IAEA 60 Years
Atoms for Peace and Development

IAEA Activities Supporting Fukushima Efforts on On-Site Decommissioning and Off-site Remediation

Waste Management 2017

Session 013

Global Support for Fukushima Decontamination and Decommissioning and Clean-Up Efforts

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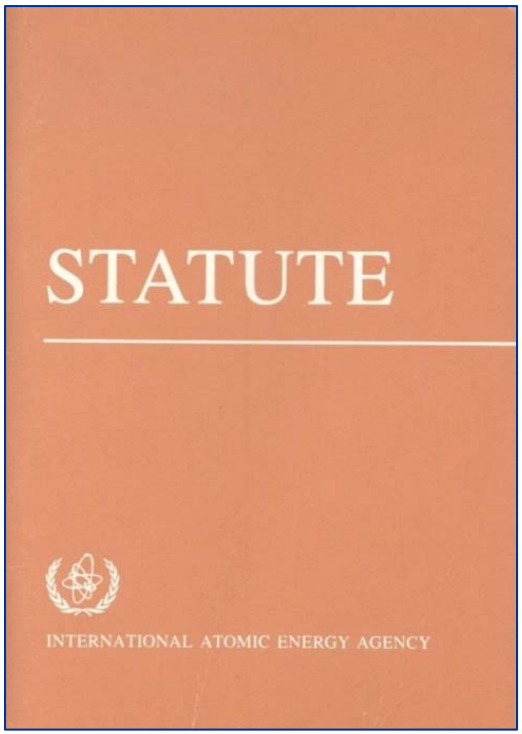
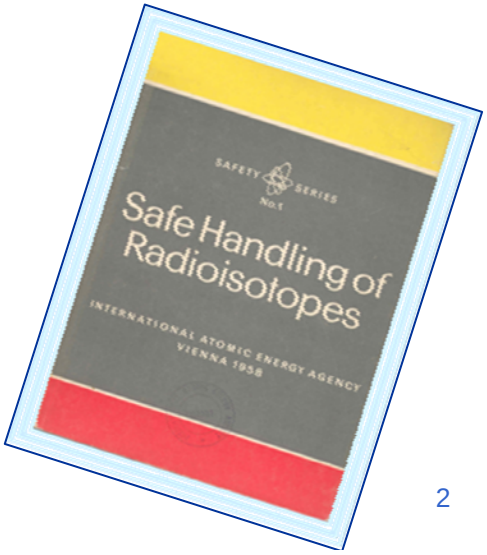
Division of Radiation, Transport and Waste Safety
Waste and Environmental Safety Section

IAEA Statute



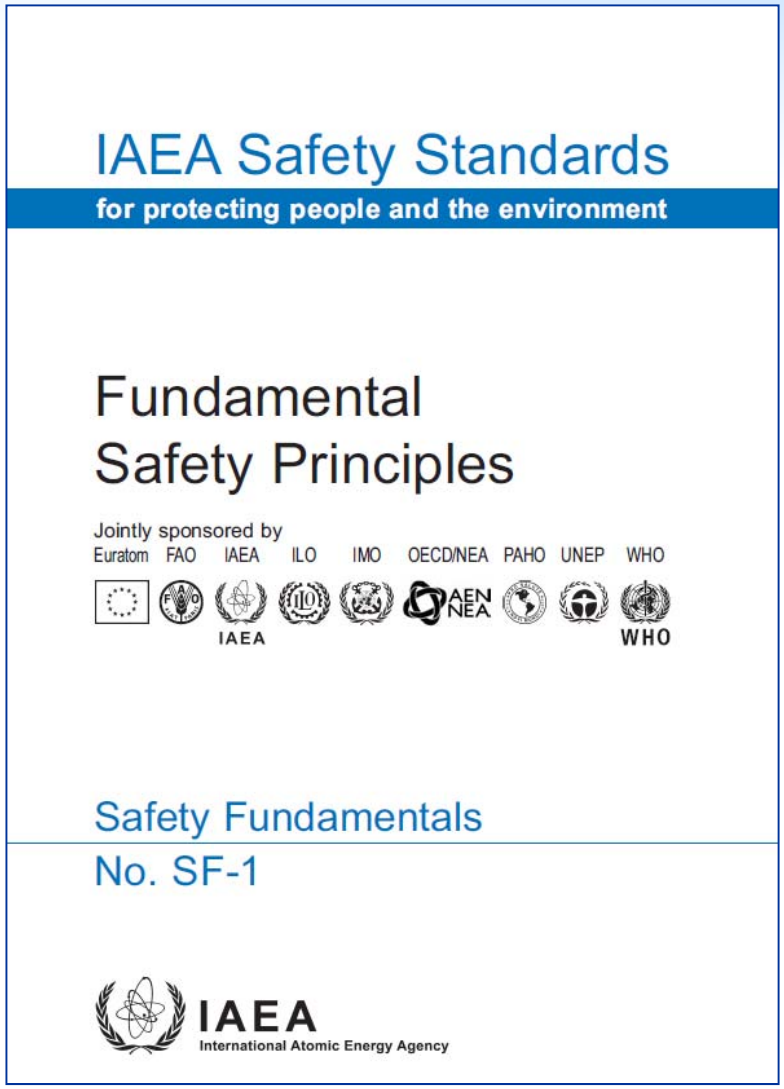
The IAEA Safety Standards have a status derived from the IAEA's Statute, which authorizes the IAEA *"To establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property ... and to provide for the application of these standards".*

In **1958**, the IAEA published its first Safety Standard, Safety Series No. 1, **Safe Handling of Radioisotopes**. Over the years, more than 200 publications were issued in the Safety Series.



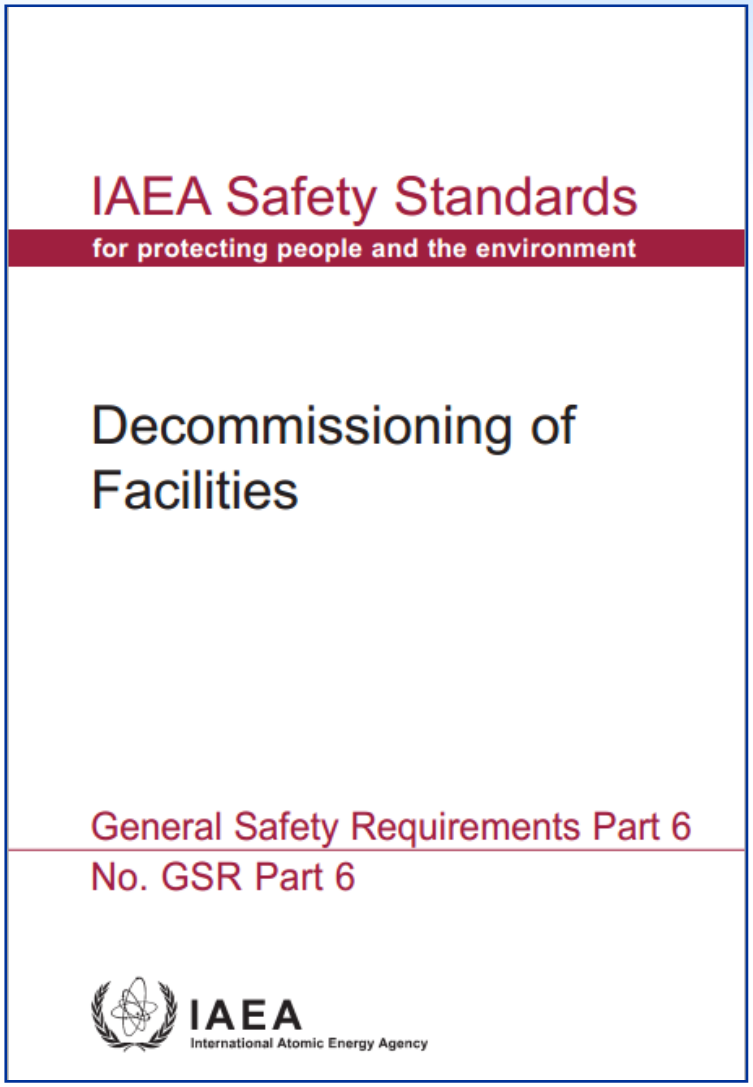
Safety Fundamentals

- A single top level (fundamentals-level) standard
- Policy document of the IAEA Safety Standards Series
- Present the fundamental safety objective and 10 principles of protection and safety
- Provide the basis for the safety requirements
- Use “MUST” statements



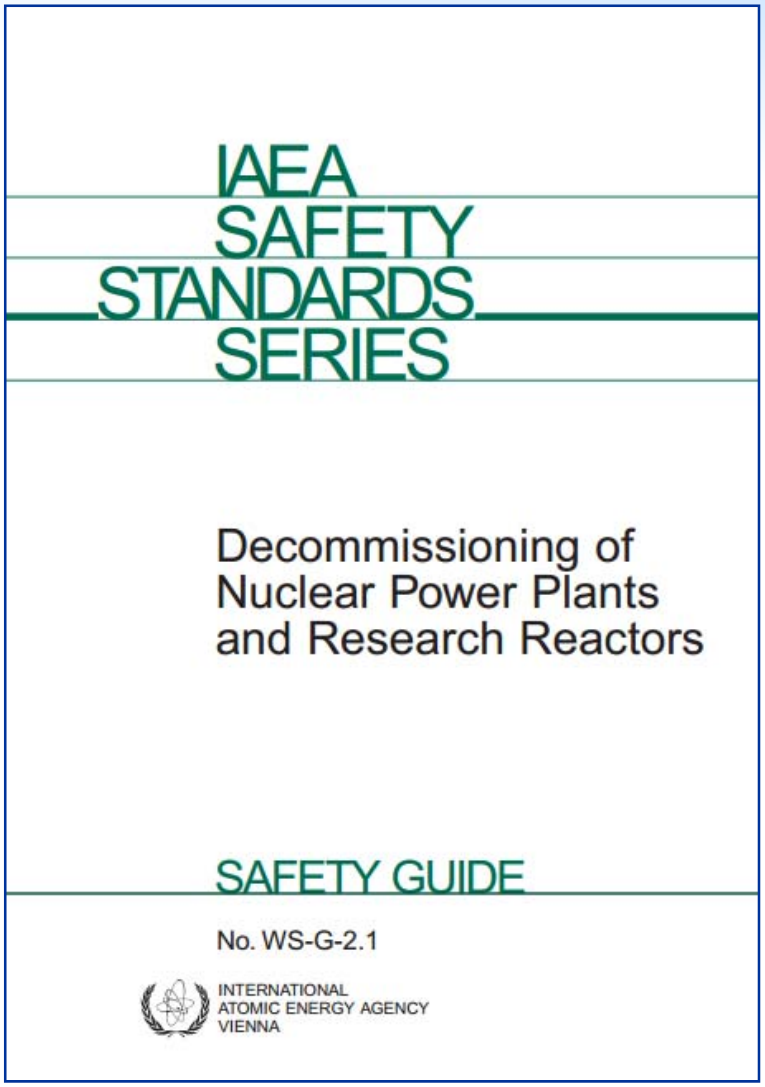
Safety Requirements

- General and specific SR
- Elaborate on the basic objective and the principles of SF-1, as they apply to a specific activity or facility
- Concise, reflect "WHAT", "WHO" and "WHEN"; associated explanatory text describes "WHY" the requirements exist
- Use "SHALL" statements
- The format and style facilitate their use for establishment of national regulatory frameworks



Safety Guides

- General and specific safety guides
- Provide recommendations and guidance on HOW to comply with the safety requirements
- Present international good practices, and increasingly reflect best practices, to help users in achieving high levels of safety
- Use “SHOULD” statements



IAEA Action Plan on Nuclear Safety

The Action Plan was unanimously adopted in September 2011 as a response to the accident at the Fukushima Daiichi NPP.

Its purpose was to define a programme of work to strengthen the global nuclear safety framework

The Action Plan covered **12 key areas** of nuclear safety with a view to integrating the lessons learned from the Fukushima Daiichi Accident

Preparedness

Safety Assessments

IAEA Peer Reviews

Emergency Preparedness and Response

National Regulatory Bodies

Operating Organizations

IAEA Safety Standards

International Legal Framework

Member States Embarking on Nuclear Power

Capacity Building

Protection from Ionizing Radiation

Communication

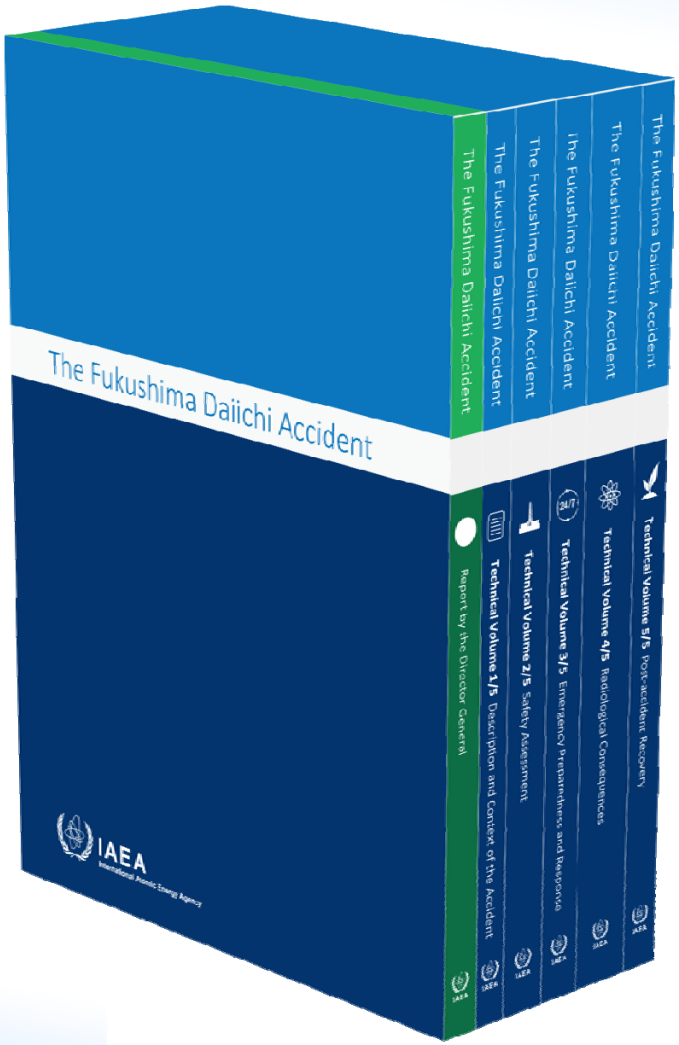
Research & Development

Report on the Fukushima Daiichi Accident

IAEA 60 Years Atoms for Peace and Development

Approximately **180 experts** from **over 40 Member States and various international bodies** were involved in the preparation of the report.

- Report by the Director General
- Technical Volume 1/5
  Description and Context of the Accident
- Technical Volume 2/5
  Safety Assessment
- Technical Volume 3/5
  Emergency Preparedness and Response
- Technical Volume 4/5
  Radiological Consequences
- Technical Volume 5/5
  Post-accident Recovery



Report by the Director General

Section 1: Introduction	The Report on the Fukushima Daiichi Accident					
Section 2: The accident and its assessment	Description of the accident	Nuclear safety considerations	Technical Volumes 1 & 2			
Section 3: Emergency preparedness and response	Initial response in Japan to the accident	Protecting emergency workers	Protecting the public	Transition from the emergency phase to the recovery phase and analyses of the response	Response within the international framework for emergency preparedness and response	Technical Volume 3
Section 4: Radiological consequences	Radioactivity in the environment	Protecting people against radiation exposure	Radiation exposure	Health effects	Radiological consequences for non-human biota	Technical Volume 4
Section 5: Post-accident recovery	Off-site remediation of areas affected by the accident	On-site stabilization and preparations for de-commissioning	Management of contaminated material and radioactive waste	Community revitalization and stakeholder engagement	Technical Volume 5	
Section 6: The IAEA response to the accident	IAEA activities	Meetings of the Contracting Parties to the Convention on Nuclear Safety	Technical Volumes 1 & 3			

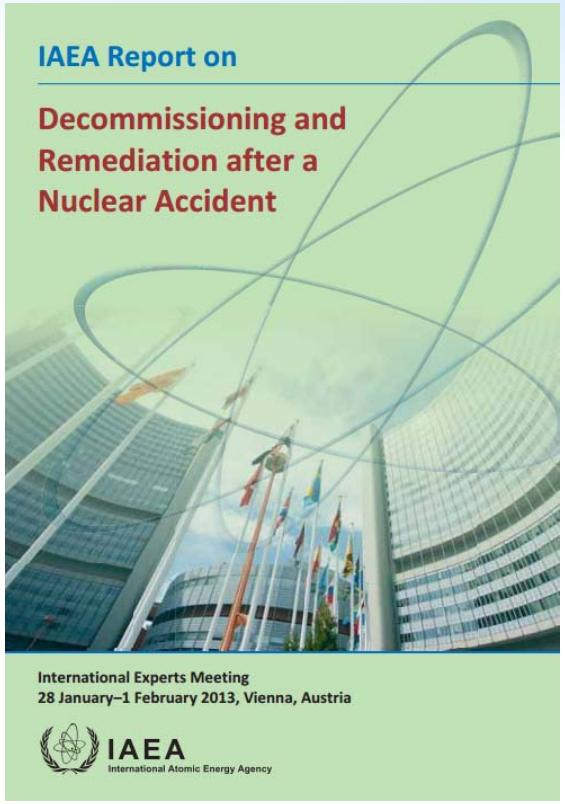
www-pub.iaea.org/books/IAEABooks/10962/The-Fukushima-Daiichi-Accident

Key observations and lessons related to decommissioning:

- A flexible strategic plan for maintaining long term stable conditions and for the decommissioning is essential.
- Retrieving damaged fuel and fuel debris necessitate solutions that are specific to the accident.

IEM on Decommissioning and Remediation

- International Experts' Meeting on Decommissioning and Remediation after a Nuclear Accident took place in January 2013;
  - Attended by over 200 experts from 40 Member States;
  - Highlighted the lessons learned and emphasised the need for relevant authorities to develop a national strategy in advance of an accident to support the recovery phase;
  - The relevant authorities should develop decommissioning, remediation and waste management plans to support such strategy, which need to include an appropriate level of stakeholder participation;
  - Need appropriate programmes to characterize and monitor damaged nuclear fuel and radioactive waste;
  - Formed basis for IAEA Report on Decommissioning and Remediation after a Nuclear Accident (2013);

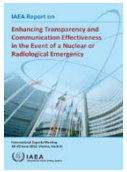


Reports capturing Lessons Learned

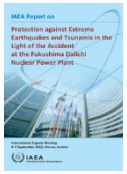
60 Years IAEA Atoms for Peace and Development

Published in 2012

Reactor and Spent Fuel Safety in the light of the Accident

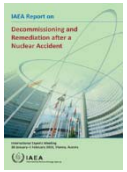


Enhancing Transparency and Communication Effectiveness

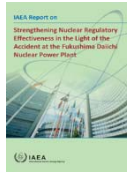


Protection Against Extreme Earthquakes and Tsunamis

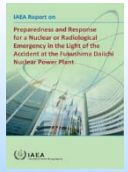
Published in 2013



Decommissioning and Remediation after a Nuclear Accident



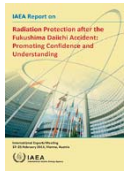
Strengthening Nuclear Regulatory Effectiveness



Preparedness and Response for a Nuclear or Radiological Emergency

Published in 2014

Human and Organizational Factors in Nuclear Safety



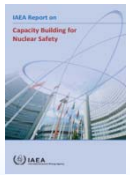
Radiation Protection: Promoting Confidence and Understanding

Published in 2015

Severe Accident Management

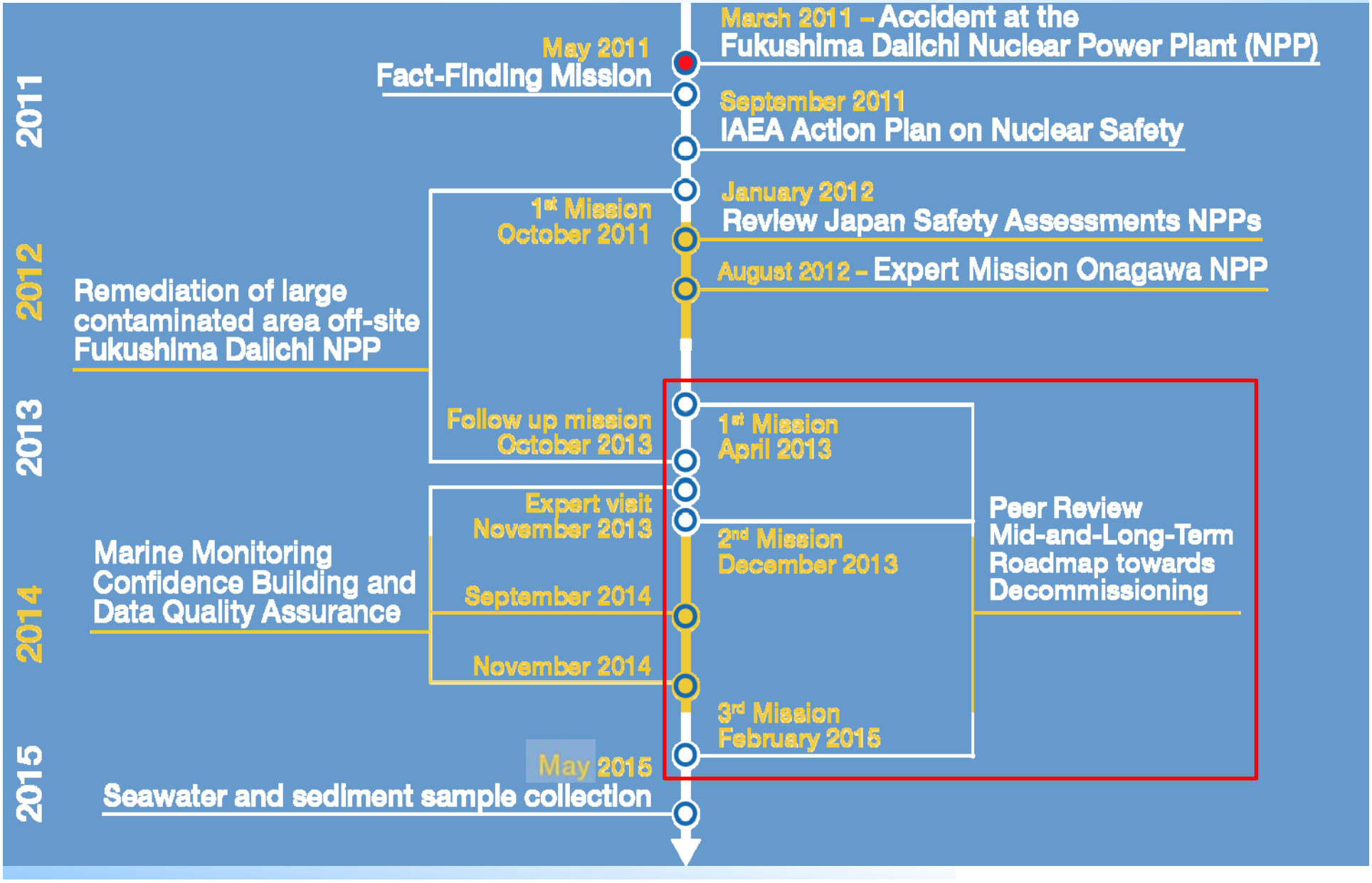
Strengthening Research and Development Effectiveness

Assessment and Prognosis in Response to a Nuclear or Radiological Emergency



Capacity Building for Nuclear Safety

International Expert Missions



Mid-and-Long-Term Roadmap towards the Decommissioning of the Fukushima Daiichi NPP

- **1st mission – April 2013:**
  - Review of the Roadmap – the strategy, planning, timing and organizational structure
  - Preparations for the decommissioning licensing
  - Review of specific short-term issues:
    - Assessment of the situation of the reactors;
    - Management of radioactive releases and assessment of associated doses;
    - Reduction of radioactive exposure of the employees and on-site decontamination;
    - Structural integrity of reactor buildings and other constructions.
- **2nd mission – November-December 2013:**
  - Reviewed the marine monitoring performed by Japan under its Sea Area Monitoring Action Plan;
  - IAEA Marine Environment Laboratories in Monaco also observed sea water sampling in the vicinity of the Fukushima Daiichi NPP;
  - Concluded that Japan had adopted a proactive approach towards addressing the many complex challenges for decommissioning;
  - The final report was presented to the Government of Japan.
- **3rd mission – February 2015:**
  - Focussed on the safety and technological aspects of decommissioning, management of radioactive waste, control of underground water and accumulation of contaminated water at the site;
  - Reviewed the progress made since the first two review missions in 2013;
  - The mission Report was presented to Government of Japan in April 2015 and is available of the Agency's website;
  - The review team considered that Japan has achieved good progress in improving its strategy and associated plans, as well as allocating the necessary resources.

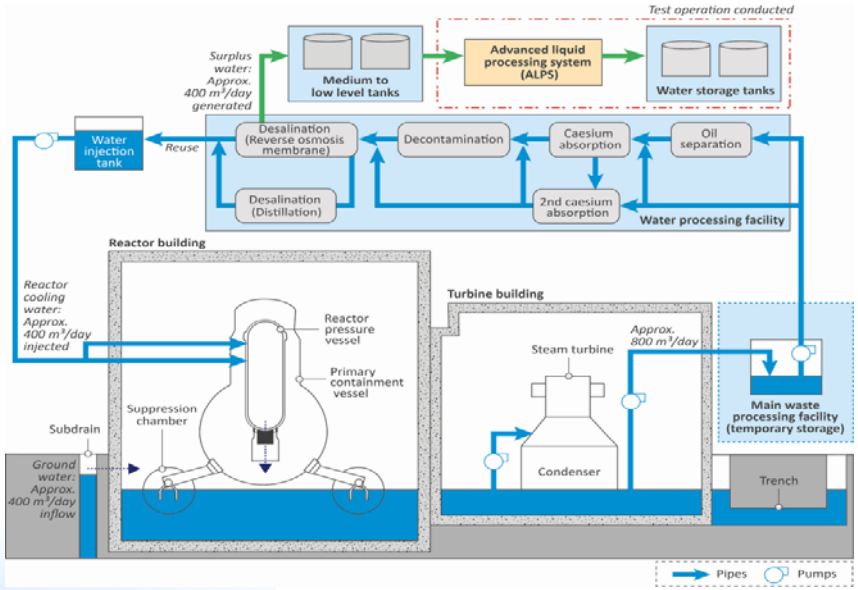
Final reports submitted to GoJ on 22 May 2013 and 12 February 2014 and published on:
https://www.iaea.org/sites/default/files/final_report120214.pdf
https://www.iaea.org/sites/default/files/missionreport220513.pdf

The Third Mission to F1 Decommissioning

IAEA 3rd Mission on F1 NPS Decomm. Main Findings (1/2)

- New organizational framework to enhance management of 1F decommissioning at operational and at strategic levels
  - ✓ New D&D branch of TEPCO (FDEC) to clarify responsibilities for decommissioning 1F
  - ✓ Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF) as a national authority to develop strategy for the decommissioning

- Situation on-site had been improved since last IAEA mission 2013:
  - ✓ Successful completion of spent fuel removal in U4
  - ✓ Improvement of systems to clean contaminated water
  - ✓ New more robust tanks to store water
  - ✓ Operation of underground bypass
  - ✓ Clean-up of site, reducing radiological dose to workers

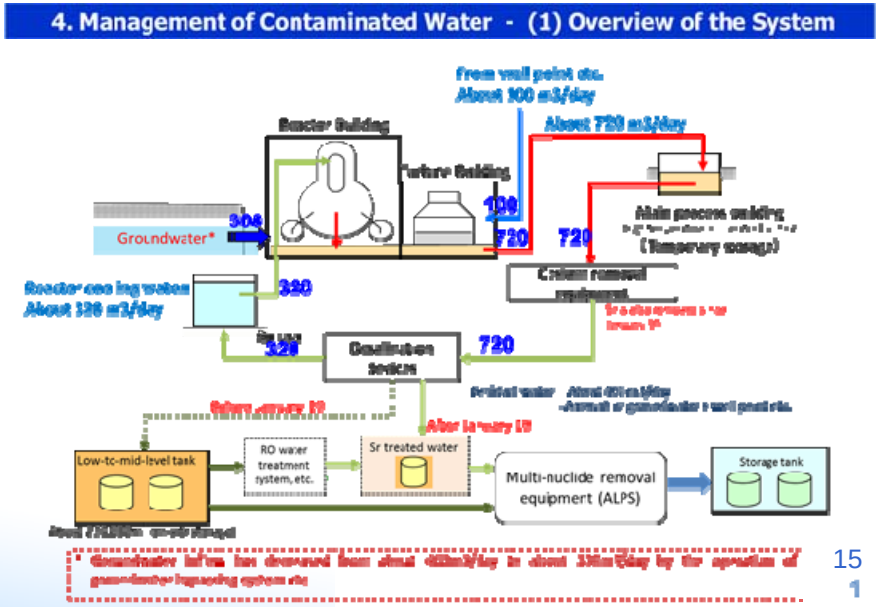


Final reports published on:
https://www.iaea.org/sites/default/files/missionreport130515.pdf

IAEA 3rd Mission on F1 NPS Decomm. Main Findings (2/2)

The IAEA team also encouraged Japan to continue implementing and enhancing its strategy to ensure the safe decommissioning and RWM. Continuing challenges include:

- ✓ persistent underground water ingress to main buildings and the accumulation of contaminated water on-site;
- ✓ the long-term management of radioactive waste; and
- ✓ issues related to the removal of spent nuclear fuel, damaged fuel and fuel debris removal.



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COOPERATION BETWEEN FUKUSHIMA PREFECTURE AND IAEA IN THE AREA OF RADIATION MONITORING AND REMEDIATION

Efforts on Off-site Remediation

including

IAEA Assistance to Japan

IAEA 2nd Mission on Remediation 2013

- **Period**: 14 to 21 October 2013

- **Objectives**:
  - Assistance to Japan in assessing progress on remediation of Special Decontamination Area and Intensive Contamination Survey Areas
  - Review remediation strategies, plans and works in view of advice from previous mission in 2011 (Follow-up)
  - Lessons learned to share with international community

- **Team**:
  - 13 experts
  - 3 experts WG-5 IAEA F1 Report

IAEA Mission on Remediation 2013. Conclusions

Final report submitted to GoJ on 23 January 2014 and published on:
https://www.iaea.org/sites/default/files/final_report230114.pdf

- **Main conclusion**

  Japan is allocating enormous resources to developing strategies and plans and implementing remediation.

  Japan has achieved good progress in remediation activities and has well considered the advice provided by previous mission in 2011.

  Good coordination of remediation with reconstruction and revitalisation efforts.

Formal Agreements on collaboration between the IAEA and the Fukushima Prefecture

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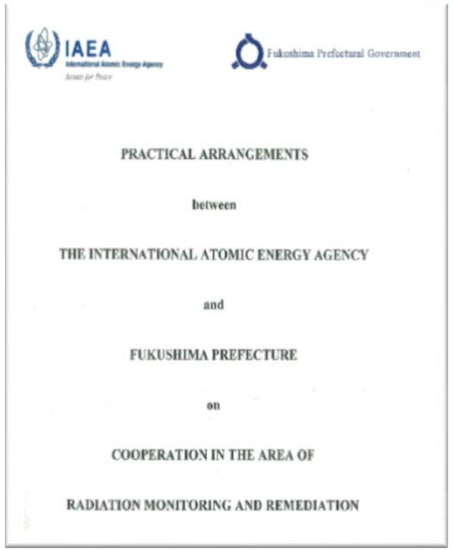
Cooperative Projects



IAEA International Atomic Energy Agency — Fukushima Prefectural Government

PRACTICAL ARRANGEMENTS

between

THE INTERNATIONAL ATOMIC ENERGY AGENCY

and

FUKUSHIMA PREFECTURE

on

COOPERATION IN THE AREA OF

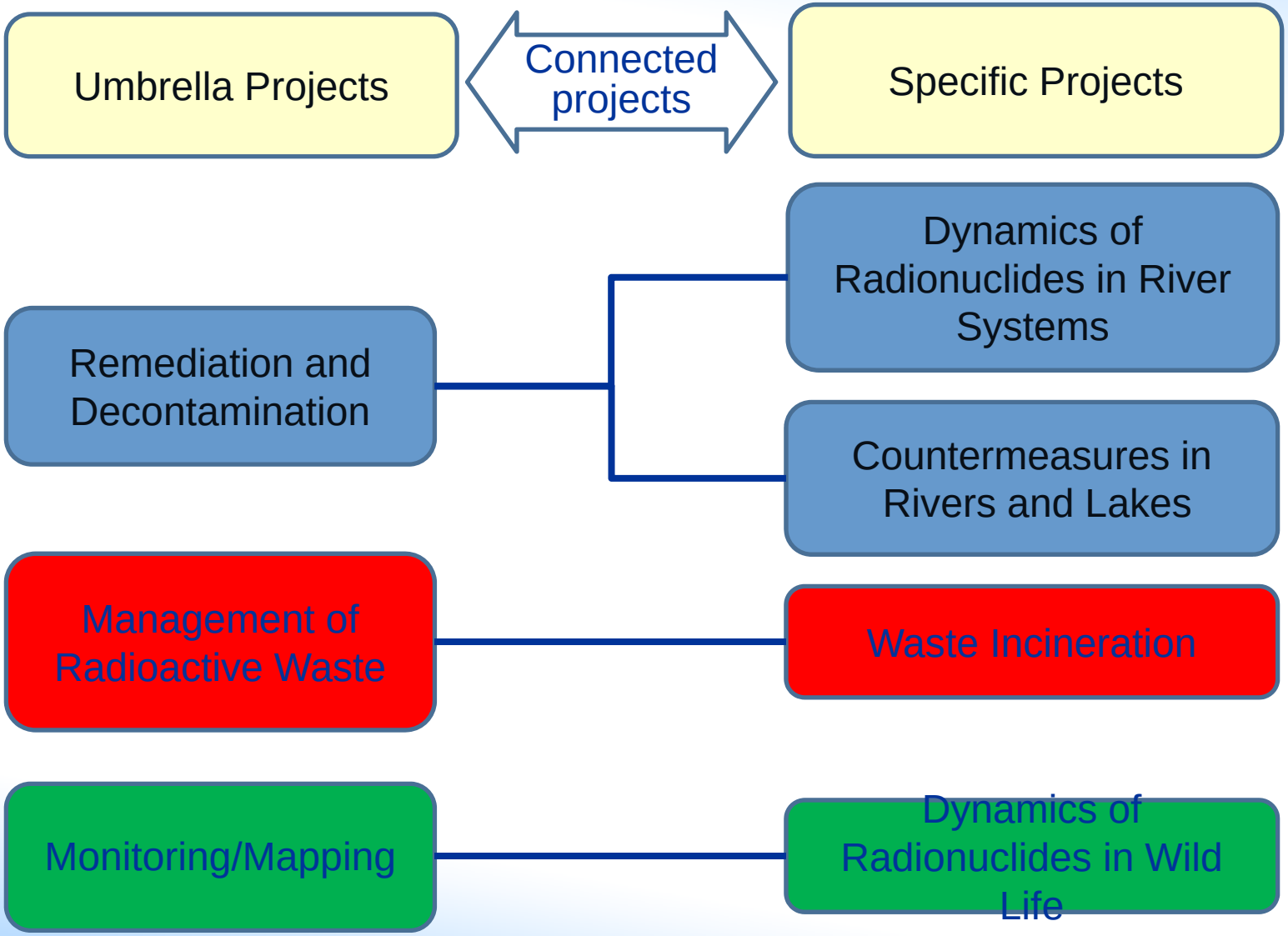
RADIATION MONITORING AND REMEDIATION

Individual activities under the cooperation (selection)

- To develop a safety assessment of temporary storage sites
- To assist in providing understandable information of monitoring results
- Providing guidance on cleaning up publicly accessible areas
- Guidance on specific feature of cleaning water systems (rivers, lakes, streams, etc.)
- Guidance on safe handling/retrieval of waste, and sustainable management of temporary storage sites

Activities assisted by IAEA

Practical Arrangements between IAEA and Fukushima Prefecture



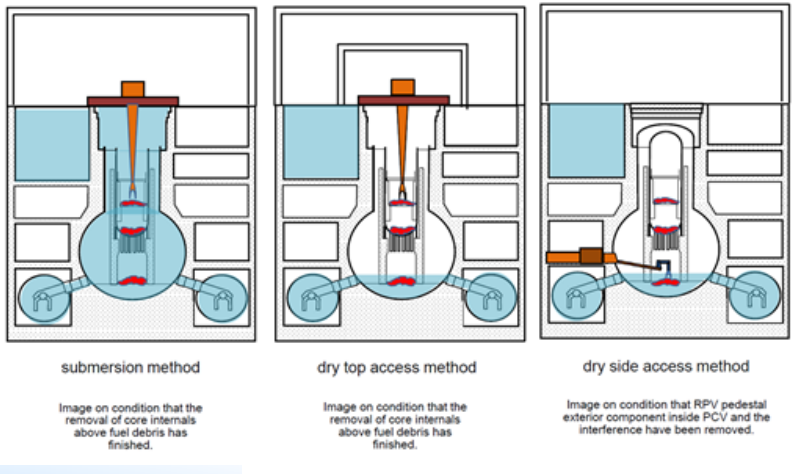
Other IAEA assistance to Japan on F1 Related Issues

IAEA RANET Capacity Building Centre, Fukushima

- Officially designated in May 2013
- Conducts Emergency Preparedness and Response workshops and capacity building for national and international participants
- Stores radiation monitoring equipment that can be deployed in Asia-Pacific region in case of a nuclear or radiological emergency

Remediation <> Decommissioning

- Coordination between Off-site Remediation efforts and On-site Decommissioning of F1 is essential to further **Optimise** Japan's efforts towards the recovery after nuclear accident (IAEA Safety Fundamentals)

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Thank you!