

# **Review of National and International Standards on Clearance**

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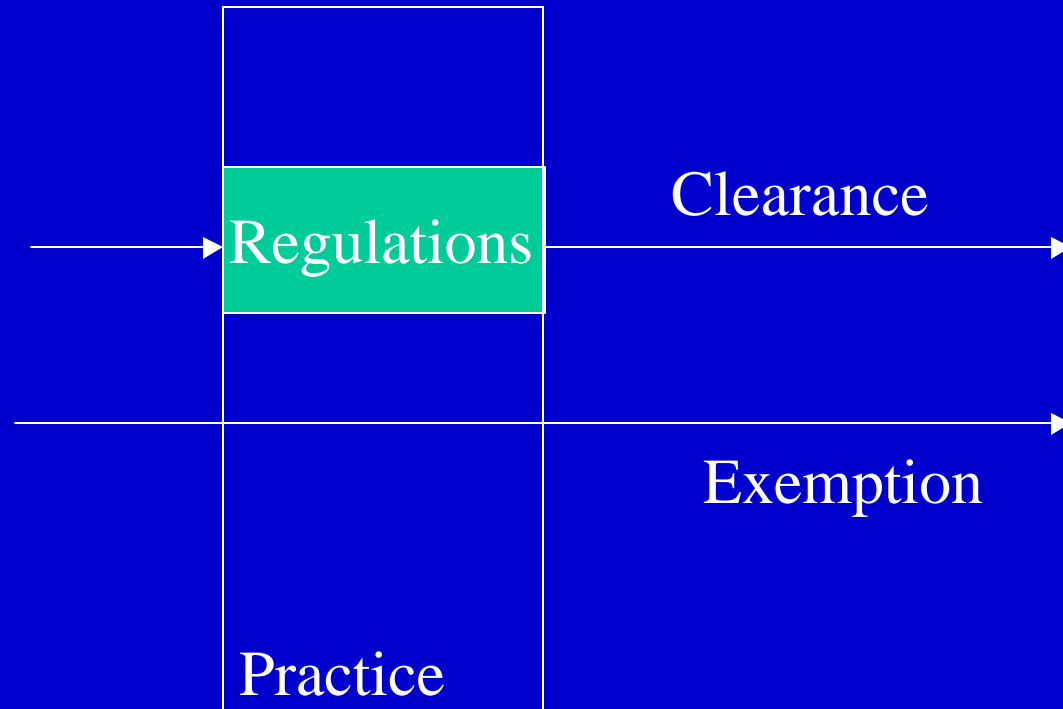
## Aims

- Introduce concept of clearance
- EC work
- IAEA work
- Other clearance work
- UK position

## EC Basic Safety Standards

- Directive in 1996
  - Incorporates ICRP 60
  - in UK legislation by 2000 (just)
  - New dose limits
  - Gives new exemption levels (in IRRs)
  - Introduces regulation of NORM industries
  - Introduces concept of clearance

# Exemption and Clearance



## Exemption/clearance criteria for practices

- Individual dose 10 microSv/y
- skin dose 50mSv/y
- Collective dose 1 man Sv per year of practice OR exemption is optimum
- Doses to critical group (representative of more highly exposed individuals)

## How clearance levels are obtained

- Dose criteria
- Consider exposure scenarios
- Calculate doses from unit activity concentration
- Compare doses with criteria and obtain clearance levels
- Round to a factor of 10

## EC clearance levels

- Article 31 Group of Experts
- Clearance levels reports
  - Bq/g and Bq/cm<sup>2</sup>
  - Metals RP89
  - Buildings and rubble RP113
  - General RP122 part 1 and part 2
- Guidance only

## RP89

- Metals recycling
  - scrapyards, foundry, use of products, use and disposal of by-products
  - Bq/g and Bq/cm<sup>2</sup>
- Reuse of contaminated items
  - Bq/cm<sup>2</sup>
- ~150 nuclides
- details of calculations in RP117 and RP101

## RP113

- Buildings and building rubble
  - clear before demolition or reuse
- reuse or demolition of building, demolition only
  - Bq/cm<sup>2</sup>, average over ~1m<sup>2</sup>
- building rubble
  - Bq/g, average over ~1t
  - (if only 100t in total, could use 10x)
- details of calculations in RP114

## RP122 part 1

- General clearance levels for practices
- Bq/g only
- ~250 nuclides
- Summation rule for mixtures

## RP122 Part 2

- Exemption and clearance for natural radiation sources
- exemption and clearance levels are the same
- dose criterion is 300microSv/y
- gives clearance levels for chain in equilib, chain members, unat
- general values and values for wet sludges from oil and gas

## RP122 part 2 Clearance levels for some naturals, Bq/g

U-235 Sec	1
U238sec+U235sec	0.5
Th232 sec	0.5
Th230	10
Ra-226	0.5
Pb-210,Po-210	5
K40	5

## IAEA Clearance levels

- Tecdoc 855 (1996, interim report)
  - formula (inh, ing, ext),
  - $\sim 0.01-0.1$  x exemption levels
- Tecdoc 1000 (1998, industry, research, medicine)
  - Use exemption values (or  $0.1$  x ELs)
- DS161 (in draft, general large mass exemption values also for use as clearance levels)

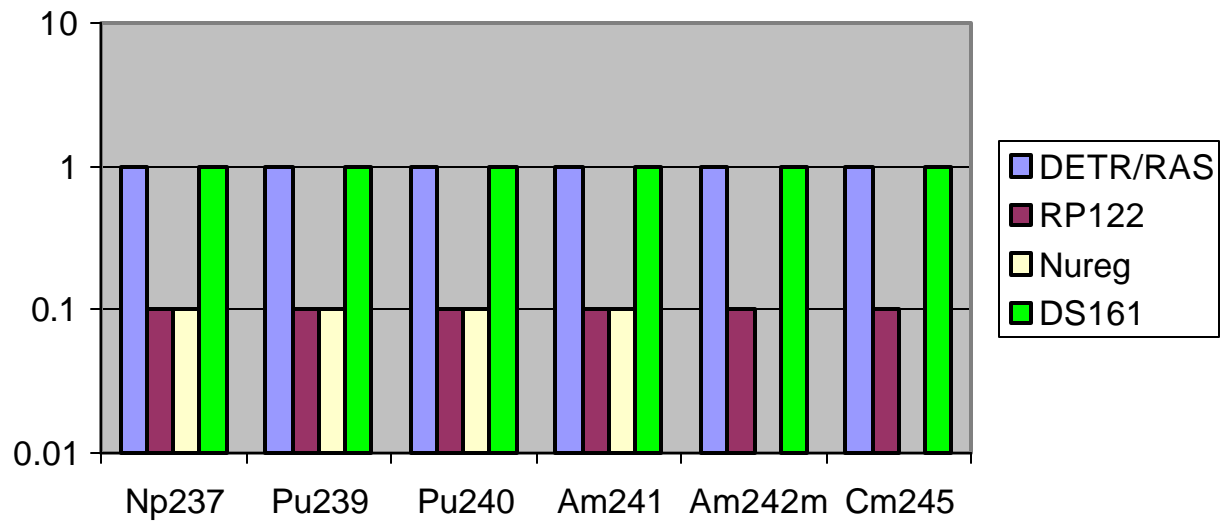
## Draft IAEA DS161

- Exemption, exclusion, clearance
- Artificials
  - scenarios
  - Bq/g rounded 0.1, 1, 10, 100, 1000
  - summation rule
- Naturals
  - comparison with natural levels
  - 0.5 Bq/g any member (5Bq/g for K40)

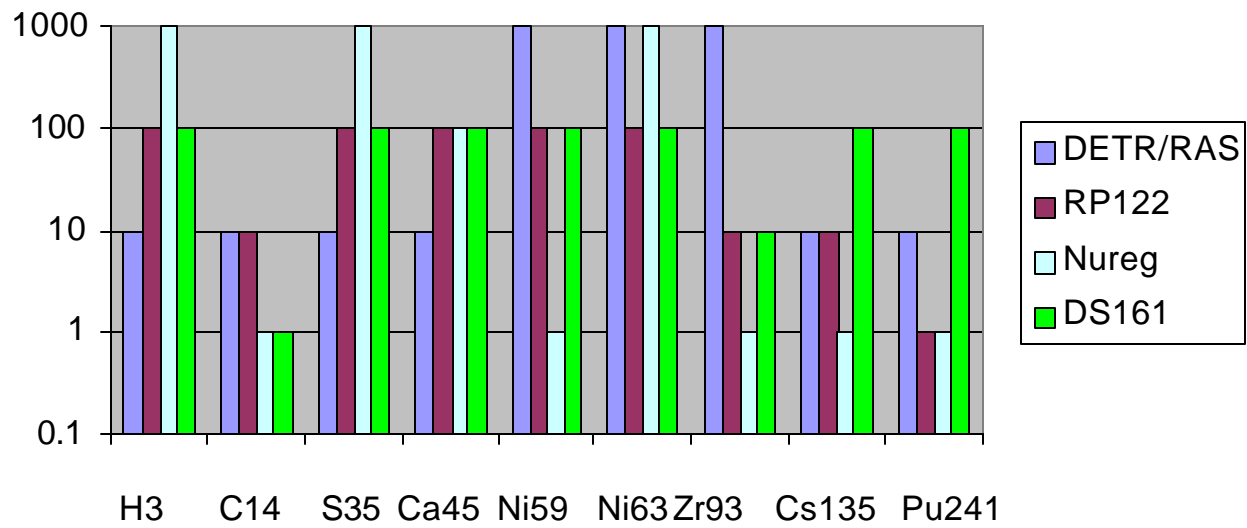
## Other clearance work

- NRPB M986 (1998)
  - metals, concrete, recycling, reuse and disposal
- DETR/RAS/98.004 (1998)
  - metals, concrete, soil, paper, recycling, reuse and disposal
- NUREG 1640 (1999)
  - metals reuse and recycling

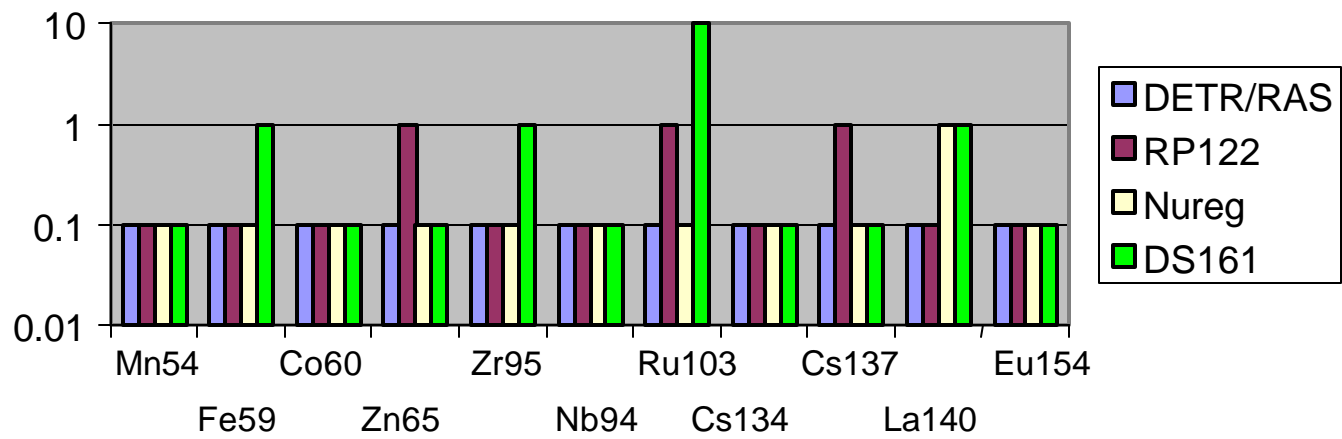
Comparison of derived values for alpha emitters



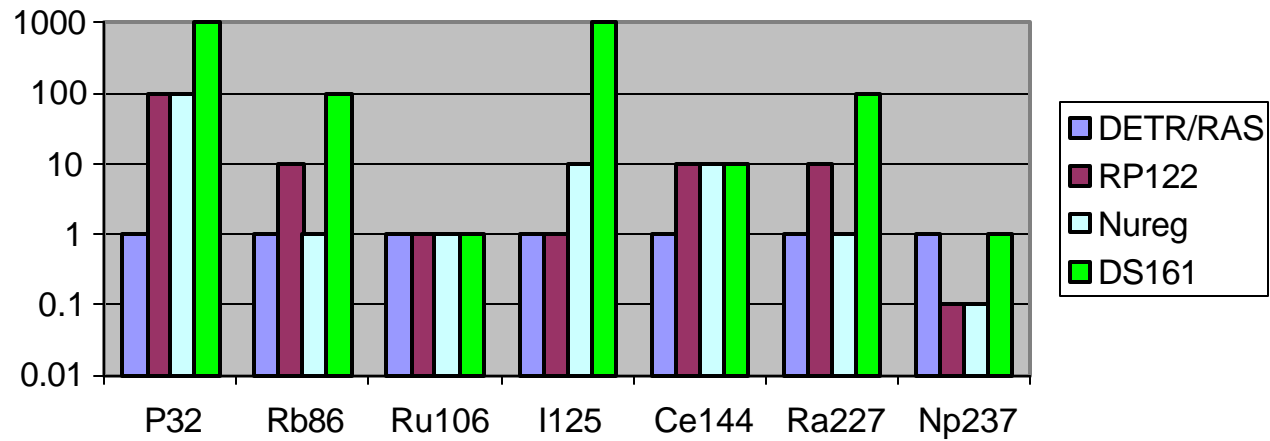
### Comparison of values for weak beta and electron capture



### Comparison of derived values for gamma emitters



**Comparison of derived values for other beta and gamma emitters**



## Clearance levels for some nuclides, Bq/g

Nuclide	IAEA DS161	EC RP 122
H-3	100	100
C-14	1	10
Fe-55	1000	100
Co-60	0.1	0.1
Ni-63	100	100
Sr-90+	1	1
Tc-99	1	1
Ru-106+	1	1
Cs-137+	0.1	1
Eu-154	0.1	0.1
Ra-226+	0.5	0.01/0.5
Pu-239	1	0.1

## UK clearance levels

- SoLA 0.4 Bq/g (total)
- Schedule 1 levels for naturals
  - elements
- Exemption orders for naturals
  - elements
    - Phosphatic 14.8 Bq/g Ra
      - »4.9 Bq/g Ra-226??

## Relevance to the UK

- None at present!
- EC is encouraging harmonisation: other countries have adopted RP122 etc
- Next Directive will most probably include clearance levels and these will then enter UK law
- Which set will become the favourite?
  - DS161, RP122 or future ICRP values?
- We will have to get used to them!