

# Programme and Perspectives on Post-Accident Decommissioning and Remediation

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## NEA Decommissioning and Remediation Experience

- The NEA has been addressing decommissioning issues, within the Radioactive Waste Management Committee, since 1985, and remediation issues, within the Committee on Radiation Protection and Public Health, since 1993
- The Fukushima-related work being performed by the NEA in these areas is based on this experience

## RWMC Decommissioning Work

The RWMC has for some time focused on the regulatory, managerial and technical aspects of decommissioning in the contexts of:

- Advancing the status of decommissioning expertise
- Decommissioning R&D needs
- Identifying decommissioning challenges

## Advancing Decommissioning Status

Decommissioning is becoming a mature industry, but has not yet achieved a fully industrial scale

- Decommissioning projects are facility/site specific
  - project tasks are not routine
  - change management is often significant (insufficient data and operational history/events, records of facility design and modification)
  - R&D has achieved a very high level, but addresses site needs
- Decommissioning is a business, sharing of technical knowledge and experience is “business – based”
- Availability of adequate funds, and material / waste management infrastructure are necessary but often inadequate

## Decommissioning R&D Needs

International organisations facilitate platforms for communication, information exchange, co-operation on specific projects

- Physical, chemical, and radiological characterisation of bulk waste
- Long term storage technologies
- Waste processing technologies and waste packaging
- Remote decontamination and handling technologies

# Decommissioning Post-accident Challenges

Existing knowledge and experience does extent to accidental aspects

- Emergency activities are the first priority
- High doses/contamination -> radio-protection of workers
- Nuclide inventory -> waste management
- Assessing the status of barriers and structures
- Large contaminated areas -> bulk of waste

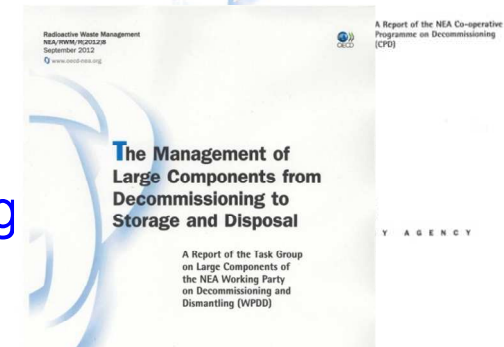
# RWMC Decommissioning Products

## Recent Related Publications

- Decontamination and Dismantling of Radioactive Concrete Structures (2011)
- Remote Handling Techniques in Decommissioning (2011)
- Management of Large Components from Decommissioning to Storage and Disposal (2012)

## Ongoing Related Work

- Radiological characterization for decommissioning (strategies)
- R&D and innovation needs for decommissioning (reference book)
- Nuclear site restoration (1. strategies; 2. approaches, techniques, case studies)



## Decommissioning Conclusions

- Large accidents are thankfully few, but result in much work in harsh environments
- Each accident will be unique, having its own specific decommissioning characteristics and challenges, and may require specific R&D
- Existing decommissioning experience and techniques (e.g. characterisation, cutting, demolishing, waste management, etc.) are applicable to accident situations



## CRPPH Remediation Work

The Committee on Radiation Protection and Public Health has for some time focused on the radiological protection aspects of remediation in the contexts of:

- International Nuclear Emergency Exercises
- Stakeholder Involvement in Recovery Decision Making
- Post-accident, Off-site Remediation Lessons Learned

# International Nuclear Emergency Exercises

Since 1992 the NEA has organised and analysed the results of large-scale international nuclear emergency exercises, the INEX Series

- The INEX 3 (2005-6) and INEX 4 (2010-11) exercises focused on consequence management aspects (agricultural and urban respectively)
- Further INEX exercises will be organised and will deal with consequence management and recovery aspects

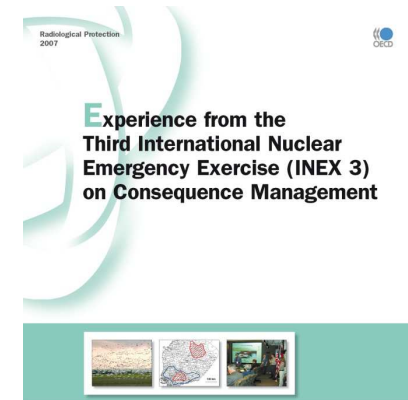
# INEX 3 Recovery Results

## INEX 3 Recovery Conclusion

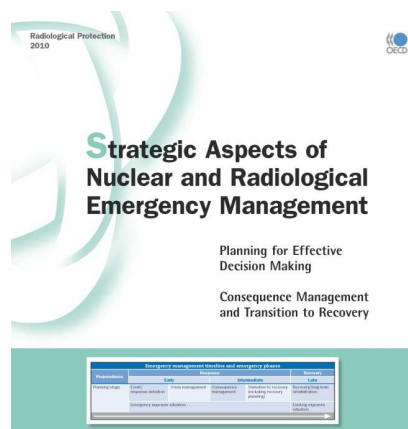
Countries are less prepared for recovery than for emergency management

## INEX 3 Key Needs in Recovery Management

- Strategic description of the transition to “recovery”
- Discussion and development of thinking on organisational, administrative, and stakeholder involvement issues and processes
- Discussion and development of thinking on recovery areas (Populations, Environment, Infrastructure, Waste)
- Development of criteria or other relevant considerations relating to the recovery areas (cleanup, return, etc.)



Experience from the  
Third International Nuclear  
Emergency Exercise (INEX 3)  
on Consequence Management



Strategic Aspects of  
Nuclear and Radiological  
Emergency Management

Planning for Effective  
Decision Making

Consequence Management  
and Transition to Recovery

Emergency management timeline and emergency phases			
Phase	Start	End	Key activities
Emergency preparedness	Before	During	Emergency preparedness activities
Emergency response	During	After	Emergency response activities
Recovery	After	After	Recovery activities

# INEX 4 Recovery Results

**INEX 4 Recovery Conclusion:** Recovery planning and implementation requires stakeholder involvement, and is very case specific

## INEX 4 Key Needs in Recovery Management

- Develop plans/procedures/processes for items identified as not being currently in place
  - cleanup criteria and/or approaches
  - guidelines, policies, or legislation governing compensation
  - animal welfare procedures
  - stakeholder involvement and training
  - management of significant amounts of contaminated wastes
  - criteria for ending the emergency situation
- Procedures are needed for the preparation and use of “clean” certificates
- Need clear interfaces between local, regional, national, and international authorities
- Need plans to address public concerns and to communicate information in a way that promotes trust and understanding
- Develop a well-defined system of prioritizing actions in the face of local or other pressures
- Develop emergency procurement processes for obtaining additional resources

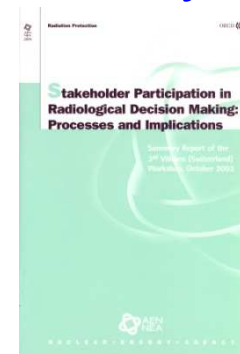
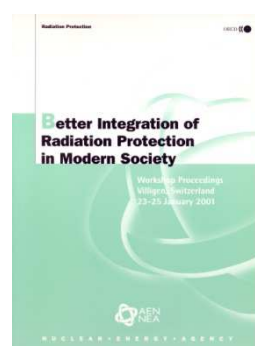
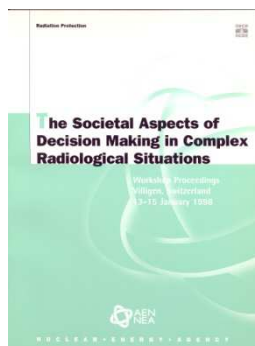
# Stakeholder Involvement in Recovery Decision Making

Stakeholder involvement is essential for recovery planning and implementation. The NEA has held, and will continue to organise workshops and expert groups to discuss these issues:

- Villigen workshops
- Chernobyl-related work
- Science and Values in RP Decision Making workshops
- Practices and Experiences in Stakeholder Involvement for Post Nuclear Emergency Management workshop

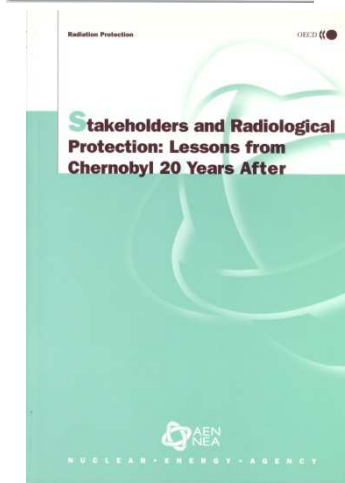
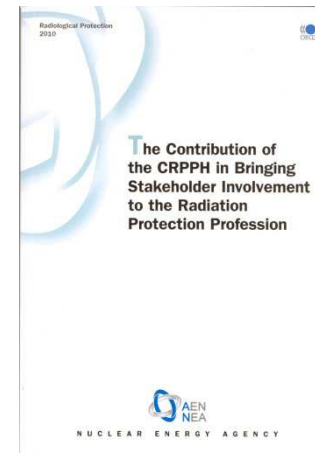
# Stakeholder Involvement in Recovery Decision Making

- Villigen Workshops on Stakeholder Involvement (1998, 2001, 2003)
  - Radiological protection must be integrated into societal decisions, rather than integrating societal aspects into radiological protection decisions
  - Stakeholder involvement is essential to achieving sustainable, accepted decisions in complex radiological situations, such as post-accident recovery



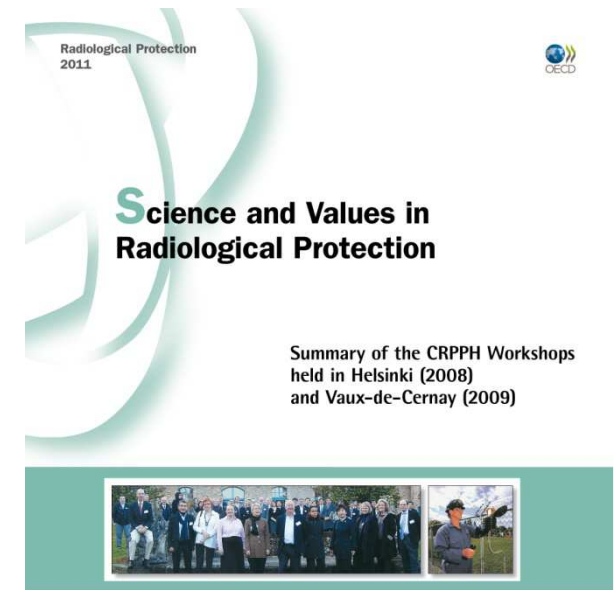
## Chernobyl-related Work

- A top-down approach will need to evolve into a bottom-up approach
- Listening to and working with stakeholders can help to rebuild trust
- Stakeholders are a resource to identify problems and practical solutions on the ground



# Stakeholder Involvement in Recovery Decision Making

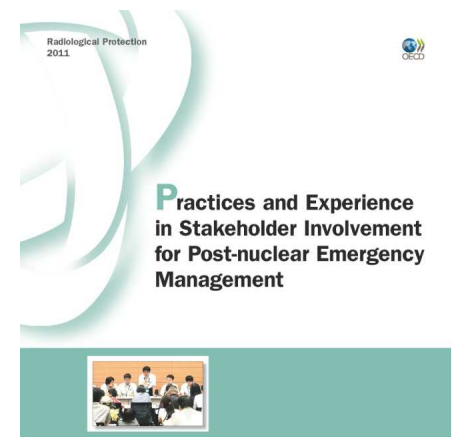
- Science and Values in RP  
Decision Making Workshops  
(2008, 2009, 2012)
  - Decisions are informed by science but driven by social values
  - Protection of children is a universal objective, and a focus of recovery activities
  - Low-dose health effects are poorly understood by stakeholders, and their concerns need to be better addressed





# Stakeholder Involvement in Recovery Decision Making

- Practices and Experiences in Stakeholder Involvement for Post Nuclear Emergency Management Workshop (2010)
  - Stakeholder involvement should be central to emergency and recovery management planning
  - A multi-disciplinary team of professionals is needed to deal with the spectrum of stakeholder issues



# Post Accident, Off-Site Remediation Lessons Learned

The Fukushima accident has resulted in broad rethinking of national post-accident plans and preparedness. The NEA is surveying its members on their post-Fukushima review of national recovery plans in the areas of:

- Return to evacuated areas
- Management of decontamination wastes
- Cleanup criteria and approaches
- Communication strategy (i.e. to the public, to elected officials, within responsible organisations)
- Education, information and building effective radiological protection culture

## Remediation Conclusions

- These RP lessons are not new
- It is important to take advantage of lessons that have been learned (the hard way)
- There is a need to focus at least as many resources on recovery as are focused on emergency management

Good Judgment, that comes from experience  
Experience, well, that comes from bad judgment