

# **TENORM**

## **Where is it and what can be done?**

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## ***Development of regulations***

- **1990: ICRP-60: General recommendations**

- **1996: IAEA Basic Safety Standards**

1 Bq/g limit is for "moderate quantity"; bulk volumes of materials with concentrations lower than 1 Bq/g require attention

- **1998: ICRP-75: General principles for the Radiation Protection of Workers**

Action level in workplaces 3-10 mSv/year and/or 1-10 Bq/g

- **2000: ICRP-82: Protection of the Public in Situations of Prolonged Radiation Exposure**

Commodities / building materials < 1 mSv/year

Constrains for practices 0.3 mSv/year (0.1 mSv/year – for 'prolonged')

- **2002: EC RadPro-122, part II: Application of the Concepts of Exemption and Clearance to Natural Radiation Sources**

Dose constraint of 0.3 mSv/year

Levels for radon 200 Bq/m<sup>3</sup> (public), 500 Bq/m<sup>3</sup> (workers)

Clearance levels (Bq/g):

$U^{238}, Ra^{226}, Th^{232}_{sec} = 0.5 \text{ Bq/g}$

$Ra^{228} = 1 \text{ Bq/g} [\dots?]$

$U_{nat}, Th^{232} = 5 \text{ Bq/g}$

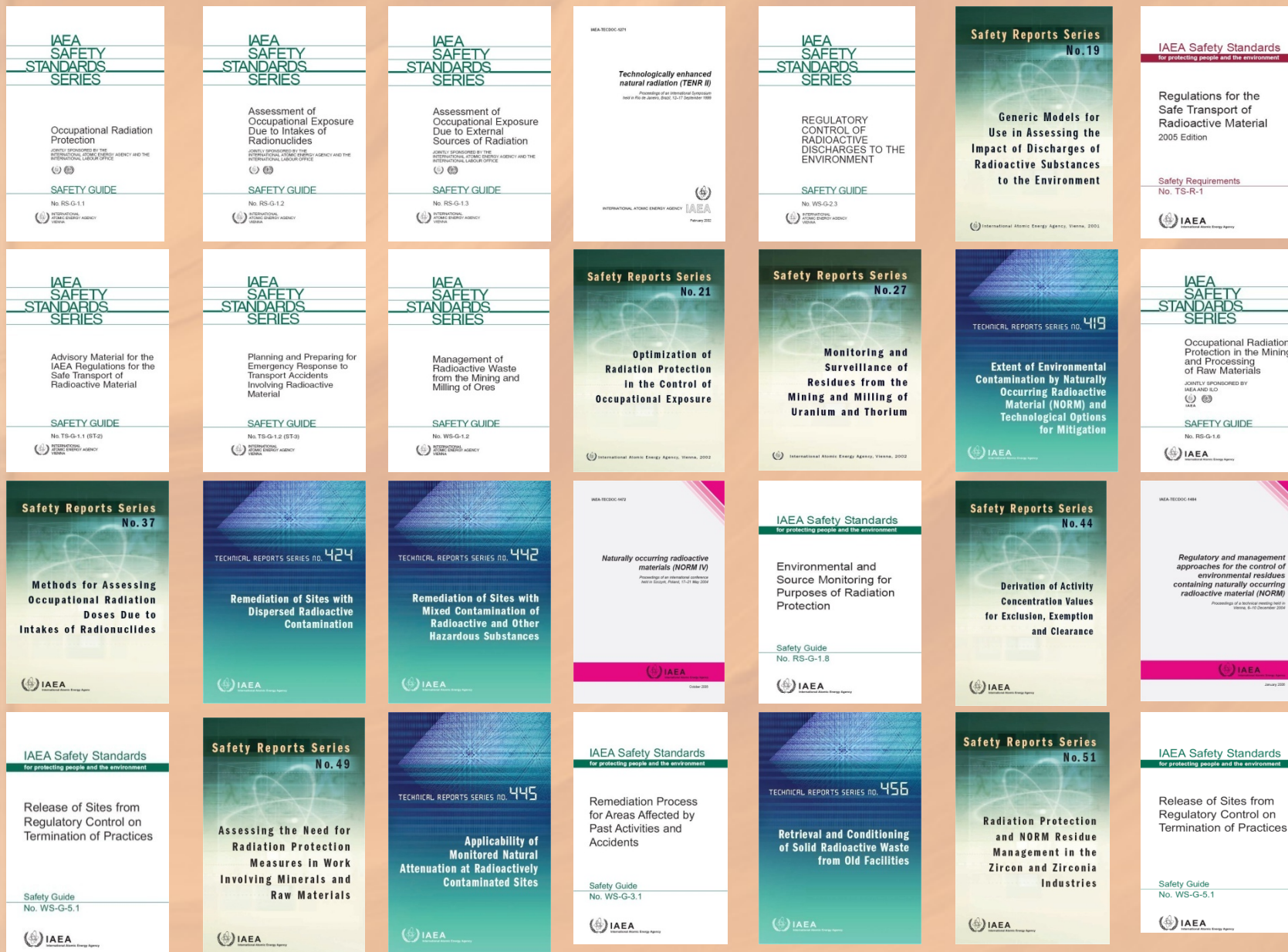
Different and much larger values (10-20 times higher) for wet sludge from oil and gas industry.

- **2004: IAEA RS-G-1.7 Application of the Concepts of Exclusion, Exemption and Clearance**

1 Bq/g clearance level (but may be up to 10 Bq/g)



# Other important IAEA documents



## ***Regulatory suggestion***

### **Most important and complex:**

#### **→ Avoiding over-regulation whilst complying with international recommendations**

- Set performance standards in the form of radiation exposure and 'release/clearance' limits and leave it to the industry to develop systems to meet these standards in specific circumstances.
- The industry systems must be, of course, the subject to the approval by an Appropriate Authority. Commonly accepted procedures on, say, dose calculations etc. should be developed but the amount and volume of documents supporting the regulation should be limited to a reasonable extent.
- If industry is provided with detailed and compulsory specifications on how to meet the performance standards, the system of radiation protection may degenerate into a continuing effort to comply with ever more complicated regulations, procedures and guidelines – completely losing sight of the basic goal of safe operation.

**Illustration →**





# ***NORM regulation in general - illustration***

## **Current situation**

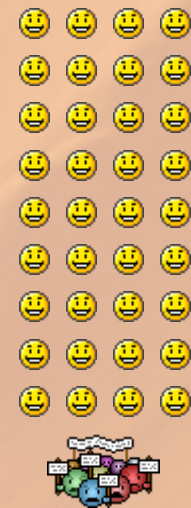
### **INDUSTRY**



### **GOVERNMENT**



### **PUBLIC**



## ***NORM regulation in general - illustration***

### **Possible outcome**

#### **INDUSTRY**



#### **GOVERNMENT**



#### **PUBLIC**



## ***NORM regulation in general - illustration***

### **Different points of view**

- Radiation protection professionals
- Potentially affected workers
- Members of the general public
- The Government
- The Industry
- Scientific Institutions
- The media and pressure groups

Need to be addressed...



## ***Regulations***

- **Australia**

New draft NORM document to introduce uniformity, based on 1-10 Bq/g and 0.3-1.0 mSv/year.  
Currently: QLD – IAEA BSS, WA, VIC – 30 Bq/g total, TAS – 31 Bq/g total, SA – 35 Bq/g total, NSW – 100 Bq/g total, NT – 370 Bq/g total.

- **USA**

Very complex. Federal: DOE, EPA – 0.25 mSv/year constraint. Mainly regulated by States (CRCPD), some do not regulate at all.

Typical 0.25 microGy/hr over background or 0.50 microGy/hour with background; 0.185 Bq/g (5 pCi/g) radium (fertilisers and zircon exempted).

- **Canada**

Dose constraint of 0.3 mSv/year; unconditional release limit for U, Th & Ra is 0.3 Bq/g.

- **South Africa**

Dose constraint of 0.25 mSv/year, exclusion level for NORM – 0.5 Bq/g.

- **Brazil**

NORM classified in 3 groups, with different rules applicable:

Category I – NORM > 500 Bq/g, possible public doses > 1 mSv/year;

Category II – NORM >10, <500 Bq/g;

Category III – NORM ,10 Bq/g, worker doses < 1 mSv/year.





## ***Regulations***

- **Japan**

1 mSv/year limit for public applies. Currently in transition from 370 Bq/g total to IAEA BSS. Being considered: raw materials/ores, waste from past activities, ash, scale, etc.

- **China**

Quantitative criteria being developed based on IAEA BSS. Special Standards developed, i.e. for building materials and for import of minerals.

- **Malaysia**

Dose limit of 1 mSv/year; exclusion for materials  $> 0.05\%$  U+Th, specific exemption for industries, i.e. zircon: U and Ra at 10 Bq/g, Th – 1 Bq/g.

- **Thailand**

Dose limit of 1 mSv/year, exemptions for materials below 10 Bq/g Ra & 1 Bq/g Th and U.

- **Vietnam**

Dose limit of 1 mSv/year, NORM not yet included in regulations, IAEA BSS being adopted.

- **Tanzania, Mozambique**

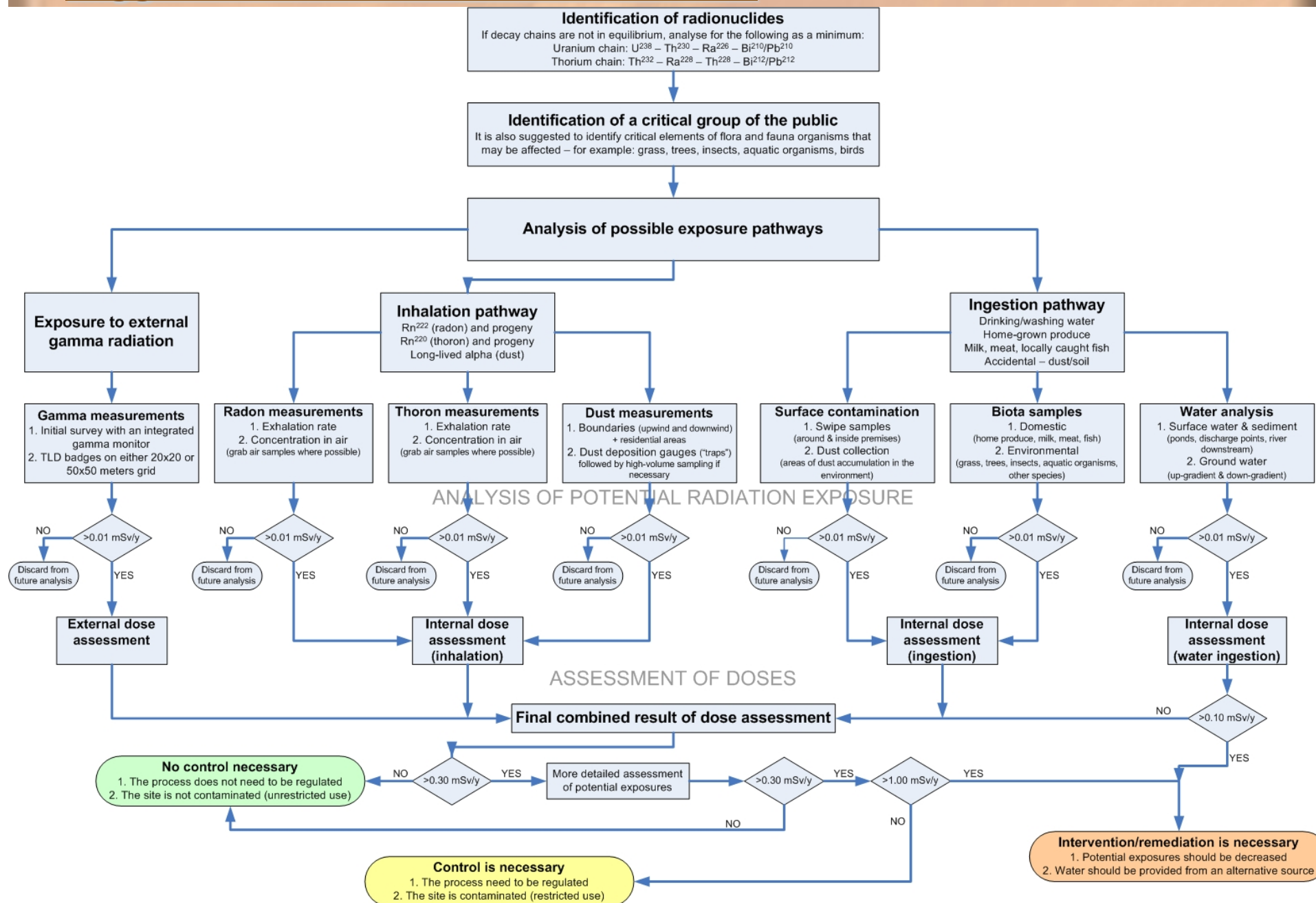
NORM treated the same way as other sources of radiation.

- **Croatia, Tajikistan**

Special guidelines developed for building materials.



# Suggestions on classification of sites



## **Internet resources**

- [\*\*www.calytrix.biz/tenorm\*\*](http://www.calytrix.biz/tenorm) (to be updated)
  - TENORM Notes
  - New Western Australian NORM guidelines
- [\*\*www.normreport.com\*\*](http://www.normreport.com)
  - Publication re-commences in 2009

**Thank you for your attention**

