

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



Waste Origin - Examples

- Goiânia, Brazil (1987): Radiological accident involving a radioactive source (^{137}Cs , 50 TBq)
 - Substantial contamination
 - Buildings demolished
 - 3500 m³ 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.)

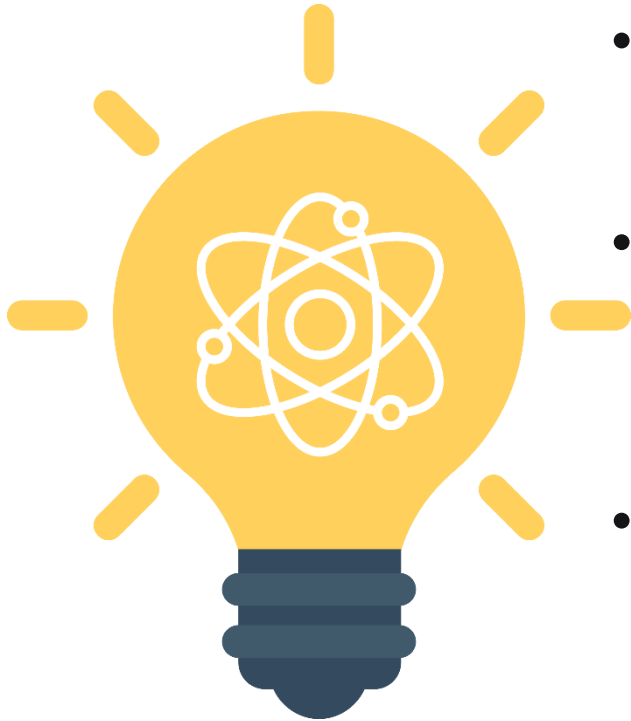
- Advanced planning to include:
 - Acceptable waste collection points
 - What acceptable storage site characteristics are
 - What would be transport of radioactive waste limitations

- 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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