From Mapping of Radon in Soil to Inventory of Radon Indoors

- The Swedish Story -

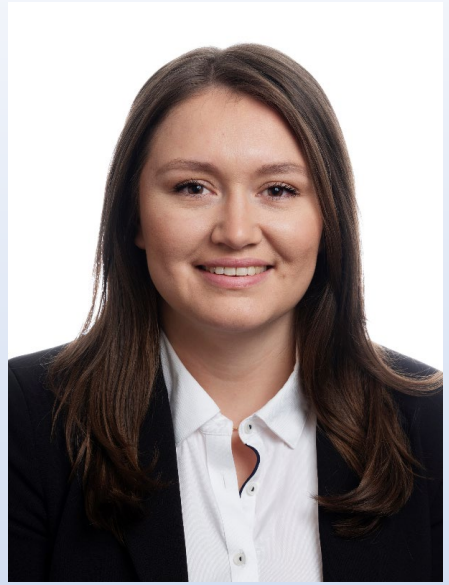
Linda Aguirre, Business Developer at Eurofins Radon Testing

Presentation

- Linda Aguirre, Luleå Sweden
- Background in Business and Economics with a major in marketing
- Business Developer at Eurofins Radon Testing Sweden

Eurofins Group: a leading provider of testing and analytical services - *Testing for Life*

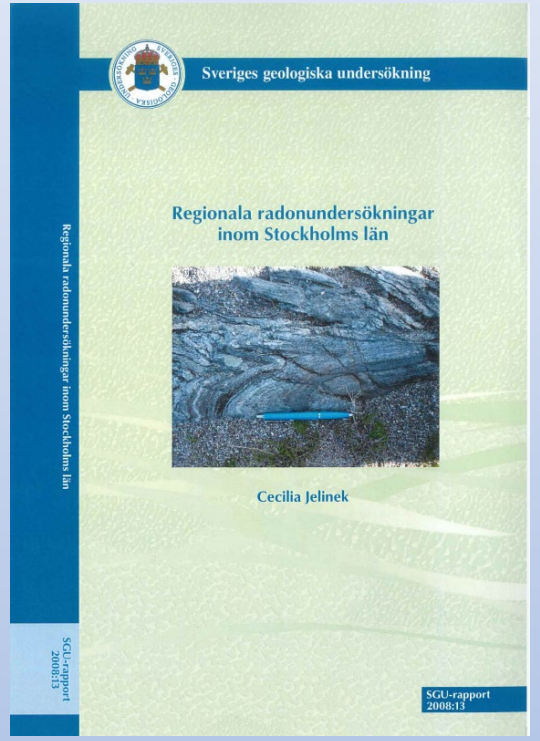
Global Competence Center for Radon – cross-sell our analysis all around the world

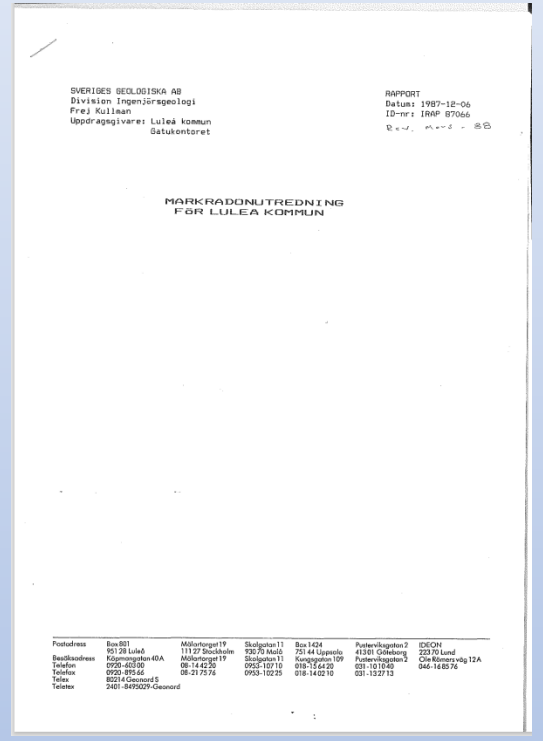


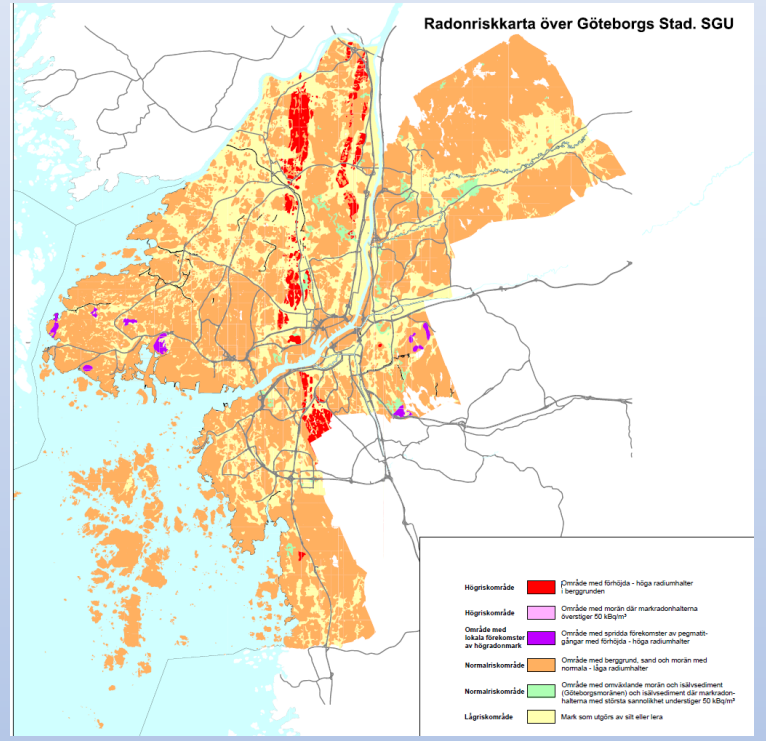
Content

Mapping Radon in Soil

Sweden have a long history of measuring radon and produce Radon risk mapping

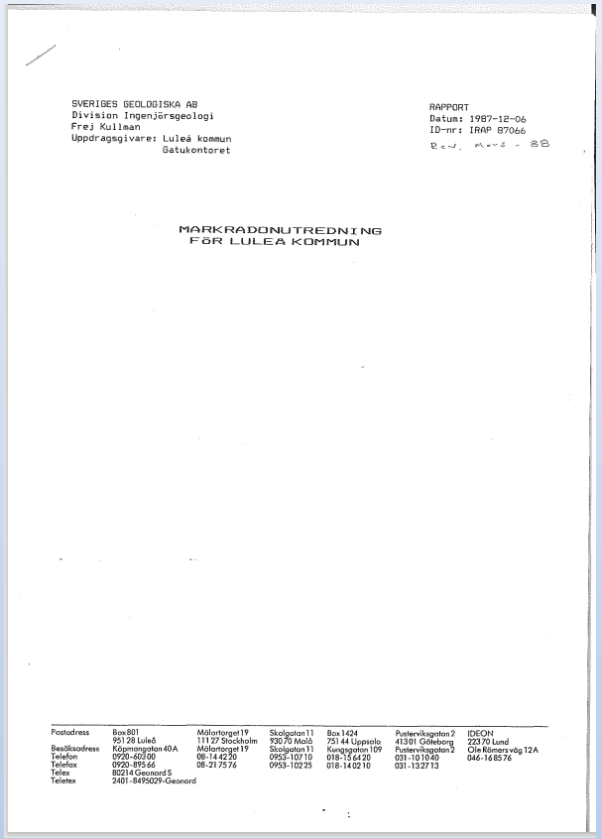






Mapping Radon in Soil

- In 1987 SGU was commissioned to produce a radonrisk map of Luleå municipality.
- Perform field inspections, inspections with gammaspectrometer together with measurements for radon in soil
- The purpose
  - Support authorities with information
  - Define focus areas invent and/or require measurements in soil and indoor air



SVERIGES GEOLOGISKA AB
Division Ingenjörsgeologi
Frej Kullman
Uppdragsgivare: Luleå kommun
Gatukontoret

RAPPORT
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Radon in Soil

- Radon-222 is formed upon decomposition of radium-226.

- The risk of soil radon from a soil type is determined by:
  - how high the content of radium-226 is in the bedrock
  - how much of all formed radon is emitted to the air in the pores
  - how easily the soil air type can be transported – permeability

- High risk:
  - Coarse sand, Gravel and block-rich gravelly and sandy moraine
- Low risk:
  - Fine and coarse slit

Radon in Soil

- All homes with ground contact run the risk of getting high Rn levels indoors.
  - The soil plays an important role.
  - Ground air volume is large - risk construction
  - Concrete slab, need to be pressure tested.

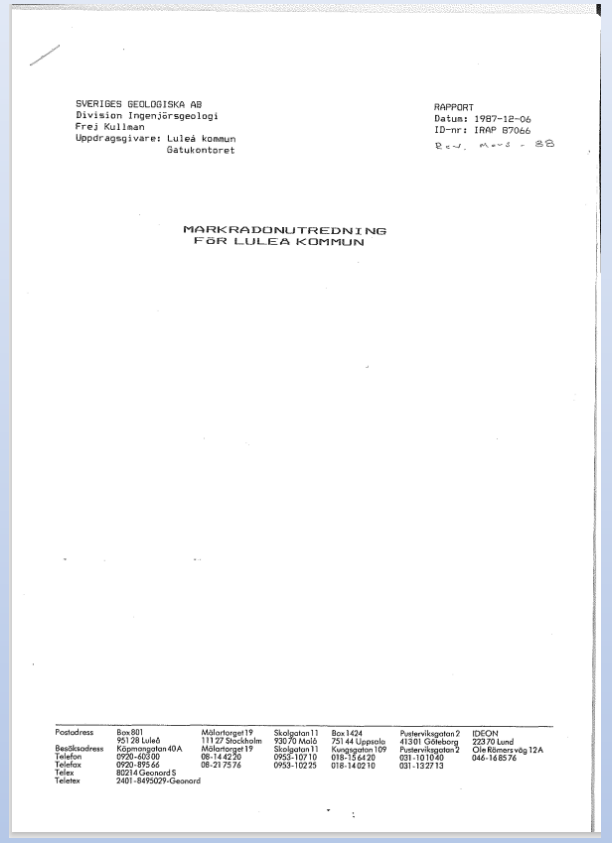
- Level of Rn in soil is based on level of Ra as well as soil conditions and its components.
- Different soils have different permeabilities

Different Risk Classifications on Soil

- High Rn risk soil area
  Level of radon in the soil air is >50 kBq/m^3 (>1350 pCi/L)
- Normal Rn risk soil area
  Level of radon in the soil air is 10-50 kBq/m^3 (270-1350 pCi/L)
- Low Rn risk soil area
  Level of radon in the soil air is <10 kBq/m^3 (<270 pCi/L)

Conclusions

Recommended methodology for further action after mapping



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Conclusions

Recommended methodology for further action after mapping

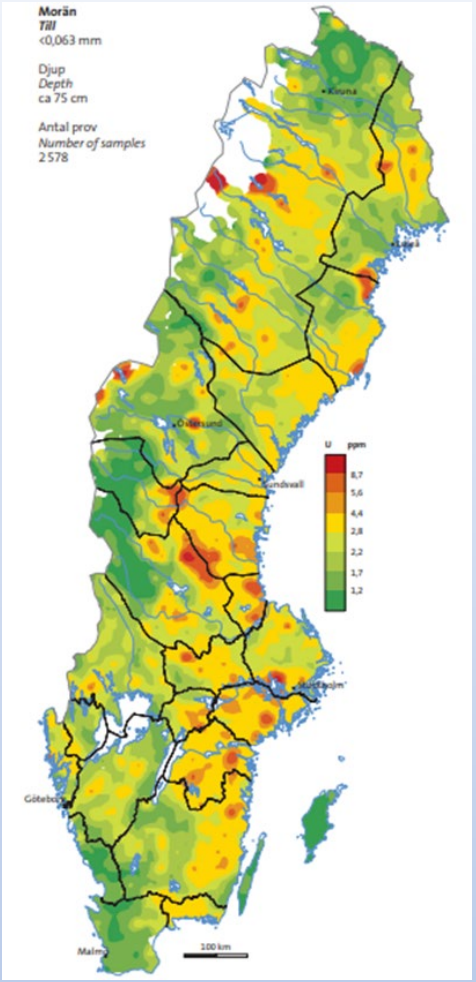
1. Soil play an important part

2. Measure building within high-risk soil areas
    - especially buildings with basements
    - buildings created on ice river material or gravel
    - buildings created directly on bedrock or blasted rock fillings

3. Prioritize buildings where people are staying permanently like dwellings, apartment buildings and workplaces

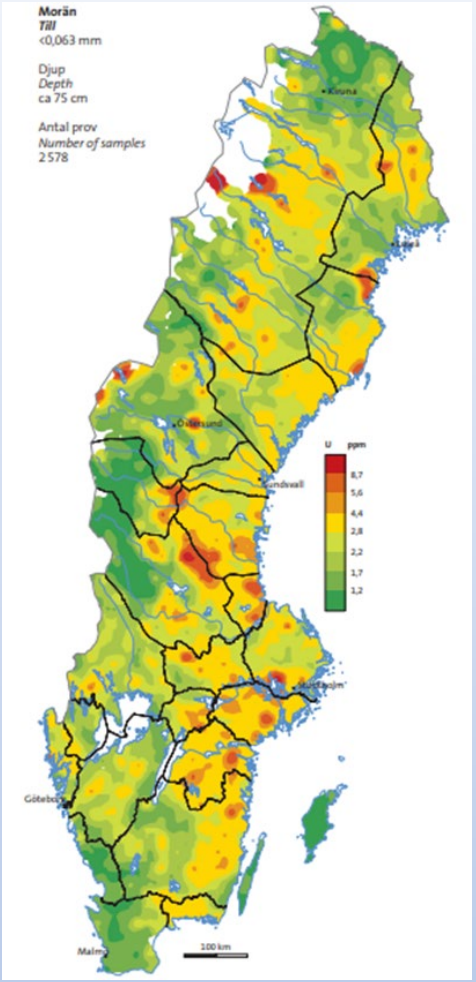
Risks with Mapping

- Mapping of radon in soil is a good start but also shows an overall plan in which areas there is a risk of high radon levels
- Always measure radon in soil before start construction of a new building – it’s cheap and easy to use



Risks with Mapping

- Radon maps are never a reliable tool for determining the indoor environment
- The only way to get a reliable picture of the radon level in indoor air is to measure
- Swedish Radiation Authorities prefer an analyze for Rn in indoors by Alpha Track method



Measure radon in soil with Alpha Track?

- Measure radon in soil with ROAC method – preferred and used on the soil radon investigation from Luleå Municipality 1987
- Today you can measure radon in soil with alpha track detectors

Swedish history of measure Rn indoors

- Blue concrete → Sweden have a high competence in the Rn
- Sweden have method descriptions
- After the EU-Directive 2013/59/EURATOM Sweden established in 2018 a Radiation Protection Law
- The Swedish Radiation Protection Law prefer the Alpha Track method
- Proposed method globally for measure radon in indoor air

Swedish history of measure Rn indoors

- Today Swedish national guidelines as well as international guidelines exist for workplaces through IRMA
- The Swedish Work Environment Authority
- Municipalities

To know Rn level – measure

The whole world agrees – *to know your level of Rn inside buildings you need to measure*

”2013/59/EURATOM determines that all EU countries must develop an action plan to ensure that the level of Rn does not exceed 300 Bq / m3 for all employees on workplaces”

Many Thanks!

Linda Aguirre

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