Characterization of Radioactive Wastes

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Contents

1. Waste Characterization for Classification
2. Waste Characterization for Treatment
3. Waste Characterization for Disposal
1. Waste Characterization for Classification

- **In-Drum Gamma Methods**
  - High Level Wastes
  - Low and Intermediate Wastes

- **In-Drum Neutron Methods**
  - $\alpha$ Wastes
  - Non $\alpha$ Wastes
1. Waste Characterization for Classification

Difficult-to-Measure Radionuclides

➢ Scale Factor Method for NPP wastes
  Ratio of DTM Radionuclide (e.g. \(^{90}\text{Sr},^{63}\text{Ni}\)) to ETM Radionuclide (e.g. \(^{137}\text{Cs},^{60}\text{Co}\))

➢ Direct Measure Technique

\[
\varepsilon^{(90\text{Sr})} = \frac{A_{\text{Brem}} - A_{\text{BG of Brem}}}{A_{\text{Sr}}}
\]

ROI: 15-290keV
2. Waste Characterization for Treatment

Radionuclide Distribution in Process Streams

- Gamma Spectrometer
- Alpha Spectrometer
- Scintillators

Plastic Scintillator for $^{90}$Sr
Radionuclide Spectrometers
2. Waste Characterization for Treatment

Sub-Process Streams Characterization

Fluidity of Cement Paste
Viscosity of Glass Melt
Homogeneity
2. Waste Characterization for Treatment

Characterization for the Wasteform

- Leaching Resistances
- Radiation Resistance
- Thermal Properties
- Mechanical Properties
3. Waste Characterization for Disposal

Fundamental Study in Lab

- Dynamic Mode
- Static Mode

US Unsaturated Disposal Test  France Multi-Barrier TVA
3. Waste Characterization for Disposal

Pilot Facility For Simulating Repository

US Intermediate Facility

France Full Scale Facility
3. Waste Characterization for Disposal

Waste Disposal Behaviour in underground Lab

- Simulating the Underground Repository
  - Multi-barriers
  - Multi-parameters
- Measuring Waste Degradation Evolution
  - Leaching of Radionuclide
  - Alteration of Waste

SCK-CEN Facility for Glass Disposal
Thank you for Your Attention