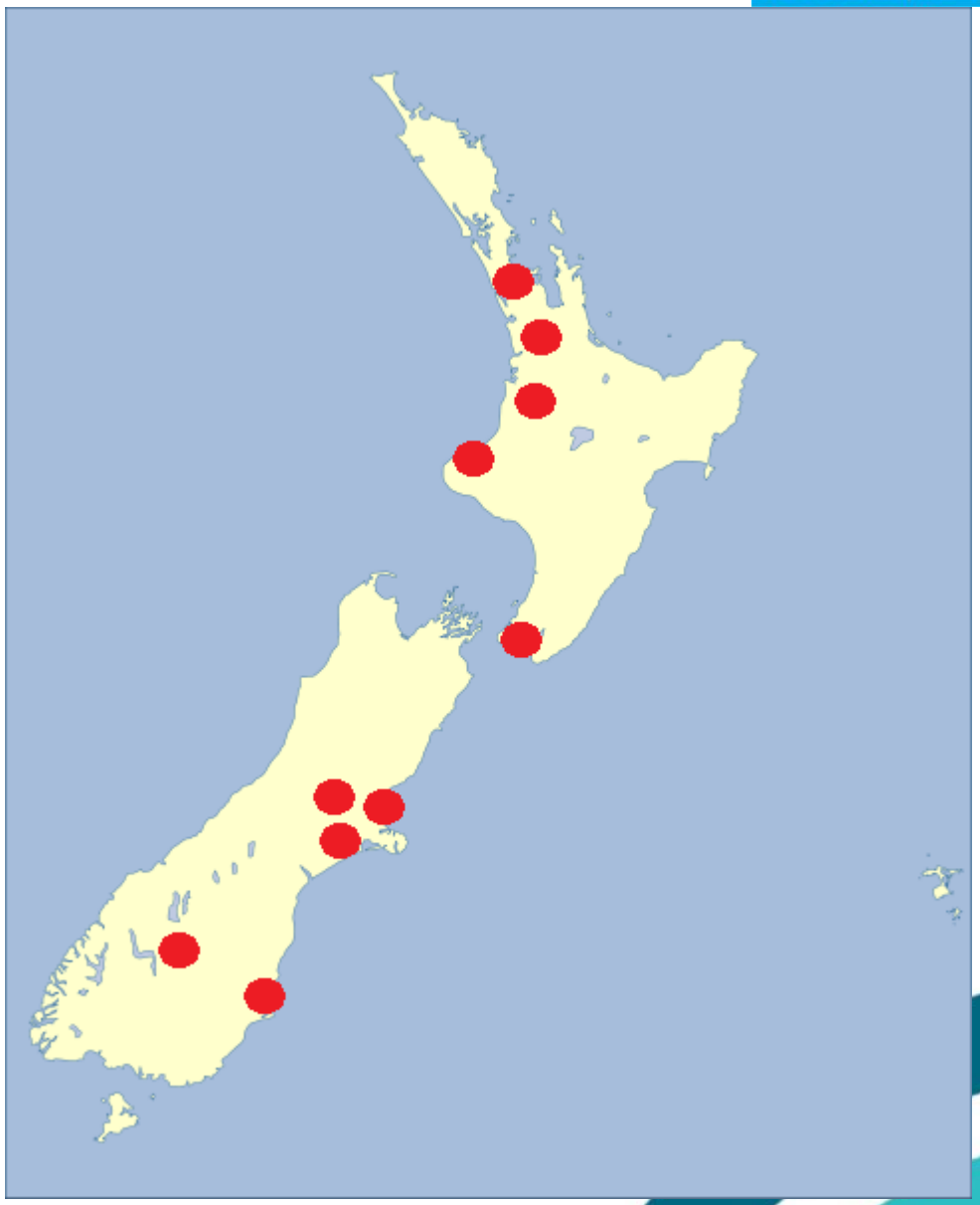
- 1988 a survey of Natural Radiation in New Zealand houses
- 2000 a survey of Radon studies in selected workplaces
- 2016 a Survey of Indoor Radon Concentrations in New Zealand Buildings

Study overview

- Limited pilot study of 10 workplaces
- Workplaces were identified to potentially have elevated radon levels
- Goal to highlight the risk around radon and provide recommendations on future actions that should be performed.

Locations selected

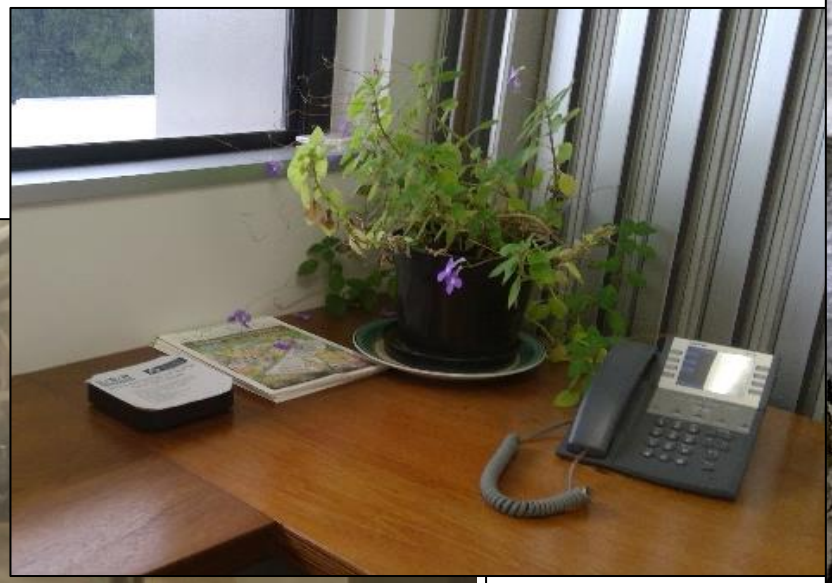
- South Island University Basement
- Canterbury Museum
- Wellington Office Basement
- Canterbury School
- Tourist Cave
- North Island Coal Combustion
- Auckland Hospital Basement
- South Island Coal Combustion
- South Island Wine Celler

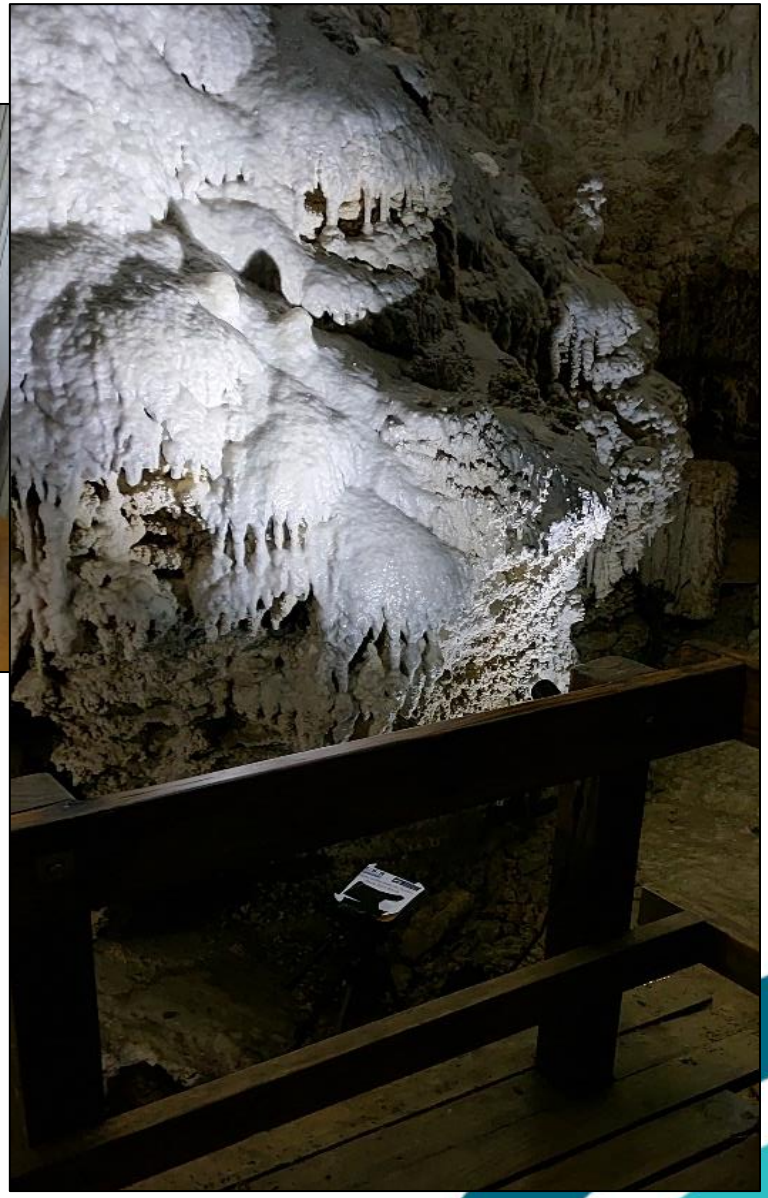


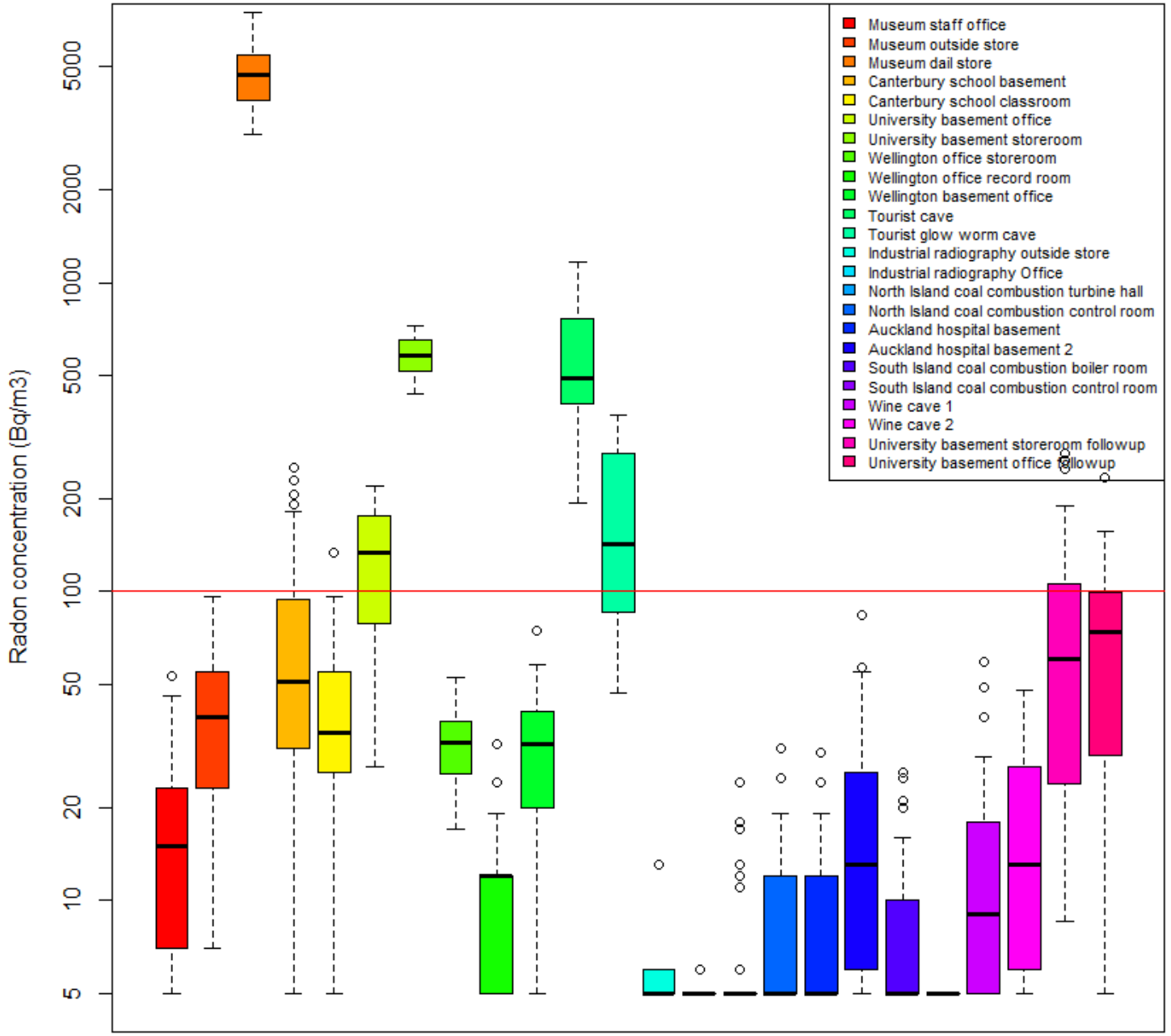
Methodology

- 48 Hours sampling
- 2-3 detectors
- One at high occupancy
- One where radon could be elevated

Sampling







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Results summary

Radon risk category	Percentage of sites in this category
Maximum less than 10 Bq/m3	8%
Maximum less than 100 Bq/m3	55%
Maximum over 100 Bq/m3	16%
Average over 100 Bq/m3	13%
Average over 1000 Bq/m3	8%

Recommendations

1. Impact analysis of implementing radon reference levels in NZ
2. Publish updated information on Radon and its health impact
3. Establish a programme to assess radon risk from radium sources
4. Develop a Radon risk Map