



EU Regulatory framework for NORM and Building materials

**European Commission
Radiation Protection**

**Participation in the WEACAU III,
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**EC-DG-ENER-D4
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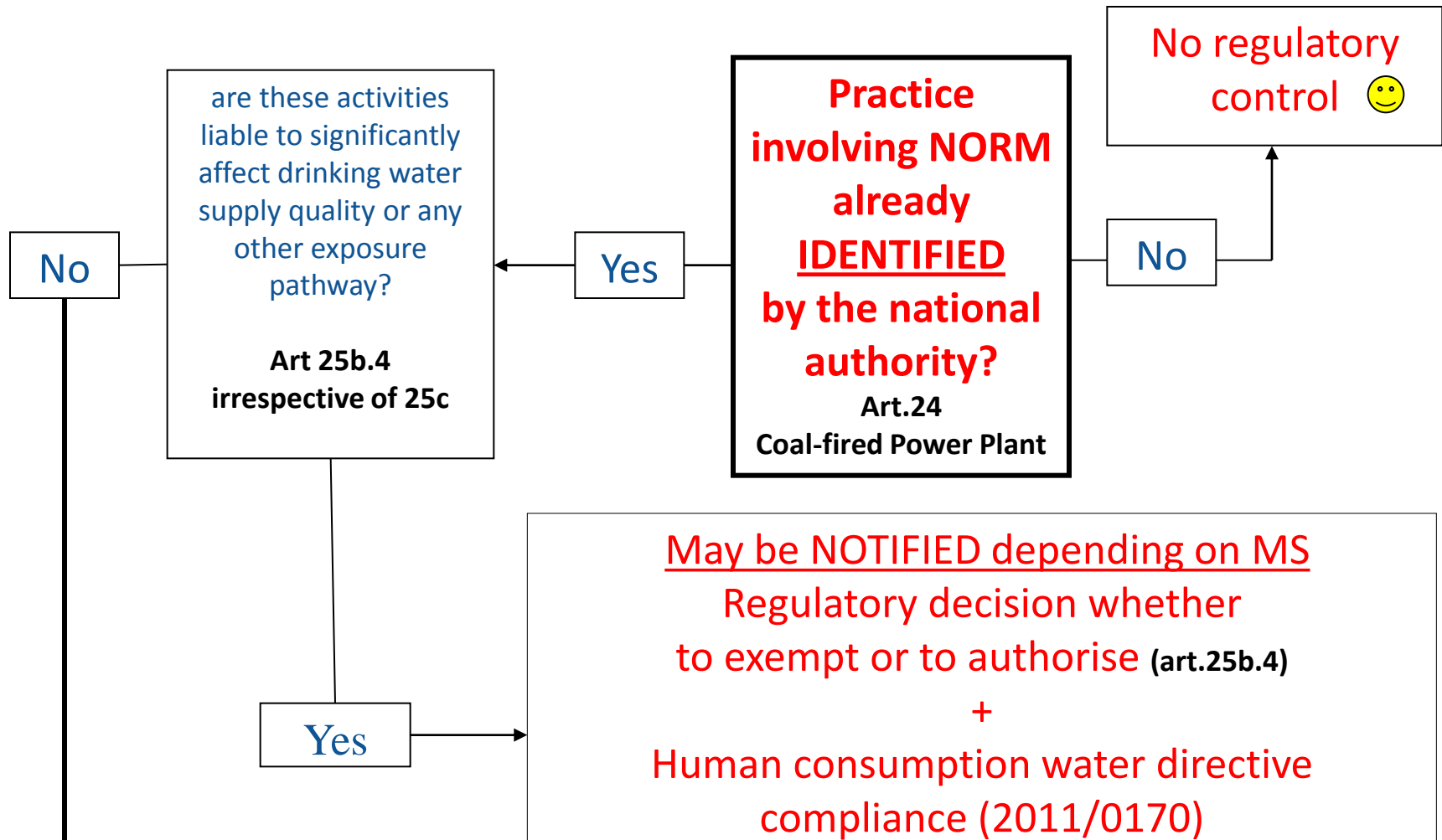
NORM EU REGULATORY FRAMEWORK

*BSS. Art. 24: Member States shall ensure the **identification** of practices involving NORM and leading to exposure of workers or members of the public...*

*Such **identification** shall be carried out by means of surveys or by any other appropriate means taking into account industrial sectors listed in Annex V.*

*extraction of rare earths from monazite;
production of thorium compounds and manufacture of thorium-containing products;
processing of niobium/tantalum ore;
oil and gas production;
geothermal energy production;
TiO₂ pigment production;
thermal phosphorus production;
zircon and zirconium industry;
production of phosphate fertilisers;
cement production, maintenance of clinker ovens;
coal-fired power plants, maintenance of boilers;
phosphoric acid production;
primary iron production;
tin/lead/copper smelting;
ground water filtration facilities;
mining of ores other than uranium ore.*

ANNEX V



Are process residues to be used in Building Materials?

art. 25b.3

No

$^{238}\text{U} \leq 1 \text{ Bq/g}$
 $^{232}\text{Th} \leq 1 \text{ Bq/g}$
 $^{40}\text{K} \leq 10 \text{ Bq/g}$

Art. 25b.1 & annex VI
Table A part 2

No

Shall be NOTIFIED
Art. 24 + 25b.1
+
Assessment & regulatory decision
whether to
AUTHORISED or to EXEMPT
the practice (< 1mSv/y ?)

Art. 25a + Annex VI

Yes

No regulatory control



Art. 29.2 & 25c.1

New BSS



Are process residues to be used in Building Materials?

(e.g. fly ash)

art. 25b.3

Yes

**Index \leq
1 or specific national RL?**

$$C_{226\text{Ra}}/300 + C_{232\text{Th}}/200 + C_{40\text{K}}/3000$$

C in Bq/kg

art.25b.3 + Annex VII

Yes

No regulatory control



Art. 29.2 & 25c.1

No

Practice to be NOTIFIED
With radionuclide concentrations & index

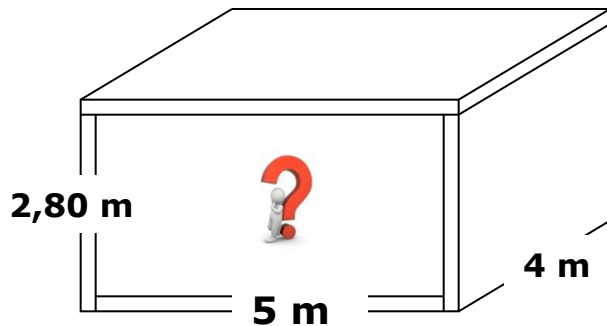
art. 25b.3 & 75

+

**Assessment & regulatory decision
with requirements and/or restrictions**

Art. 75.4 & annex VII

Index origin



- Model room of 5 m x 4 m x 2.80 m
- Made of one building material with a density of **2350 kg m⁻³**
- Walls, ceiling and floor: 20 cm thick
- Exposure time 7000 hours a year
- Dose conversion of 0.7 Sv Gy⁻¹
- Fixed background activity of 50 nGy h⁻¹

$$\text{Dose estimate (mSv/year)} = C_{226\text{Ra}}/300 + C_{232\text{Th}}/200 + C_{40\text{K}}/3000$$

C in Bq/kg

To provide for guidance

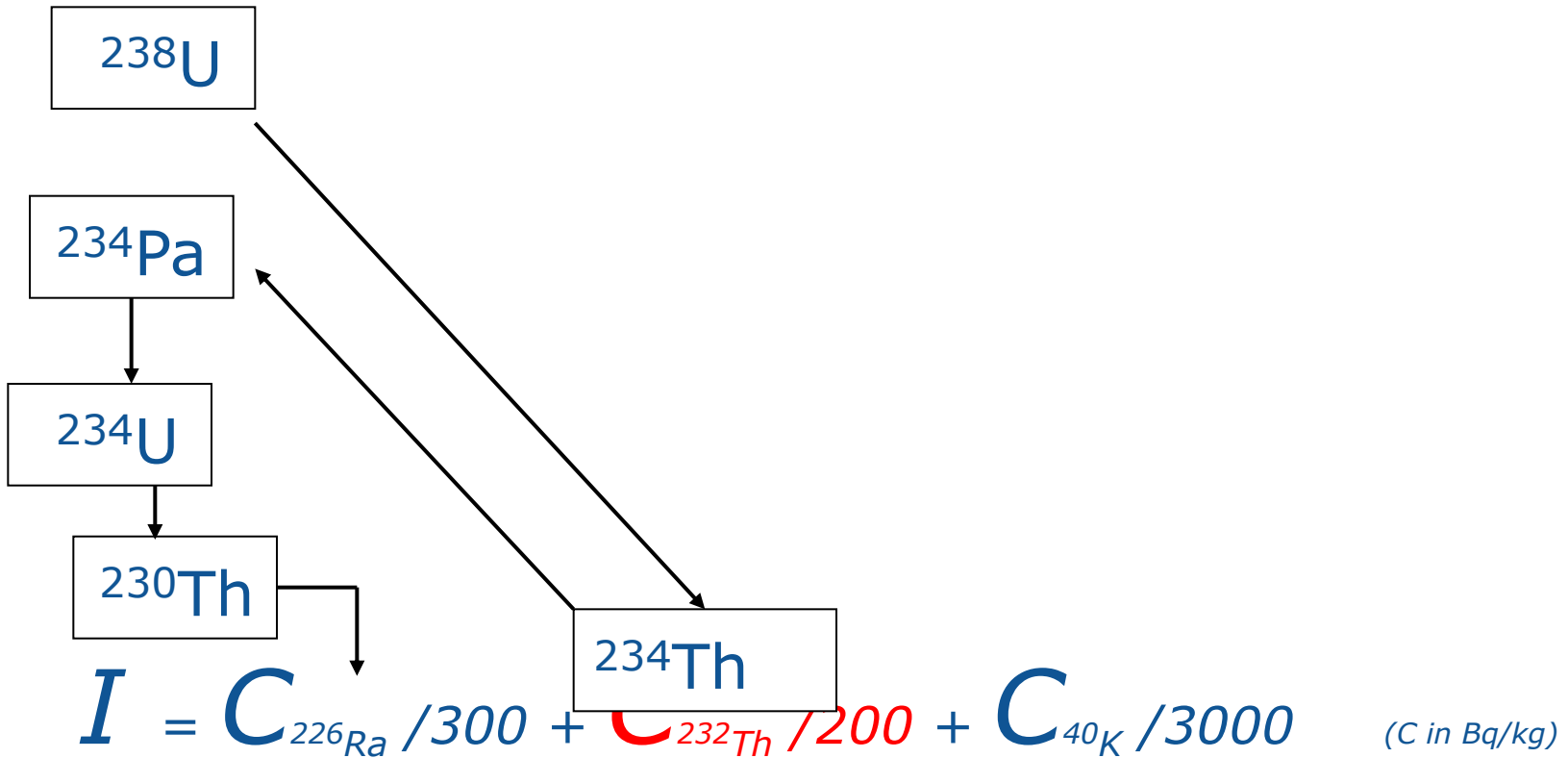
$$I = C_{^{226}\text{Ra}} / 300 + C_{^{232}\text{Th}} / 200 + C_{^{40}\text{K}} / 3000 \quad (\text{C in Bq/kg})$$

EC mandated CEN under Council dir. 89/106/EEC of Dec. 1988* to help standardize and harmonize activity concentration measurement and test standards.

WG: CEN-TG 31

*NOW: REGULATION 305/2011 of 9 March 2011

SOME DIFFICULTIES



DIFFICULTIES?

$$I = C_{226\text{Ra}} / 300 + \boxed{?} + C_{40\text{K}} / 3000 \quad (C \text{ in Bq/kg})$$



^{228}Ac

^{228}Th

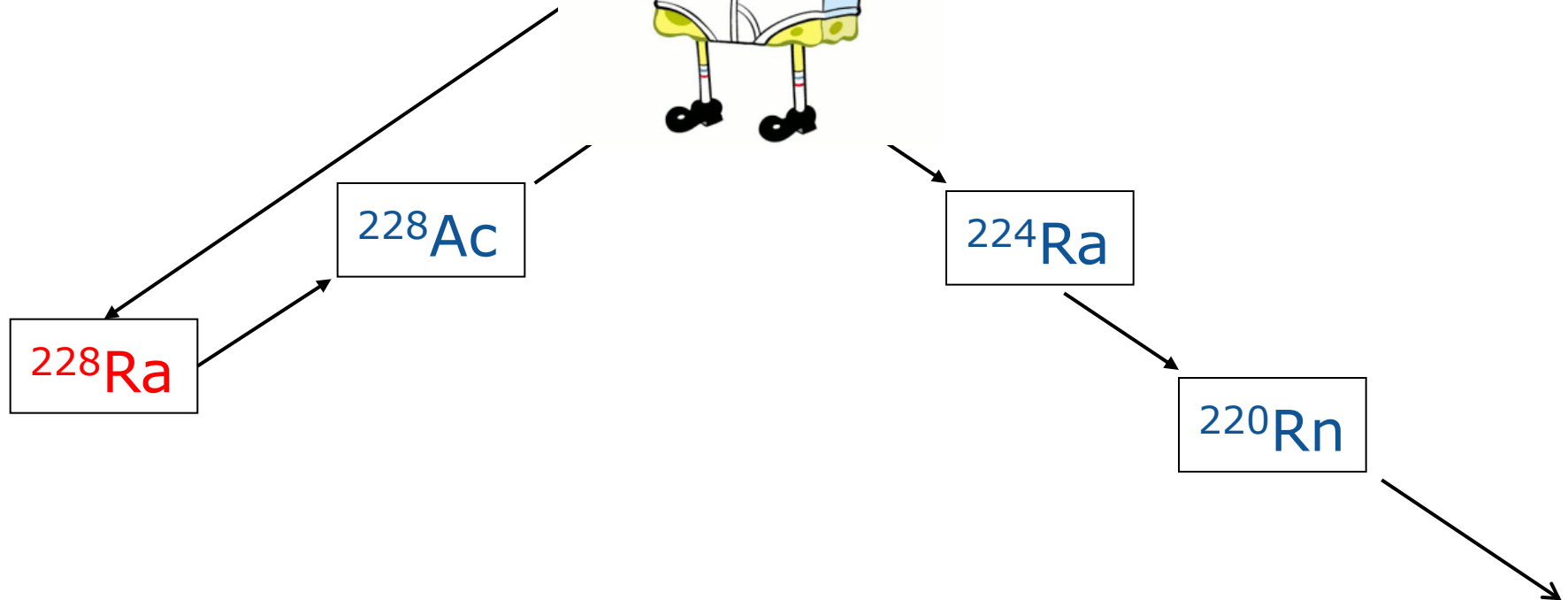


^{220}Rn



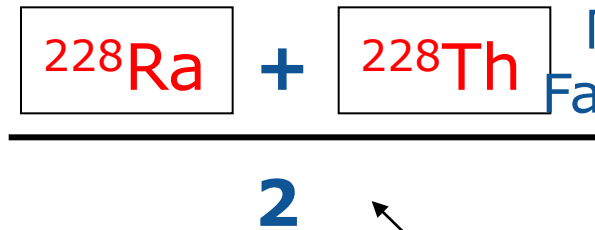
DIFFICULTIES?

$$I = C_{226\text{Ra}} / 300 + C_{40\text{K}} / 3000 \quad (C \text{ in Bq/kg})$$



Experiment with Building materials

$$I = C_{^{226}\text{Ra}} / 300 + C_{^{232}\text{Th}} / 200 + C_{^{40}\text{K}} / 3000 \quad (C \text{ in Bq/kg})$$



Neutronic VS Spectro
Factors may vary from 3
to 10 !!!

Spectrometry (progenies)



Not representative
at all...

Other
appropriate
techniques
e.g. neutronic

To provide for guidance

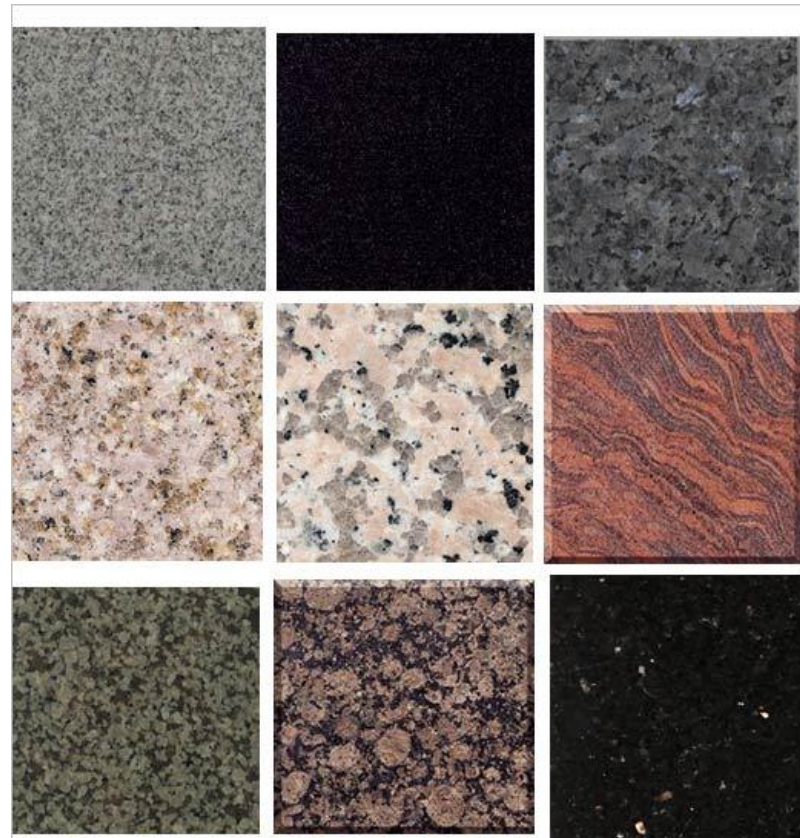
CEN is also mandated to work on protocols for the assessment of expected doses from indoor external exposure from specific types of building materials, in excess of prevailing outdoor external exposure

WG: CEN-TG 32

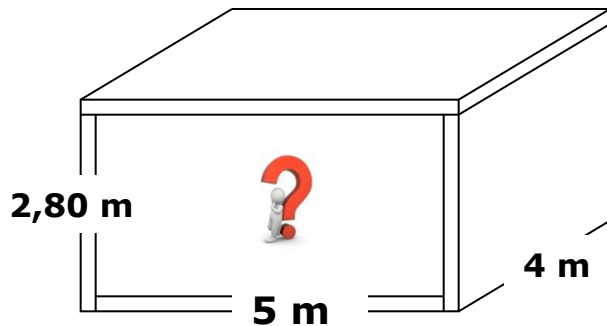
The index much too conservative for thin or superficial building materials

**Index > 1 although
doses < 1 mSv/year ???**

Use	Categories	
	A \leq 1mSv	B > 1mSv
Bulk materials (1)	I \leq 1 Type A1	I > 1 Type B1
Superficial materials with restricted uses (2)	I \leq 6 Type A2	I > 6 Type B2



German Federal Office for RP (BfS) to review the index for density aspects



- Model room of 5 m x 4 m x 2.80 m
- Made of one building material with a **lower density (d) than 2350 kg m⁻³**
- Walls, ceiling and floor: 20 cm thick
- Exposure time 7000 hours a year
- Dose conversion of 0.7 Sv Gy⁻¹
- Fixed background activity of 50 nGy h⁻¹

Dose estimate (mSv/year)=

$$[C_{226\text{Ra}} (2.6\ln(d)-13.9) + C_{232\text{Th}} (3.1\ln(d)-16.6) + C_{40\text{K}} (3.1\ln(d)-16.6)] \times 7.10^{-4} - 0.245$$

C in Bq/g

Harmonized dose risk modelling to be established in EU

- Activity concentration measurements (index) CEN-TG31 with additional measurement techniques if necessary
- Dose modelling harmonisation for building materials CEN-TG 32
- Building materials not to give a gamma dose to “a member of the public” exceeding 1 mSv/year to any member of the public



**What about Radon exhalation
from building materials then?**

Other outcome from Oct. & Nov. meetings

All buildings:

Max. RL, for all buildings (old or new),
shall be 300 Bq/m³

Flexibility was kept to establish different lower limits at
national level

At work, according to the latest ICRP data:

- **400 Bq/m³** (annual average) and 2000 hours of exposure: **10,4 mSv**
- **300 Bq/m³** (annual average) and 2000 hours of exposure: **8 mSv**
- **225 Bq/m³** (annual average) and 2000 hours of exposure: **6 mSv**

Other outcome from Oct. & Nov. meetings

At work:

RL = 300 Bq/m³ for the workplace (with 2000 hours).

If more, compliance with national radiation protection regulation based on the BSS directive (chapter VI) for the protection of workers.

Building codes:

to incorporate requirements to reduce radon ingress in building...

Radon kept out of the screening tools for gamma radiation

CONCLUSION

- NORM processing and building material radioactivity will be taken on board by the new EU-BSS directive
- Related pieces of guidance are to be drafted:
 - Activity concentration measurements (index) CEN-TG31
 - Dose modelling harmonisation for building materials CEN-TG 32
- Radon:
 - Max RL of 300 Bq/m³ for all buildings or dwellings
 - Max RL = 300 Bq/m³ at work as well, and if not: compliance with specific national radiation protection regulation based on selected parts of the BSS Chapter VI.

Thank you

