

# Nuclear Industry Code of Practice

## **Section 3:**

*“Industry Practices not Specified by  
Regulations or Regulatory Guidance”*

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# Applicability

- **Yes**, if actually or potentially active and need to be cleared (it is good practice to minimise radioactive waste disposals)
- **No**, if there is no credible potential for contamination or activation (treat as 'clean')
- **No**, for controlled area transfers
- **No**, for de-licensing or for off-site consequences of authorised discharges
- **No**, for people or animals

# Dilution

- Deliberate dilution by mixing wastes from different sources to achieve clearance is not acceptable
- Unavoidable dilution may occur, and is acceptable, e.g:
  - when excavating ground contamination
  - rubble containing bricks contaminated on one side only

# Inhomogeneity - some suggestions

- Section 6 will provide answers - but not yet!
- Some guidelines are given about what degree of inhomogeneity should be acceptable
- Above these guidelines, clearances may still be justifiable, but should consider:
  - practicability of segregation
  - suitability of monitoring regime
  - size of sentencing volume
  - potential radiological significance of clearance
  - introduction of formal statistical test(s)

# Confidence Levels

- No such thing as certainty, so suggest:
  - <5% probability of sentencing active material as exempt or clean ('false negative')
  - <20% probability of sentencing clean material as active ('false positive')
  - (Section 6 will - in due course - inform on how to meet the chosen criteria)
- Must always take account of whole fingerprint

# Sentencing & Compliance Volumes

- Sentencing volume must be appropriate:
  - perhaps 0.1 m<sup>3</sup> for limited amounts of inhomogeneous wastes
  - perhaps 10 m<sup>3</sup> for large amounts of homogeneous waste
- Number of samples per sentencing volume should be justified statistically
- Required confidence level may not be achievable for each sentencing volume, but should be achieved for every compliance volume

# Surface Contamination & 'Thin' Things

- Relevant to contaminated impervious substances (with contamination detectable by monitoring and/or wiping)
- Criteria are given (later) for clearance on basis of surface measurements only ...
- BUT: Do not forget: RSA compliance is the overriding requirement, even for 'thin' items
- N.B: Not suitable for tritium contamination (or caesium sometimes) because of diffusion into the material

# Reference Surface Clearance Levels

- Compliance with RSA is always necessary (Bq/g)
- In many cases RSA clearance may be granted on the basis of surface contamination measurements (Bq/cm<sup>2</sup>)
- BUT radiation protection considerations lead to additional specification of maximum acceptable surface levels as constraints - the 'reference surface clearance levels'. A long history, but not enshrined in law.
- For 'thin' items, compliance with reference surface clearance levels (Bq/cm<sup>2</sup>) may not also be compliance for RSA clearance (Bq/g)

Illustrative minimum thicknesses of items for application of reference surface clearance levels alone to ensure simultaneous compliance with the SoLA Exemption Order limit when surface **contamination exists on one side only** at SC3 limiting levels

Material	Typical density g/cm <sup>3</sup>	Minimum average thickness of surface contaminated material (cm) for simultaneous compliance with the SoLA Exemption Order limit of 0.4 Bq/g		
		0.4 Bq/cm <sup>2</sup> $\alpha$ activity	4.0 Bq/cm <sup>2</sup> $\beta \gamma$ activity	40 Bq/cm <sup>2</sup> low toxicity radionuclides
Wood	0.75	1.3	13	130
Glass	2.2	0.45	4.5	45
Steel	8	0.12	1.2	12

# Reference Surface Clearance Levels

SC1: Overriding requirement for RSA compliance

SC2: Loose contamination:  $\alpha < 0.4$ ,  $\beta/\gamma < 4$  Bq/cm<sup>2</sup>, and always ALARP

SC3: Total (fixed+loose) ALARP and  $\alpha < 0.4$ ,  $\beta/\gamma < 4$ , low-toxicity  $\beta$  and e-capture  $< 40$  Bq/cm<sup>2</sup>. Also dose rate constraints:  $< 5$   $\mu$ Sv/h  $\beta/\gamma$ ,  $< 1$   $\mu$ Sv/h penetrating  $\gamma$

SC4: For 'thin' items, use bulk monitoring if practicable

SC5: For 'thin' items, if bulk monitoring not practicable, then use measurements to confirm SC2 & SC3 compliance

SC6: Average over appropriate areas