

**IAEA**

WM 2014  
Phoenix, 1- 6 March 2014

## IAEA Actions in Support to Decommissioning and Remediation Activities in Fukushima

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# Action Plan on Nuclear Safety

- Number of activities implemented since 2011
- Most important in remediation and decommissioning area:
  - Review missions on remediation
  - Review mission on decommissioning
  - IAEA Report on Fukushima Accident
  - International Experts Meetings
  - Projects on processing and on disposal of large volumes of waste
  - Projects on decommissioning techniques and tools for decommissioning

# First Review mission on remediation

- October 2011: Expert Mission on remediation of large contaminated areas around Fukushima Daiichi NPP
- Main objectives:
  - Provide assistance to Japan in the management of the remediation of large contaminated areas
  - Review remediation strategies, including contamination mapping
  - Share its findings with international community as lessons learned
- [http://www.iaea.org/newscenter/focus/fukushima/pre\\_report.pdf](http://www.iaea.org/newscenter/focus/fukushima/pre_report.pdf)

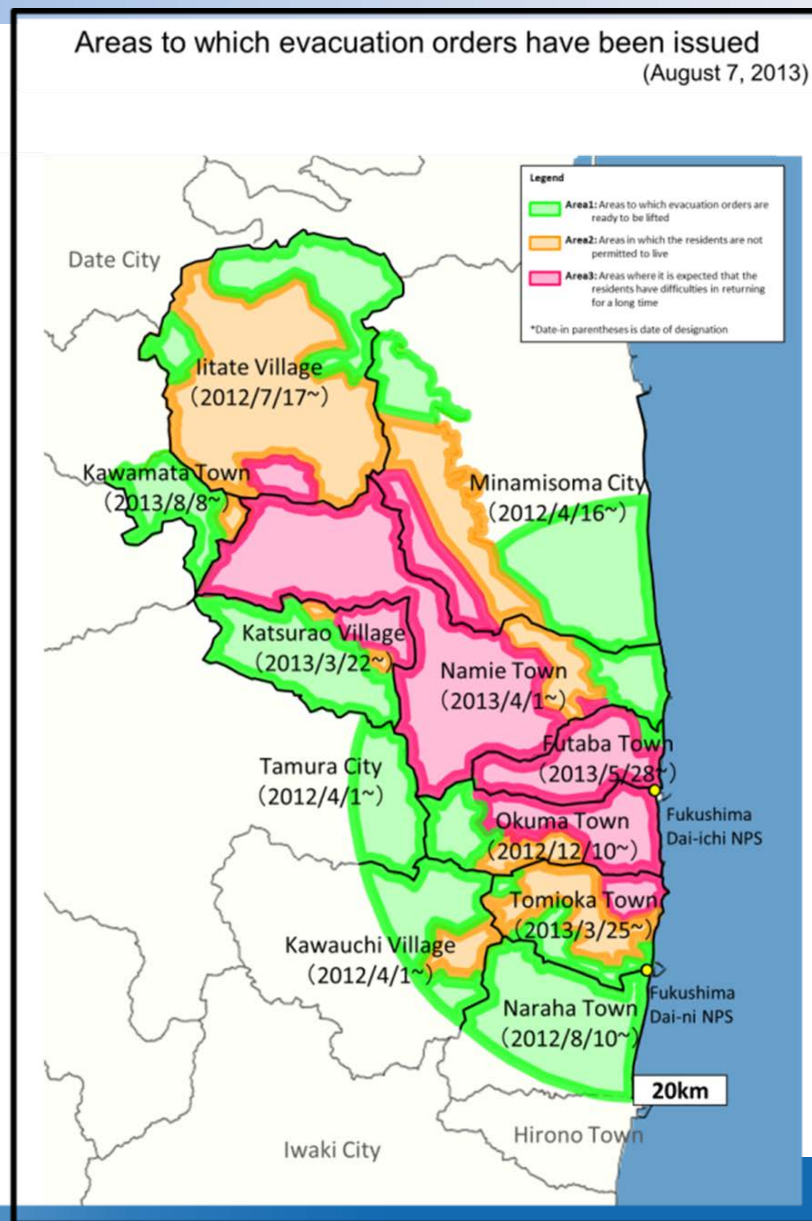


# Follow-up Mission on Remediation

- Organized in October 2013, 8 working days
- 13 experts (IAEA + external from Indonesia, UK, Finland, Canada) + 3 experts working on IAEA Fukushima report
- Japanese counterparts:
  - 4 Ministries (Environment, Agriculture, Forestry & Fisheries, Health, Labour & Care and Foreign Affairs), NRA, Cabinet Office, Reconstruction Agency, JAEA, Fukushima Prefecture
  - Visits to Fukushima City, Date and Tamura City, Kawauchi Village

# Main objectives

- Assess the progress in remediation in SDA (Special Decontamination Area) in ICSA (Intensive Contamination Survey Areas)
- Review remediation strategies, plans and works in view of previous advice
- To share findings with international community





# Main findings and observations

- Large efforts to remediate contaminated areas and enable evacuated people to return
- Important progress since first mission observed, advice well taken
  - Institutional arrangements to address remediation implemented
  - Shifting from remediation efforts based on surface contamination reduction to air dose rates reduction
  - Comprehensive food safety measures and monitoring of aquatic areas
  - Improved communication, information and involvement of stakeholders
  - Comprehensive monitoring programme and management of data
  - Good progress with temporary storage facilities

# Review Team Advice

- On institutional arrangements:
  - More active participation of the NRA in the review of remediation activities
  - To strengthen efforts to explain the public that individual dose of 1 mSv/year is a long term goal, which requires step-by-step approach
- Stakeholders' involvement:
  - Communicating remediation and reconstruction programmes holistically with proactive approach to stakeholders' engagement can improve confidence
  - To establish mechanisms for sharing experience and initiatives between municipalities and with government

# Review Team Advice

- On remediation strategy implementation:
  - General concepts: Individual doses measured by personal dosimeters should be used to support remediation decisions
  - Food and agriculture: By taking into consideration natural processes leading to reduced Cs in crops the need for remediation measures can be optimized and amount of removed soil reduced while still producing safe food



# Review Team Advice

- On remediation strategy implementation:
  - Forest areas: optimization of remediation of forest and around residential areas should continue, occupational safety of workers should be balanced against the benefit
  - Aquatic areas: monitoring of freshwater and marine environment should continue and, if needed, site-specific remediation can be considered



# Review Team Advice

- On waste management:
  - Demonstration of safety of facilities for management of radioactive waste, in particular long-term activities, should be addressed





# Review Mission on Decommissioning

- On-site Peer Review Mission on Mid-and-long- term Roadmap towards the decommissioning of Fukushima Daiichi NPP units 1-4 conducted in 2013 in two steps:
  - First mission 15-22 April 2013
    - 13 experts (IAEA + external)
    - Meetings with METI, TEPCO, NRA in Tokyo, with TEPCO staff at Fukushima Daini NPP + Visit to Fukushima Daiichi NPP
  - Second mission from 25 November to 4 December 2013
    - 16 experts ( IAEA + external from OECD/NEA, Canada, France, Hungary, UK) + 3 experts working on IAEA Fukushima Report
    - Meetings with METI, TEPCO, IRID, NRA in Tokyo, with TEPCO staff at Fukushima Daini NPP, meeting with officials of Fukushima Prefecture + Visit to Fukushima Daiichi NPP

# Objectives of the Review

- To provide an independent review of activities related to planning and implementation of decommissioning of Fukushima Daiichi NPP
- First mission: to provide initial review of the Mid-and-Long-Term Roadmap towards Decommissioning + review of several specific short-term issues and challenges
- Second mission focused on more detailed and holistic review of the Roadmap (updated in June 2013) and mid-term challenges + review of agreed specific topics.

# Topics covered by the first mission

- Initial review of the Roadmap:
  - Strategy and planning,
  - Stakeholder involvement & communication,
  - Organizational structure,
  - Preparation for licensing



# Topics covered by the first mission

- Specific short-term issues and recent challenges:
  - Assessment of current condition of reactors and PCVs,
  - Management of waste, spent fuel and fuel debris,
  - Radioactive releases and assessment of associated doses,
  - Decontamination within the site for improvement of working environment,
  - Structural integrity of reactor buildings and other constructions,
  - Reduction of radioactive exposure of the employees.





# Topics covered by the second mission

- Holistic review of the revised and updated Roadmap including public relation and communication issues.
- Specific topics and mid-term challenges:
  - Removal of spent fuel from storage pools / removal of fuel debris from reactors and their further management,
  - Management of contaminated water,
  - Waste management,
  - Measures to stop or reduce ingress of ground water into reactor and turbine buildings,
  - Reviewing of the public radiation exposure in the surrounding areas from on-going activities at the site,
  - Specific decommissioning programmes and decommissioning planning,
  - Preparation for licensing and regulatory requirements.

# Topics covered by the second review mission

- Technologies for remote decontamination, technologies for investigation of PCV/RPV interiors, etc.
- Programme and processes to maintain and to enhance stability and reliability of structures, systems and components until decommissioning.
- Marine monitoring including assessment of potential radiological impact.



# Main findings and observations

- The revised Roadmap was developed based on more-realistic assumptions, current knowledge of the condition of each specific unit, and feedback from stakeholders
- TEPCO has become more proactive in implementing public information and communication activities
- Substantial efforts made by TEPCO to enable the removal of first fuel assemblies from Unit 4 in November 2013, one month ahead of the original plan.
- TEPCO's and IRID's efforts to develop remote technology to identify and fix water leakage locations in primary containment vessels

# Main findings and observations

- Deployment of advanced and large-scale treatment technologies for decontamination and desalination of highly radioactive water
- Proactive steps by the Government of Japan on contaminated water issue (formulation of policies, establishment of the Committee on Countermeasures of Contaminated Water Treatment)
- Good radiation protection measures on the site





# Review Team Advice

- On the Roadmap and decommissioning planning:
  - GoJ to continue efforts towards the safe implementation of the decommissioning of Fukushima Daiichi NPS. NRA is encouraged to oversee the implementation.
  - Defining end-state for decommissioning would help focus the efforts; stakeholders involvement should be considered
  - More proactive approach to licensing of decommissioning of the Fukushima NPS to ensure timely implementation of the decommissioning process
- Public relations and communication:
  - METI to move forward for establishing the Fukushima Advisory Board without delay so that it can begin engaging stakeholders in a more structured manner.
  - TEPCO's communication strategy should include also on-site staff and contractors

# Review Team Advice

- Management of contaminated water:
  - Sustainable solution to the problem of contaminated water is needed. All options should be considered, including possible resumption of controlled discharges to the sea.
  - Assessment of the potential radiological impact to the population and the environment arising from the release of tritium and any other residual radionuclides to the sea would provide a good scientific basis for taking decision
  - TEPCO should make efforts to improve the performance and enhance the capacity of Advanced Liquid Processing System ALPS to be able to meet the goals in managing contaminated water stored on-site.



# Review Team Advice

- Spent fuel and fuel debris removal:
  - TEPCO should consider alternative options to support the on-going fuel storage operations in the Common Spent Fuel Pool and future fuel disposition
  - Adequate contingencies should be in place to address the huge uncertainties that are likely to be faced during the fuel debris removal from reactor pressure vessels



# Review Team Advice

- Management of radioactive waste:
  - Strategy and long-term waste management plan should be prepared by estimating volumes, types and characteristics of different waste streams and by identifying optimized WM scenarios, even though end-points for waste are not yet defined
  - Waste characterization facility is needed to characterize the waste and allow development of strategy for processing, storage and final disposal
  - Design lifetime of waste storage facilities on site should consider the expected long decommissioning period and the need to store on-site large amounts of waste from the decommissioning

# IAEA Comprehensive Report on Fukushima

- Preparation announced at 56<sup>th</sup> General Conference in 2012, the Report to be completed in 2014
- Scope:
  - description and context of the accident,
  - safety assessment,
  - emergency preparedness and response,
  - radiological consequences
  - post-accident recovery
- Comprehensive work on-going with almost 100 external experts involved divided in five Working Groups

# IAEA Report on Fukushima Accident

- The chapter on post-accident recovery addresses remediation and decommissioning and dismantling
  - Remediation preparedness
  - Environmental remediation
  - On-site post-accident stabilization and recovery towards decommissioning
  - Radioactive waste management
  - Revitalization of infrastructure and community

# IAEA Report on Fukushima Accident

- In 2014 two meetings of all WG scheduled:
  - Meeting in February with all WGs to discuss cross-cutting issues, identify overlaps and gaps
  - Last meeting in April and May (not all WG together)
- In June the draft report should be ready for the review
- Review process will include internal and external experts and advisory bodies
- Report should be completed by the end of 2014

# Conclusions

- IAEA is through the Action Plan on Nuclear Safety implementing a number of activities to:
  - Assist Japan in mitigating the consequences of the accident
  - To collect and share experience and lessons learned with all Member States
- All reports from Review missions, IEM and projects available at IAEA web pages