NORM

Introducing NORM in building materials (?)

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NuTeC [XIOS – Uhasselt]

EU NORM Conference
Dresden, 03-07 december 2012

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Overview

- Introduction
- Radioactivity in building materials
  - Euro-BSS
  - Indoor radon
- NORM4BUILDING

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- Uhasselt (CMK/TANC, Diepenbeek, Belgium
- XIOS University College (Diepenbeek, Belgium)
  - Industrial Sciences: **“Nuclear and environmental Engineering”**
    - Environmental Technology-Radiochemistry
    - Medical Nuclear Technology

Nuclear **Te**chnological **C**enter

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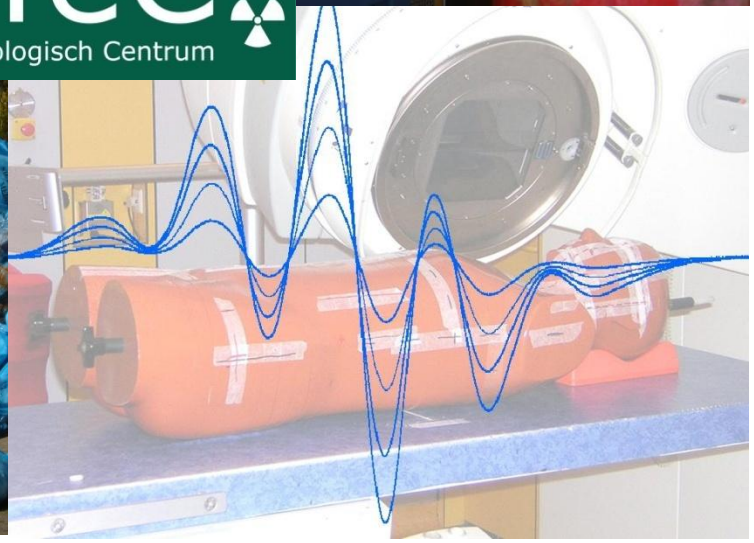

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- Environmental and Energy related research
- Development and application of nuclear measurement aperture

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B-NORM project

- Study of current practices involving natural radioactivity in the Belgian building industry
- Funded by EFRO, Hermes and XIOS
- In co-operation with Belgian building industry
- Goals
  - Knowledge diffusion
  - Building material ACI inventory of Belgian market
  - Measurement method evaluation
  - Preparing industry for the new Basic Safety Standards (BSS)

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Radioactivity in building materials

- The new Euro-BSS proposal explicitly requires the determination of the 'natural radioactivity content' (ACI) of building materials distributed for houses

➔ A large number of measurements will be required

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Radioactivity in building materials

- An activity concentration index (ACI) is put forward as screening tool.
- Proposed ACI:

$$I = {C_{Ra-226}}/{300 Bq \cdot kg^{-1}} + {C_{Th-232}}/{200 Bq \cdot kg^{-1}} + {C_{K-40}}/{3000 Bq \cdot kg^{-1}}$$

- *C:* activity concentration of the respective nuclide (Bq/kg)

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Radioactivity in building materials

- Criterium:

	Category (corresponding default dose)	
Use	A (≤ 1 mSv)	B (> 1 mSv)
(1) materials used in bulk amounts	A1 I≤1	B1 I>1
(2) superficial and other materials with restricted use.	A2 I≤6	B2 I>6

- If category B
  - Further testing
  - Documentation
  - And?

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Method

- Determining building material ACI
  - In a lab
  - Or on – site

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Radioactivity in building materials

- When striving for reduction in energy consumption, natural ventilation of dwellings is reduced
  - Low energy house
  - ‘Passive house’

- A correct functioning of the ventilation system is important, also regarding radon risk!

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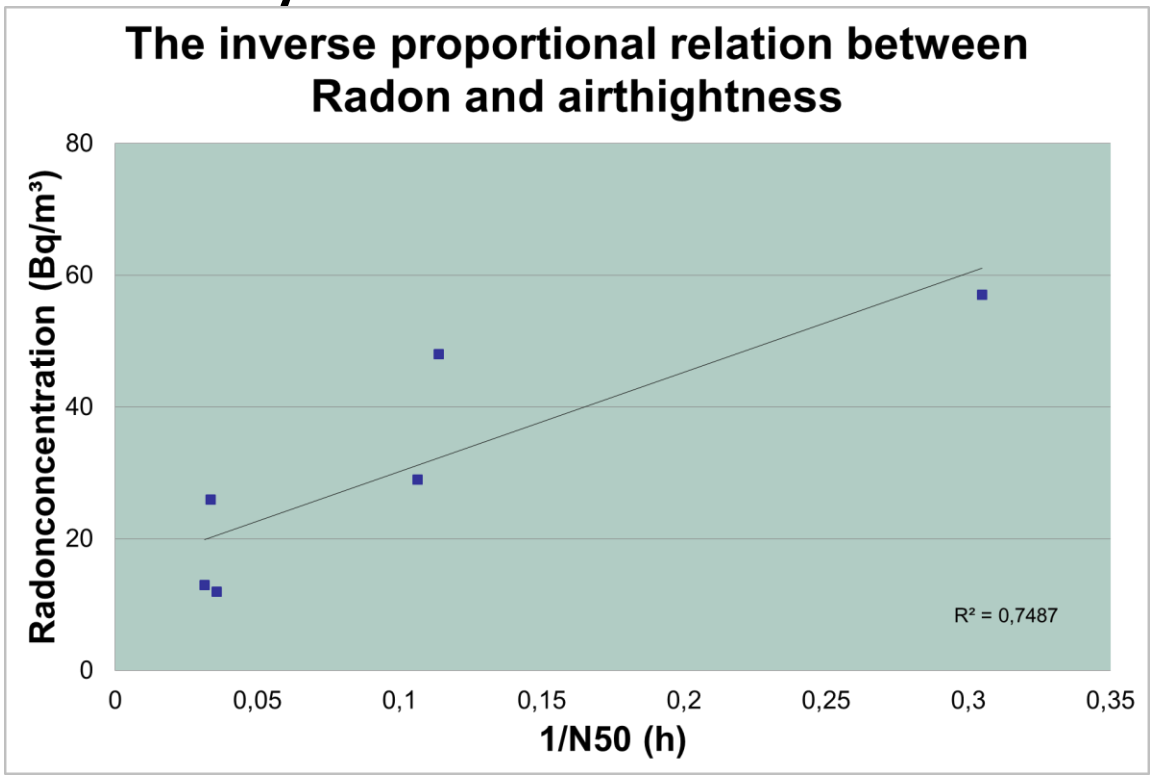
Radioactivity in building materials

- Case study:



- Other case studies are in progress

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A new COST proposal

- Trying to build a new open network…

[NORM4Building materials] Network?

"The depletion of energy recourses and raw materials has a huge impact on the building market. In the design of new synthetic building materials the reuse of various (waste)residue streams becomes a necessity…"

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End of life for NORM residues?

- NORM residues
  - fly ash produced in large quantities from coal burning
  - slags of steelworks and metal recycling industries
  - phosphogypsum
  - red mud of the aluminum processing industry
  - ….

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➔Most residues currently end up at landfills…

➔Some are used for road construction, cement, concrete

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End of life for NORM residues?

- Can innovations in building industry open new validation routes for NORM residues?
  - New types of cementitious binders involve the blending of different NORM containing waste streams.
  - New ceramic processing routes are specifically tailor-made to validate particular waste types.

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“[NORM4Building materials] Network”

- objectives:
  1. Investigate and design **new tailor-made types of building materials to reuse NORM residues**
  2. Developing realistic **radiological impact assessment models** for the reuse of NORM in building materials
  3. Investigating **legislative radioprotection scenarios** on the use of NORM residues in building materials and related impact on indoor air quality

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“[NORM4Building materials] Network”

- The key deliverables are:
  1. **Data base** with discussion of **validation options** of NORM residues in building materials
  2. **Novel insights** on **radiological aspects** when using NORM residues for building materials
  3. **Technical documents and supporting website** with **radiological impact assessment models** for use of NORM residues in building materials
  4. **Information on** the consequences of various **legislative radioprotection options** on the use of NORM residues in new building materials and the resulting influence on the indoor air quality

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“[NORM4Building materials] Network”

- Work plan:
  1. Design, technical and radiological **investigation of building materials to validate NORM residues**
  2. Building data base with **best practices for validation** of NORM residues in building materials

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1st WORKING GROUP

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“[NORM4Building materials] Network”

- Work plan:

3. **Optimization of Activity Concentration Index** for verification if building materials are in accordance to European legislative requirements:
   - Do we need an alternative for ACI?

4. Investigating and applying **industrially useful methodology/protocols** for measurement of ACI

→ **Reducing COST for industry**

2nd WORKING GROUP

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“[NORM4Building materials] Network”

- Work plan:

5. Development of **realistic radiological impact assessment models** for the use of newly designed building materials

6. Based on the new radiological impact assessment models and the screening of building materials the **influence of different legislative scenarios** in Europe is studied

3nd WORKING GROUP

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Organization

- 3 working groups

- advisory board:
  - **NORM processing** and **construction industries** and relevant associations
  - **Regulators**

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COST

- ‘We’ passed the 1e round.
  - We are participants from…

    Belgium, France, Germany, Greece, Italy, Lithuania, Magyar, Netherlands, Poland, Spain

    (so far only 10 countries…)

- Deadline submission full proposal:
  - 25th of January

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Interested in participating?

CALL FOR EXPERTS!

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  - Astrid Schellenberger, Hartmut Schulz [IAF]