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Nuclear waste Management

[1] Radioactive waste classification:

- Waste classification differs widely among countries.
- IAEA proposed a common classification scheme to improve communication and information exchange.
- The scheme is a guideline, not comulsory.
- Boundaries between waste classes are sometimes ambiguous, leading to confusion.

Key terms:

→ Exclusion: Materials not considered radioactive.

→ Exemption: very low activity waste released from regulatory control.

→ Clearance: waste proven safe for reuse or disposal as non-radioactive.

[2] Sources of Radioactive waste:

Radioactive waste originates mainly from:

→ Nuclear Fuel cycle

- Uranium mining
- Fuel fabrication
- Reactor operation
- Reprocessing

→ other sources

- Hospitals
- Research laboratories
- Industries
- Environmental cleanup
- Decommissioning of nuclear facilities

[3] Major Types of Radioactive waste :

→ Uranium Mining and Mill (UMM) waste

- contains long-lived radionuclides.
- Impacts air, soil, groundwater and surface water.
- About 85% radioactivity remains after Uranium extraction.
- often requires Low cost, passive management solutions.

→ NORM waste (Naturally occuring Radioactive Materials)

- Generated from mining and industrial processes.
- Regulatory standards are still evolving globally.

→ Very Low level waste (VLLW):

- Large volume but low radioactivity.
- Produced during:
- Facility decommissioning
- Medical and industrial activities.
- Disposal may occur in dedicated repositories with minimal engineering.

[4] Predisposal management –

Defined by IAEA as all steps before final disposal.

Includes:

- Pretreatment
- Treatment
- conditioning
- storage
- Transport

→ Decommissioning is also part of predisposal management.

[5] Waste minimization –

Definition: Reducing the volume and activity of waste as much as reasonably achievable.

Strategies:

- Proper facility design
- Material selection with Low activation.
- Segregation of radioactive and non-radioactive materials.
- Recycling and reuse.
- Decay storage.

Principle: "Do not produce waste if possible".