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Radioactive Waste Management Following a Nuclear or Radiological Emergency

IAEA-KINS Workshop on the Emergency Preparedness and Response to Nuclear and Radiological Emergencies

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Introduction

- Requirement 15: *“The government shall ensure that radioactive waste is managed safely and effectively in a nuclear or radiological emergency.”*

Discussion

- Where does the radioactive waste come from following a nuclear or radiological emergency?

Waste Origin

- Waste may origin from:
  - **Decontamination** activities
  - **Remediation and clean up** activities
  - **Decommissioning**
  - Ending the **operational life** of a source

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Waste Origin - Examples

- Goiânia, Brazil (1987): Radiological accident involving a radioactive source (^{137}Cs, 50 TBq)
  - Substantial contamination
  - Buildings demolished
  - 3500 m^3 of radioactive waste
- Algeciras, Spain (1998): Unknown ^{137}Cs melted/release of ^{137}Cs to air
  - 270 t of contaminated dust
  - US $3 million for clean-up
  - US $3 million for waste storage

Issues and Challenges

- Well defined and established governmental, legal and regulatory framework on waste management from normal operations, including:
  - National policies and strategies for radioactive waste management
  - Criteria for declaration of radioactive waste
  - Storage and/or disposal options
  - Well known waste streams

Issues and Challenges (cont.)

- An emergency may introduce a new waste stream into the national waste management strategy
  - Usually not considered prior to the emergency
- Waste from an emergency may have diverse characteristics
  - Radiological, chemical, physical, mechanical, biological
- Radioactive waste generated from an emergency may overwhelm arrangements and capabilities
  - Due to its volume, characteristics, etc.

Issues and Challenges (cont.)

- Dealing with large volumes of waste with diverse characteristics will raise necessity for:
  - New techniques and methodologies for waste characterization
  - Options for radioactive waste minimizations, e.g.
    - Reuse and recycling
    - Planning for appropriate pre-disposal management activities
    - New storage and/or disposal facilities

Issues and Challenges (cont.)

- Tendency to manage unduly all waste as radioactive waste due to radionuclides' presence
  - Usually due to public pressure, political pressure and/or lack of preparedness
  - Impacting the costs needed

- Disposal of radioactive waste – long term issue
  - Beyond EPR (and into recovery phase)
  - To follow national policy and strategy for radioactive waste management

Discussion

- How can we prepare to face these issues and challenges?

International Requirements on Radioactive Waste Management

- National policy and strategy for radioactive waste management applies for any radioactive waste
  - Irrespective of its origin
- Safe and effective radioactive waste management
- Waste management following an emergency must not compromise the protection strategy

International Requirements on Radioactive Waste Management (cont.)

- Preparedness requirements are essential and include:
  - Waste characterization
  - Criteria for waste categorization
  - Waste minimization
  - Methodology for predisposal and storage
  - Dealing with human and animal remains

International Requirements on Radioactive Waste Management (cont.)

- Other Safety Standards* provide further requirements and guidance on radioactive waste management:
  - These apply to waste management in planned, emergency and existing exposure situations
  - Targeted to Government, regulatory bodies, operating organizations

* GSR Part 5, SSR-5, GSG-1, WS-G-2.5, WS-G-2.6, WS-G-6.1

Planning Basis

- Anticipate waste characteristics and volumes
  - On the basis of hazard assessment
  - Taking into account past experience
- Review legislative and regulatory framework for
  - radioactive waste safety
  - Management of conventional waste
- Know what may or may not be appropriate waste management
- Review existing practices and resources available

Planning Basis (cont.)

- Consider what might be done with regard to the radioactive waste policy and strategy
  - Assess adequacy of existing waste management strategies to deal with waste generated following an emergency
  - Ensure provisions for its applicability for radioactive waste irrespective of its origin
  - Consider additional waste streams or deviations from existing ones

Emergency Preparedness

- Use the analysis deriving from planning basis to include waste management considerations as part of overall emergency preparedness and response arrangements

Image courtesy IAEA

Emergency Preparedness (cont.)

- Consider waste generation when justifying and optimizing the protection strategy
  - At the preparedness stage
  - During emergency response

- Engage all relevant stakeholders
  - Their acceptance may play an important role in waste management

Emergency Preparedness (cont.)

- Allocate clearly respective roles and responsibilities
  - For management of radioactive waste and of conventional waste
- Ensure an effective coordinating mechanism
  - Among relevant response organizations and organizations with responsibilities in waste management

Emergency Preparedness (cont.)

- Integrate waste management activities
  - Under the Unified Command and Control System (UCCS)
  - Account for necessary transfer of authority and information following the termination of emergency

Image courtesy IAEA

Emergency Preparedness (cont.)

- Advanced planning needs to be made:
  - Guidance for waste characterization for diverse waste properties
  - Guidance for waste acceptance criteria for existing storage/disposal facilities
  - Methodologies for prompt initiation of appropriate pre-disposal management activities
  - Guidance for feasible options for waste minimization

Emergency Preparedness (cont.)

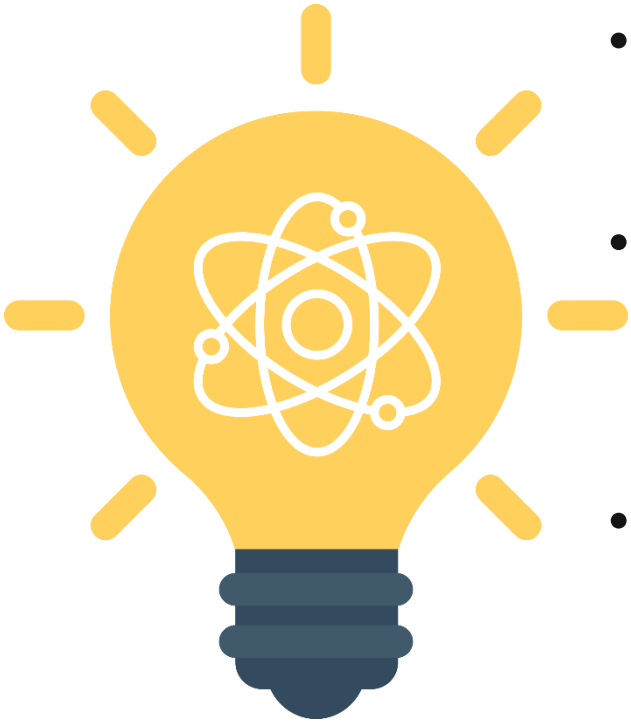
- Advanced planning to include:
  - Acceptable waste collection points
  - What acceptable storage site characteristics are
  - What would be transport of radioactive waste limitations

- Other
  - Resources available (tools, equipment)
  - Procedures
  - Training, drills and exercises

Emergency Preparedness (cont.)

- Considerations for **management of human and animal remains**:
  - Religious practices and cultural practices
  - Possible options applicable
  - Consultation with relevant interested parties on what options may be acceptable
  - Training of workers on the basic radiation protection principles

Key Points



- Management of radioactive waste is part of preparedness stage
- Legislative and regulatory framework for radioactive waste should cover waste of any origin
- Challenges to be considered for waste management in emergency:
  - Diverse characteristics of waste normal practices
  - The amount/volume of waste
  - Acceptability of storage/disposal site

Where to Get More Information

- IAEA GSR Part 7 (2015)
- IAEA GSR Part 5 (2009)
- IAEA WS-G-3.1 (2007)
- IAEA EPR-Method (2003)

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Thank you!

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