

# Review of Radioactive Waste in Ireland

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# Regulatory Control

- RPII is National Competent Authority
- Control of radioactive sources and materials is provided by a system of licensing & inspections
- Practices must be justified, radiation risk assessment & radiation safety procedures provided, RPA/RPO with appropriate experience appointed
- Licence conditions are legally binding



# Licence Conditions for Disused Sources

- A take-back agreement with the supplier of sealed sources must be in place
- A radioactive source or material can only be disposed with the approval of RPII
- RPII must be notified of any loss of or damage to a source
- Disused sources must be stored securely and clearly labelled
- Monthly check for the presence of all sources and record of this to be maintained



# Inspections

- Licensees are inspected by RPII
- 475 licensees with custody and use of radioactive sources – sealed and unsealed
- 84 licensees have custody of disused sources
- Security inspections of storage facilities have been carried out with the National Crime Prevention Office of An Garda Síochána



# Sources of Radioactive Waste

- Sealed and unsealed disused sources held by licensees
- Sealed and unsealed disused sources in post primary schools
- NORM waste



# Disused Sealed Sources

- 1982 sources with an estimated total activity of 1.73TBq
- Many manufactured  $> 20$  years ago – no take-back agreements
- Type of sources range from industrial gauges of high activity to low activity sources designed for teaching purposes



<b>Radionuclide</b>	<b>No. of Sources</b>	<b>Total Activity GBq</b>	<b>Half-life</b>
<b>Tritium</b>	<b>36</b>	<b>598.48</b>	<b>12.26 y</b>
<b>Americium-241/Be</b>	<b>15</b>	<b>225.00</b>	<b>432 y</b>
<b>Strontium-90</b>	<b>65</b>	<b>194.04</b>	<b>29 y</b>
<b>Krypton-85</b>	<b>9</b>	<b>126.75</b>	<b>10.7 y</b>
<b>Caesium-137</b>	<b>72</b>	<b>117.84</b>	<b>30 y</b>
<b>Americium-241</b>	<b>58</b>	<b>87.90</b>	<b>432 y</b>
<b>Plutonium-238</b>	<b>1</b>	<b>92.50</b>	<b>87.8 y</b>
<b>Uranium-238</b>	<b>1404</b>	<b>63.55</b>	<b>4.47. 10<sup>10</sup> y</b>
<b>Nickel-63</b>	<b>56</b>	<b>24.68</b>	<b>96 y</b>
<b>Curium-244</b>	<b>3</b>	<b>11.14</b>	<b>18.1 y</b>
<b>Samarium-151</b>	<b>3</b>	<b>7.77</b>	<b>90 y</b>
<b>Radium-226</b>	<b>41</b>	<b>1.46</b>	<b>1600 y</b>
<b>Carbon-14</b>	<b>67</b>	<b>0.16</b>	<b>5730 y</b>
<b>Totals</b>	<b>1830</b>	<b>1551 GBq</b>	

**Disused Sealed Sources with Half-Life > 10 yrs**



# Disused Unsealed Sources

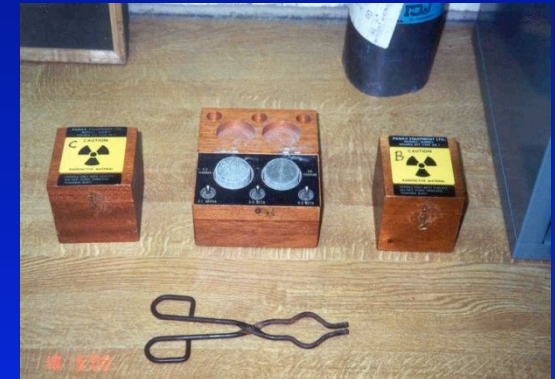
- Where licensed to dispose -Daily limits apply
- Where  $T_{1/2}$  is short, store to decay
- Solid non bio-hazardous waste sterilised, shredded and deposited in deep landfill
- Low activity powders and solutions dating back 30 years or more – radionuclides include: Cs-137, Ra-226, Sr-90, C-14, Th-238 & U-238 salts





# Disused Sources at Post Primary Schools

- 475 disused sealed sources & 470 disused unsealed sources
- Sealed sources mainly – Ra-226, Sr-90, Am-241, Co-60 – many with activity of 185kBq or less. Max 370kBq
- 470 unsealed sources of Th-238 and U-238 salts of estimated total weight 9kg



# NORM Waste

- RPII have examined the levels of radioactivity in by-products of various industries – peat and coal burning power stations, Bauxite processing, off-shore gas industry and thoriated welding rods
- Levels found have been low and indicate that regulatory control is not required from a radiological point of view



**What improvements can be made?**



# Establish a National Radioactive Waste Repository

- Seen as key element in the Waste Management Infrastructure
- Required for HASS and orphan sources and those falling out of regulatory control
- Pre-1991 sealed sources have no take-back agreement
- Present take-back agreements may fail



# Disposal of Th and U Salts and Solutions

- In absence of national repository, it was decided it was safer to dispose of these salts held at Post Primary Schools and other sectors via dilute and disperse method
- The proposal was put to Environmental Protection Agency, who raised some concerns . These have now been resolved.
- Should be able to implement the disposal procedures in near future.



# Clearance of Sources from Licence

- Presently no clearance levels exist for the removal of sources from licence control.
- Procedures for disposal of decayed sealed sources to landfill have just been agreed with Environmental Protection Agency
- This should allow disposal of many of the small disused sources presently held, especially those with a shorter  $T_{1/2}$



# Conclusion

- The amount of radioactive waste in Ireland is relatively small and under regulatory control. However, the establishment of a national radioactive waste repository would strengthen the national waste management system and remove difficulties which occasionally arise with disused and orphan sources.

