

Decommissioning of Fukushima-Daiichi NPP Waste and Water

Long-term Decommissioning Plan

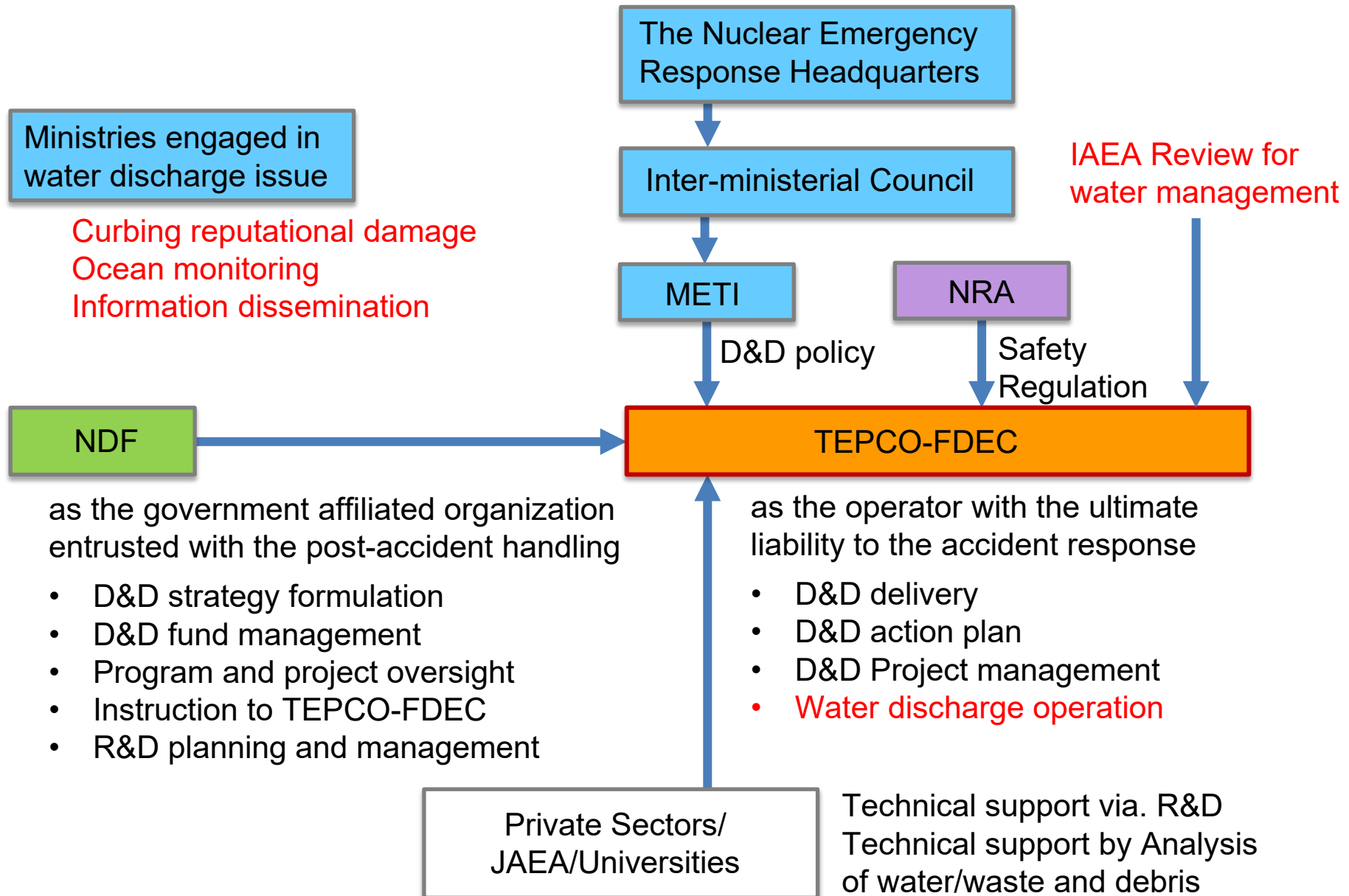
RIC 2022, March. 9, 2022

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Decommissioning Facilitation Corporation (NDF)**

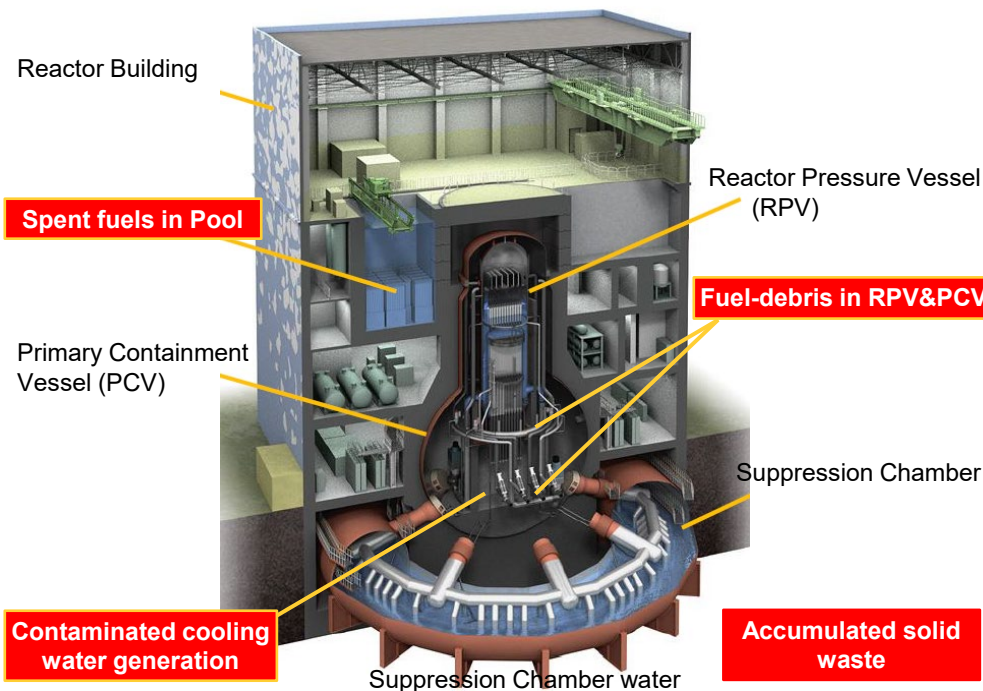
Professor Emeritus, Kyoto University

Organization and responsibility

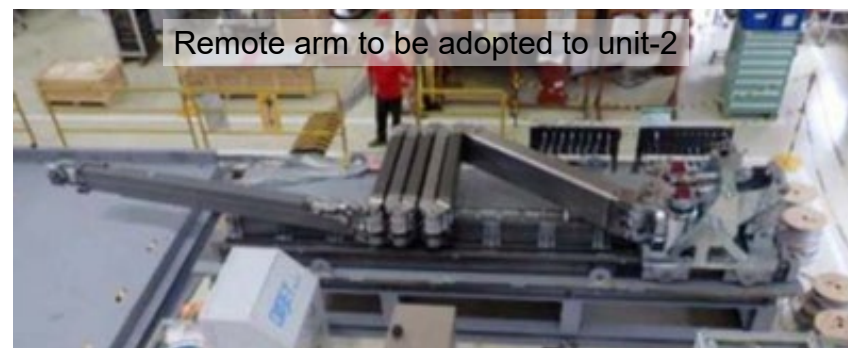


Progress and future decommissioning plan

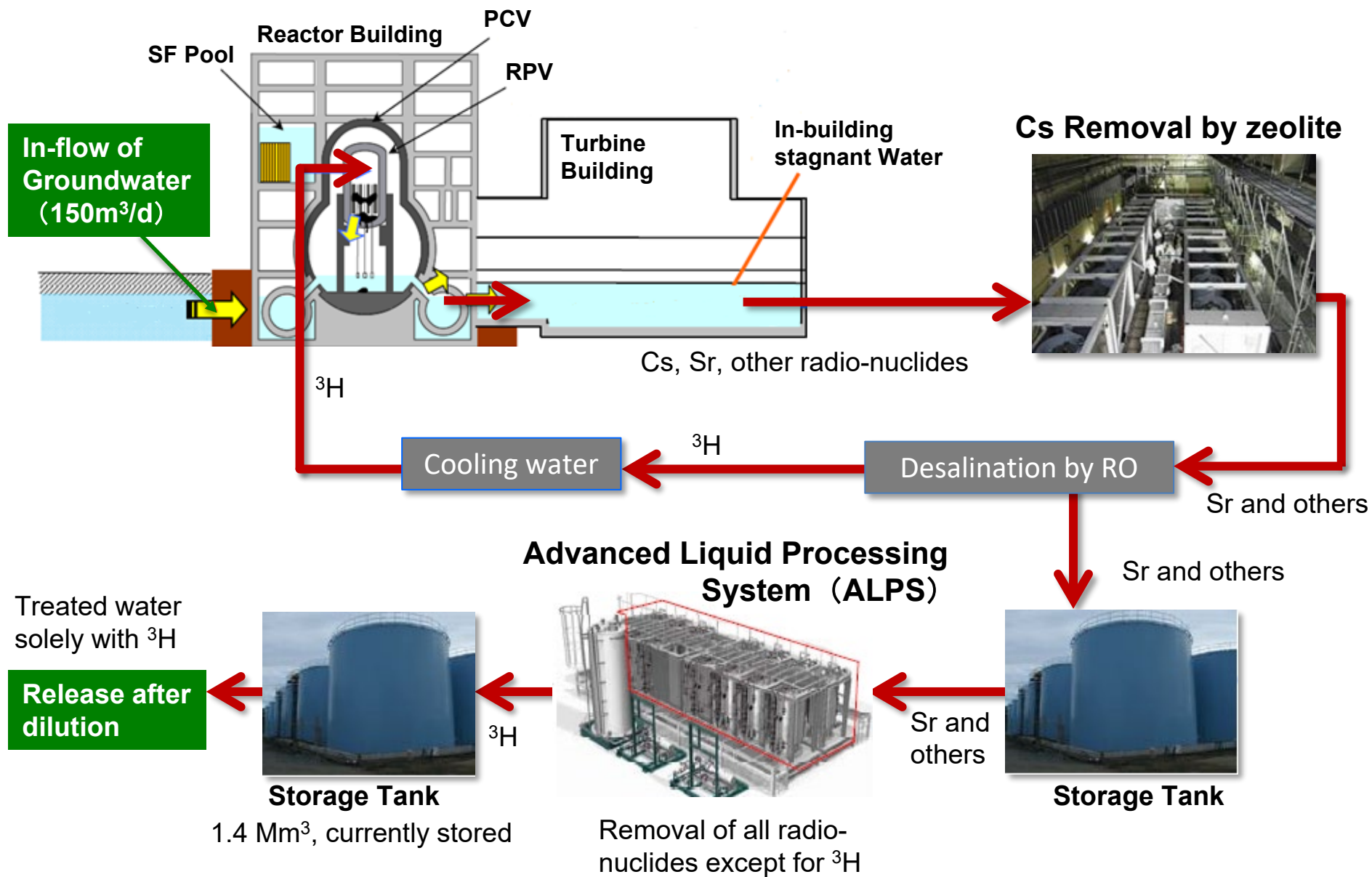
Mar,2011-Dec.2011	Dec.2011-Nov.2013	Nov.2013-2022	2022-2031	2031-around 2050
Accident Early period	Phase 1	Phase 2	Phase 3	Phase 3-2
<ul style="list-style-type: none"> Cold shutdown Significantly reducing the release of radioactive materials 	<ul style="list-style-type: none"> Spent fuel removal started in 2013 for the first implementing unit 	<ul style="list-style-type: none"> Small-scaled fuel debris retrieval is to start within 2022 for the first implementing unit 	<ul style="list-style-type: none"> From the end of Phase 2 through the end of decommissioning (Target period will be 30 to 40 years after Step 2) 	Fulfilment 



- Spent fuel removal from Units 1 to 6 completed
- Trial retrieval of fuel debris gets started
- Gradual expansion of fuel debris retrieval
- Minimize contaminated water generation
- Proceed with waste storage



Water management in Fukushima Daiichi



Water discharge plan

■ Status* of ALPS treated water etc.

- Volume of storage : 1,270,000 m³
- Increase rate : 50,000 m³ per year
- Tritium inventory : 780 TBq
- Tritium average conc. : 60,000 Bq/L

* As of December 2021

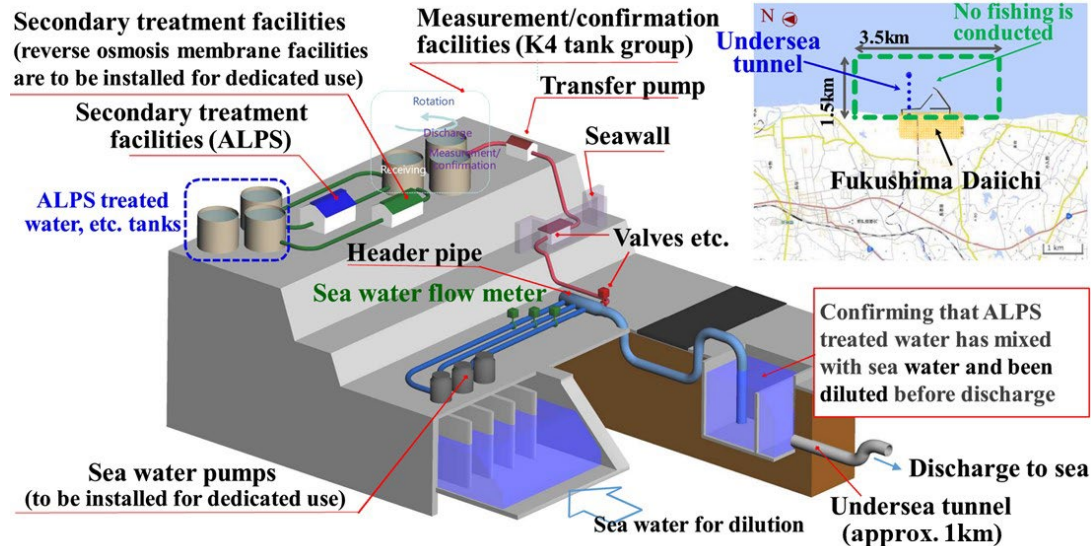
■ Plan of the ocean discharge

- Dilution rate : > 100
- Tritium amount : < 22 TBq per year
- Tritium conc. : < 1,500 Bq/L
- Conc. of other nuclides : < 0.01 of standard**

** Sum of ratios of each radionuclide concentration to the regulatory standard in ALPS treated water is reduced less than 1 and the diluted more than 100 times.

■ Facility for the ocean discharge

- Discharge method : Undersea tunnel
- Length of tunnel : approx. 1km
- Depth of discharge point : approx. 10m



Design and operations for ALPS treated water discharge

Annual amount of discharge of tritium water

Nuclear facility	Annual approx. discharge (TBq)
Fukushima Daiichi (6 units)	< 22
BWRs in the world	0.3 - 4
PWRs in the world	20 - 110
CANDUs in the world	30 - 800
Reprocessing facilities in Europe	400 - 11,000

Status

- Collaborative structure composed of multiple organizations is addressing the Fukushima Daiichi Decommissioning under the strong leadership by the government.
- TEPCO has been reinforcing its project management structure.
- Major progress:
 - 1F-site has been safely controlled under drastically improved radiation environment
 - Spent fuels removal from damaged units has been steadily progressing
 - Inside inspection of damaged units with small-scaled fuel-debris sampling will start soon
- Engineering works have been geared up for the full-fledged fuel-debris retrieval expected to start from around 2030.
- A prospect for the safety of the solid waste disposal has been confirmed by NDF.

Challenges

- Ocean discharge of the treated water:
 - Urgency of the discharge due to the limitation of the water storage capacity
 - Obtaining understanding of public and the world
 - Quality, credibility, and transparency of the analysis of the discharged water
 - Implementation of the socio-economic measures to curb the reputational damage
- Fuel-debris retrieval will embark on the stage of full-scale engineering.