IRSN
INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE

Enhancing nuclear safety

Managing nuclear accidents and dealing with consequences

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Factors to be considered in the management of an accident

Time :

- **Immediate phase**
- **Accident phase**
- **Post-accidental phase**
- **Time for effects to materialize**

Distance

Complexity of information :

- **Contamination**
- **Dose rate measurements**
- **Effective dose evaluations**

Further factors and issues

Issues for consideration :

- Contamination
- Irradiation through direct irradiation and other pathways
- Iodine ingestion
- Foodstuff and goods

Response and protective actions :

- Sheltering
- Evacuation
- Iodine Thyroid Blocking
- Restrictions on consumption/commercialization of goods
- Decontamination

Post-accidental management

International Instruments (1)

Two conventions relevant to emergency situations :

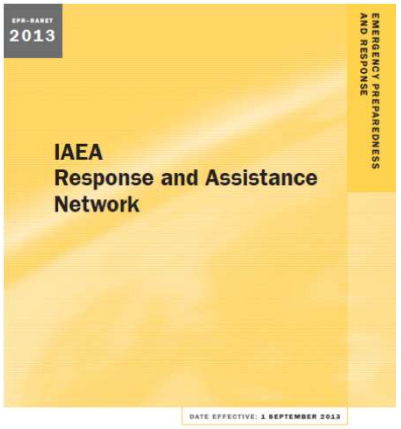
- **Convention on the Early Notification of a Nuclear Accident**
  - notification system for nuclear accidents with potential international transboundary impacts
  - Accident States to report the accident's time, location, radiation releases, and other data essential for assessing the situation.
- **Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency**
  - sets out an international framework for prompt assistance and support
  - requires States to notify the IAEA of their available means for assistance
  - In case of a request, each State Party decides whether it can render the requested assistance as well as its scope and terms.

International Instruments (2)

The two conventions are used and are of value, but would need to be strengthened :

- **Better reporting, in particular of means for assistance**
- **Need for training and exercises to develop the operational effectiveness**
- **Better consultation and sharing among States**

International Mechanisms



- RANET (IAEA Response and Assistance Network) : implementation mechanism for the Convention on Assistance
- IRMIS (International Radiation Monitoring Information System) : database for gathering and disseminating environmental measurements
- IAEA USIE (Unified System for Information Exchange in Incidents and Emergencies)
- International exercises

European Arrangements (1)

Two European directives include many provisions on emergency preparedness and response

Basic Safety Standards Directive (2013) :

- **Emergency exposure situations: professional exposure, interventions,…**
- **Preparation and management of emergency situations, information of the public**
- **Reference levels**

Nuclear Safety Directive (2014) :

- **Transparency, information of the public and other stakeholders**
- **On-site preparedness and response**

European Arrangements (2)

Operational arrangements :

- **ECURIE (European Community Urgent Radiological Information Exchange): early notification and exchange of information in radiological or nuclear emergencies**
- **EURDEP (EUropean Radiological Data Exchange Platform) : continuous exchange of data from national radiological monitoring networks in almost real-time (~hourly basis)**

European Arrangements (3)

There are numerous and serious gaps

- **Diversity in measures taken in accidental situations**
- **Inconsistency of cross-border arrangements**
- **Inhomogeneous capabilities for radiation survey and environmental measurements**
- **Lack of preparation for post-accidental situations**

Harmonization and coordination actions are sought

Attempts to Improve European Arrangements

- EU survey on current national off-site arrangements
- Research projects to develop common strategies for improved coordination - PREPARE

The proposed HERCA-WENRA Approach :

- Proposal by safety authorities
- Information exchange on measures considered in each country
- Early alignment on the measures taken in the accident State, or coordination of decisions
- In the absence of information, proposed automatic protective measures

Some lessons in particular from Fukushima

- Huge socioeconomic consequences and societal trauma
- Application of radiation protection standards is not easy
- Radiation protection, important as it is, cannot be the only consideration, need to consider equally civil protection considerations and societal expectations
- Need to plan ahead for post-accidental actions
- Need for optimized remediation strategies taking into account the effectiveness and feasibility of measures and the amount of contaminated material generated
- Engagement of stakeholders, especially local authorities and the population, is essential for all aspects of post-accident recovery

Issues in Accident Response (1)

Objectives evolving from technical to societal :

- **Short term: adequacy and effectiveness of measures**
- **Mid-term: same, based on improved understanding of the situation and risks - radiological and other risks, including societal impacts**
- **Long-term: credibility**

Issues in Accident Response (2)

Why such large differences between measures in various countries ?

- Difficulty to put risks in a comprehensive and balanced perspective
- Uncertainties
- Decisions are essentially political
- Difficult balance and decision-making between, low probability, large consequences, large resources to be committed
- Biases in decision-making
  - Predictions vs. measurements - risk of overestimation and over-reaction
  - Automatic decision-making through reflex actions
- The issue of evacuation

There can be many ways to define adequate response

Issues in Accident Response (3)

Post-accidental response

- **Managing contaminated territories : remediation, management of contaminated material and waste**
- **Managing contaminated goods and products, esp. foodstuff**
- **Community revitalization and stakeholder engagement**
- **Dealing with prolonged radioactive releases**

Need for early preparation for post-accidental response like for immediate response

Engagement of stakeholders

The active participation of the population is indispensable in accidental and post-accidental conditions

- **Education, information and dialogue between authorities, experts and people**
- **Importance of people being in a position to make their own measurements and adjust their actions accordingly**
- **Joint assessments between all stakeholders**
- **Implementation of concrete projects and measures important to the stakeholders' activities, with the support of local professionals, experts, authorities**
- **Dissemination of information and results**

Towards an expert society ?

By way of conclusion

- In spite of potential international impacts, EPR is a field where necessary international (as well as national) arrangements are far from fully established
- Need for extensive coordination for improved consistency - bottom-up harmonization from the technical side easier than top-down from political side
- Nationally:
  - Need for preparation of local authorities
  - Interest of public engagement and co-expertise

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Thank you for your attention

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