

**Japan's Side Event at the 68<sup>th</sup> IAEA General Conference**

**Strategic Plan of Fuel Debris Retrieval Method for the  
Decommissioning of the Fukushima Daiichi Nuclear Power  
Station (FDNPS)**

**September 17, 2024**

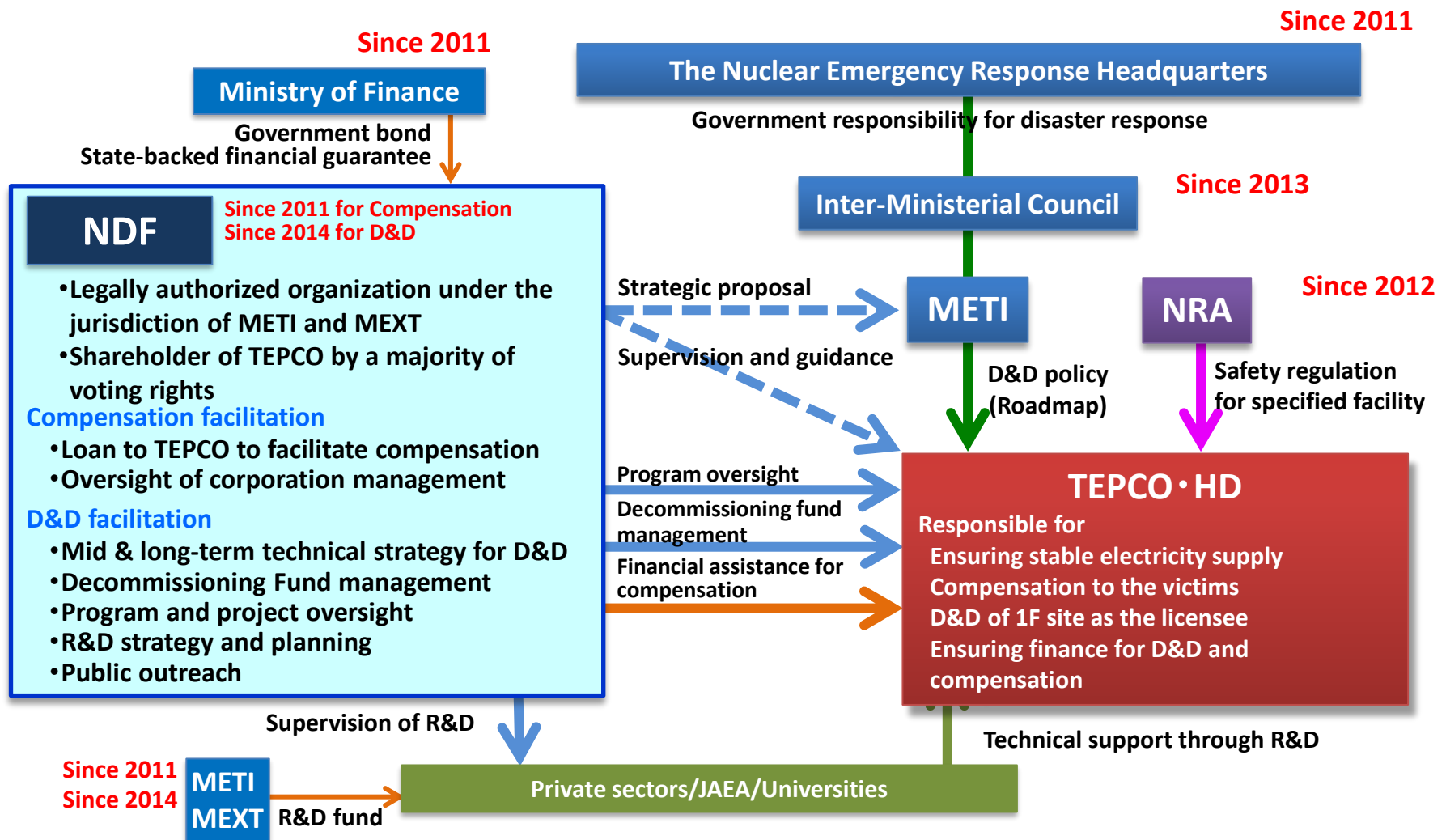
**Kosuke Ono**

**Executive Director, Head of Decommissioning Strategy Office  
Nuclear Damage Compensation and Decommissioning Facilitation Corporation  
(NDF)**

# Contents

1. Introduction of NDF
2. Status of the Sub-Committee for the Evaluation of Fuel Debris Retrieval Methods
  - 2-1. Review of the Previous Side Event
    - Mid-and-Long-Term Roadmap
    - Sub-Committee for the Fuel Debris Retrieval Method
  - 2-2. Update from the Previous Side Event
    - Recommendations for the Selection of Retrieval Method
    - Future Course of Action
      - (1) TEPCO's engineering study for large-scale retrieval method
      - (2) Development of safety assurance concept
      - (3) Follow-up by the Sub-committee
      - (4) Communications with local governments and residents

# 1. Introduction of NDF

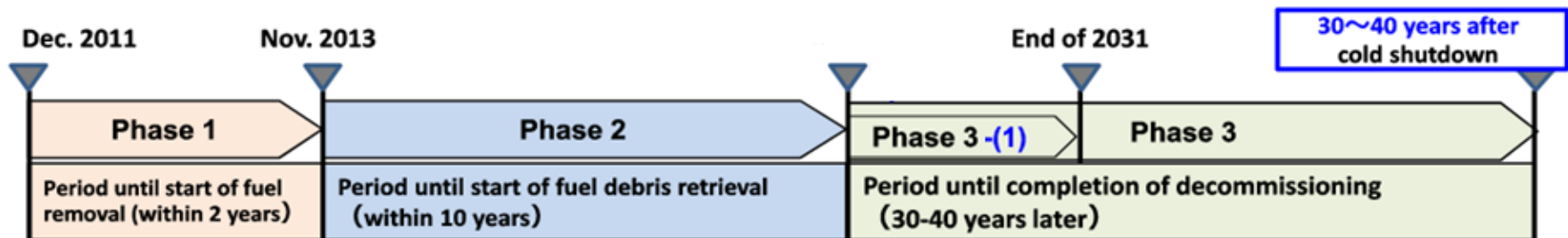


Note:  
 METI: Ministry of Economy, Trade and Industry  
 MEXT: Ministry of Education, Culture, Sports, Science and Technology  
 JAEA: Japan Atomic Energy Agency  
 TEPCO HD: Tokyo Electric Power Company Holdings, Inc.

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# 2-1 Review of the Previous Side Event: Mid-and-Long-Term Roadmap



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## Major milestones

## Revised Roadmap

Contaminated water management	Reduce to about 150 m <sup>3</sup> /day <u>Reduce to about 100m<sup>3</sup>/day or less</u> } Further reduction of generation	<u>Within 2020</u> <u>Within 2025</u>	<u>achieved</u> <u>NEW</u>
Stagnant water removal / treatment	Complete stagnant water removal / treatment in buildings* Excluding the reactor buildings of Units 1-3, Process Main Buildings, and High Temperature Incineration building. <u>Reduce the amount of stagnant water in reactor buildings to about a half of that in the end of 2020</u>	<u>Within 2020(*)</u>  <u>FY2022 - 2024</u>	<u>achieved</u>  <u>NEW</u>
Fuel removal	<u>Complete of fuel removal from Unit 1-6</u> <u>Complete of installation of the large cover at Unit 1</u> Start fuel removal from Unit 1 } Methods have changed to ensure safety and prevent dust scattering Start fuel removal from Unit 2	<u>Within 2031</u> <u>Around FY2023</u> <u>FY2027 – 2028</u> <u>FY2024 - 2026</u>	<u>NEW</u> <u>NEW</u> <u>REVISED</u> <u>REVISED</u>
Fuel debris retrieval	Start fuel debris retrieval from the first Unit <u>(Start from Unit 2, expanding the scale gradually)</u>	Within 2021	*Expected to be delayed by approx. 2 years
Waste management	Technical prospects concerning the processing/disposal policies and their safety <u>Eliminating temporary storage areas outside for rubble and other waste</u>	Around FY2021 <u>Within FY2028</u>	<u>achieved</u> <u>NEW</u>

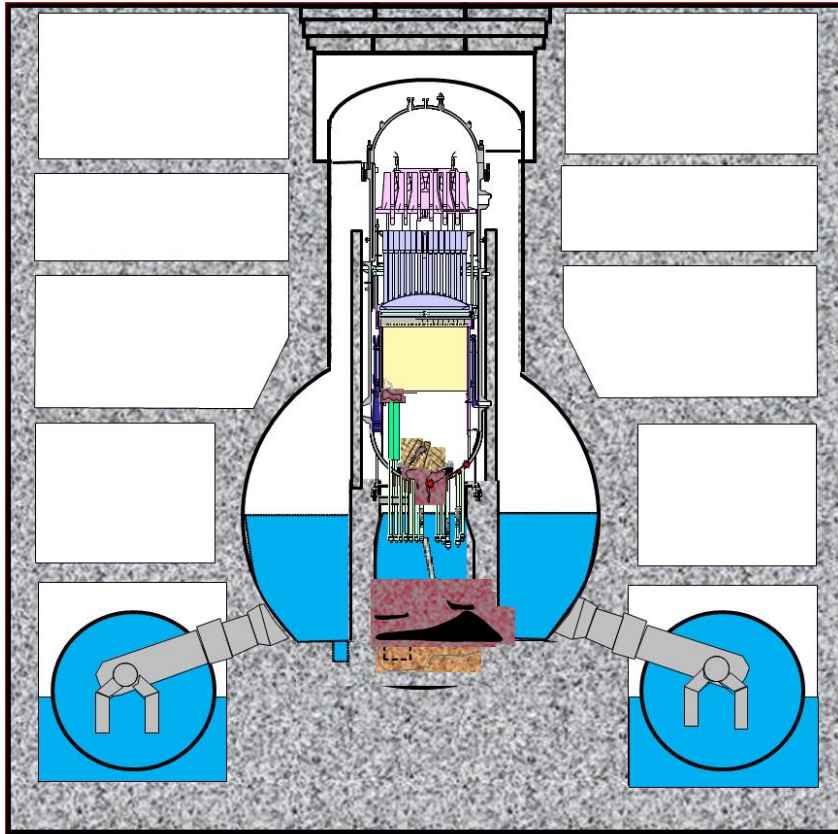
The trial fuel debris retrieval is expected to start in September 2024.

The start of the trial retrieval means that the decommissioning of FDNP will enter Phase 3 suggested in the above Roadmap.

## 2-1 Review of the Previous Side Event: Sub-Committee for the Fuel Debris Retrieval Method

- The selection of the methods for further expanding the retrieval scale of fuel debris is important that will determine the success or failure to complete the long-term decommissioning.
- In making such a decision, not only TEPCO but also the government and the NDF must be involved in the examination and evaluation.
- For this reason, **NDF established the Sub-Committee for the Evaluation of Fuel Debris Retrieval Methods** under the Decommissioning Strategy Committee in **March 2023. Mr. Toyoshi Fuketa was appointed as a Chairperson of the Sub-Committee, who is a former Chairperson of the Nuclear Regulatory Commission in Japan.**
- The Sub-Committee's tasks;
  - ✓ Clarifying issues on each retrieval method
  - ✓ Evaluating technical feasibilities of measures for the issues
  - ✓ Comparative evaluation of each retrieval method
  - ✓ Suggestions for next steps

## 2-1 Review of the Previous Side Event: Fuel Debris Retrieval at Fukushima Daiichi



The figure is provided by TEPCO Holdings, Inc.

- ✓ A full-scale retrieval starts with Unit 3.
- ✓ Properties and distribution of fuel debris greatly vary depending on the accident progression.

Fuel rods that still retain original form, fallen gravel-like fuel pellets, melted and re-solidified metal/ceramic materials, fission products stuck in narrow parts, etc.

## 2-1 Review of the Previous Side Event: Study on Retrieval Method

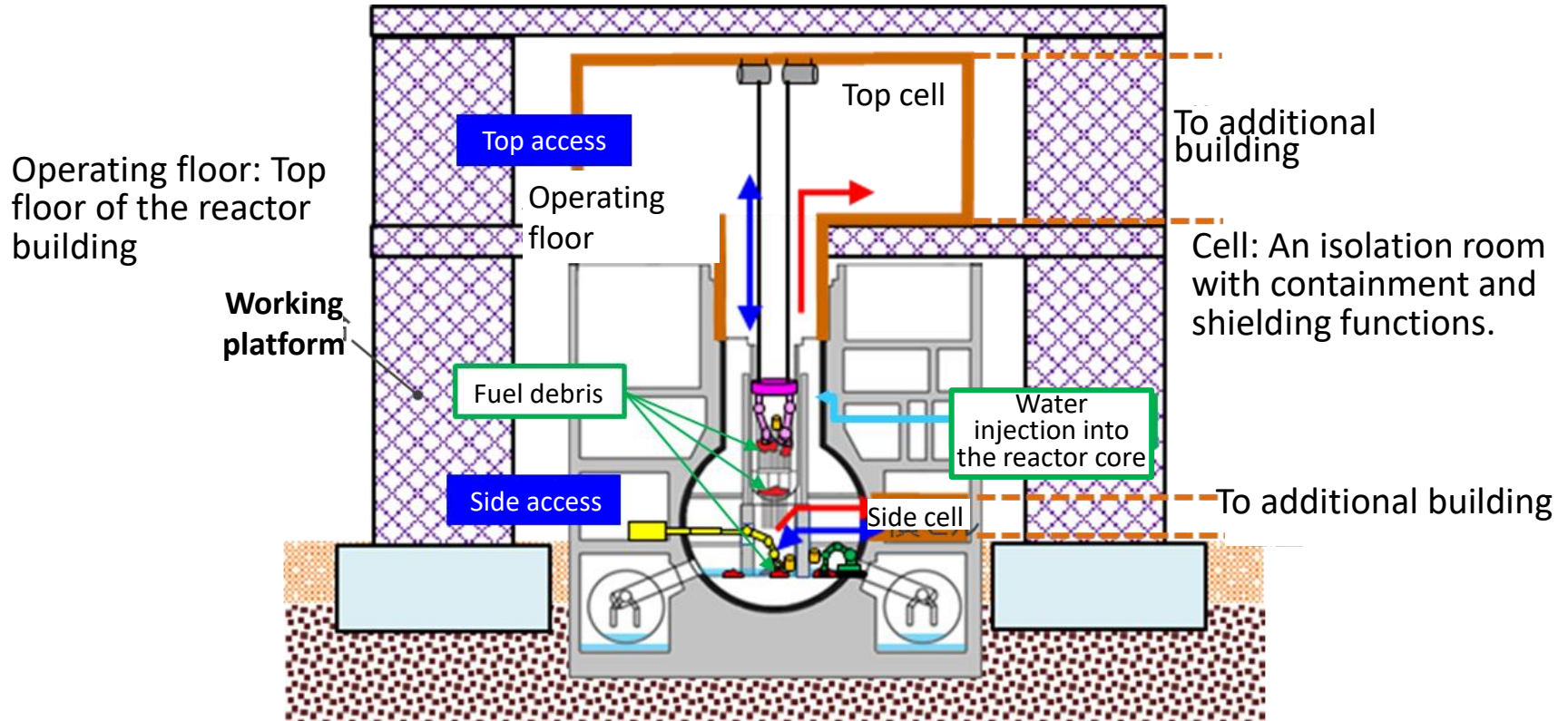
### NDF Sub-Committee for the Evaluation of Fuel Debris Retrieval Methods

- ✓ The following three methods for retrieving fuel debris are studied:
  - (1) Partial submersion method
  - (2) Submersion method
  - (3) Filling and solidification method
- ✓ Feasible methods will be selected while placing utmost priority on safety.
- ✓ Work period is rough estimate.
- ✓ Cost is not included in the study.



# 2-1 Review of the Previous Side Event

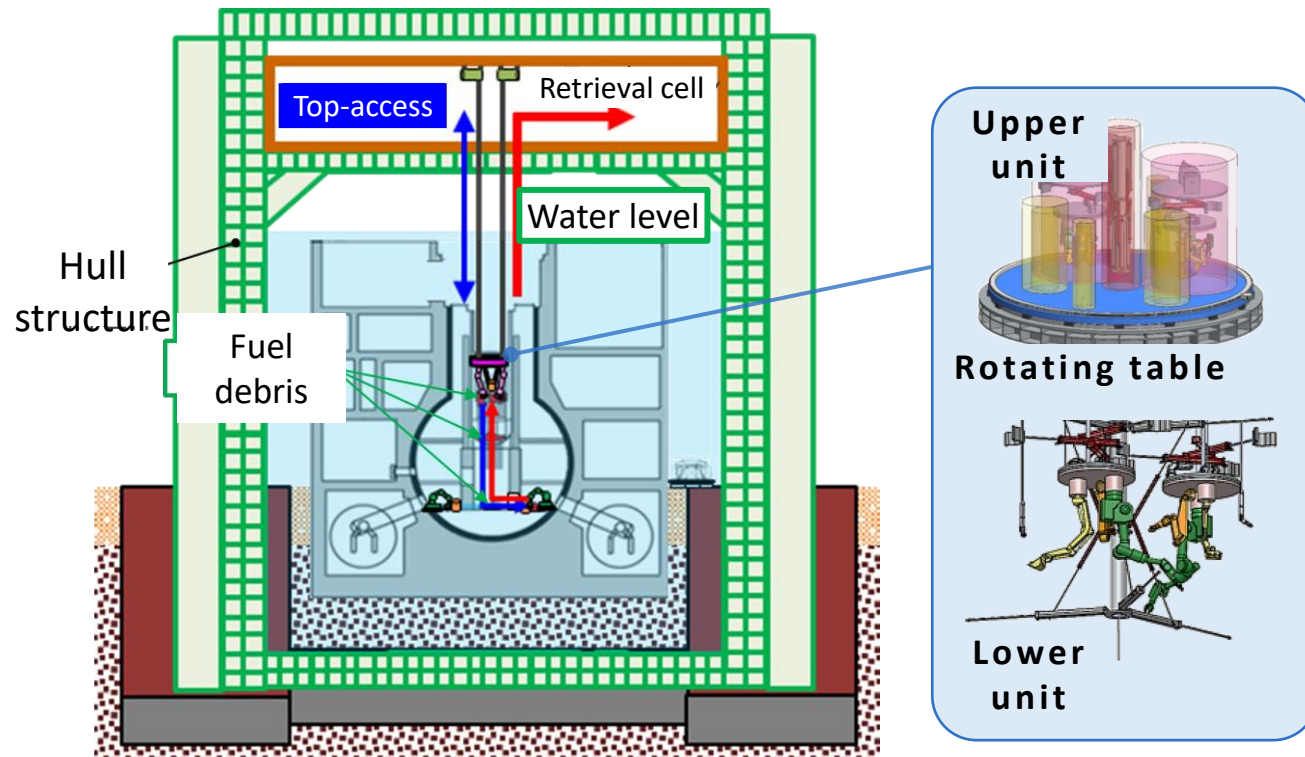
## (1) Partial submersion method



The figure is provided by TEPCO

# 2-1 Review of the Previous Side Event

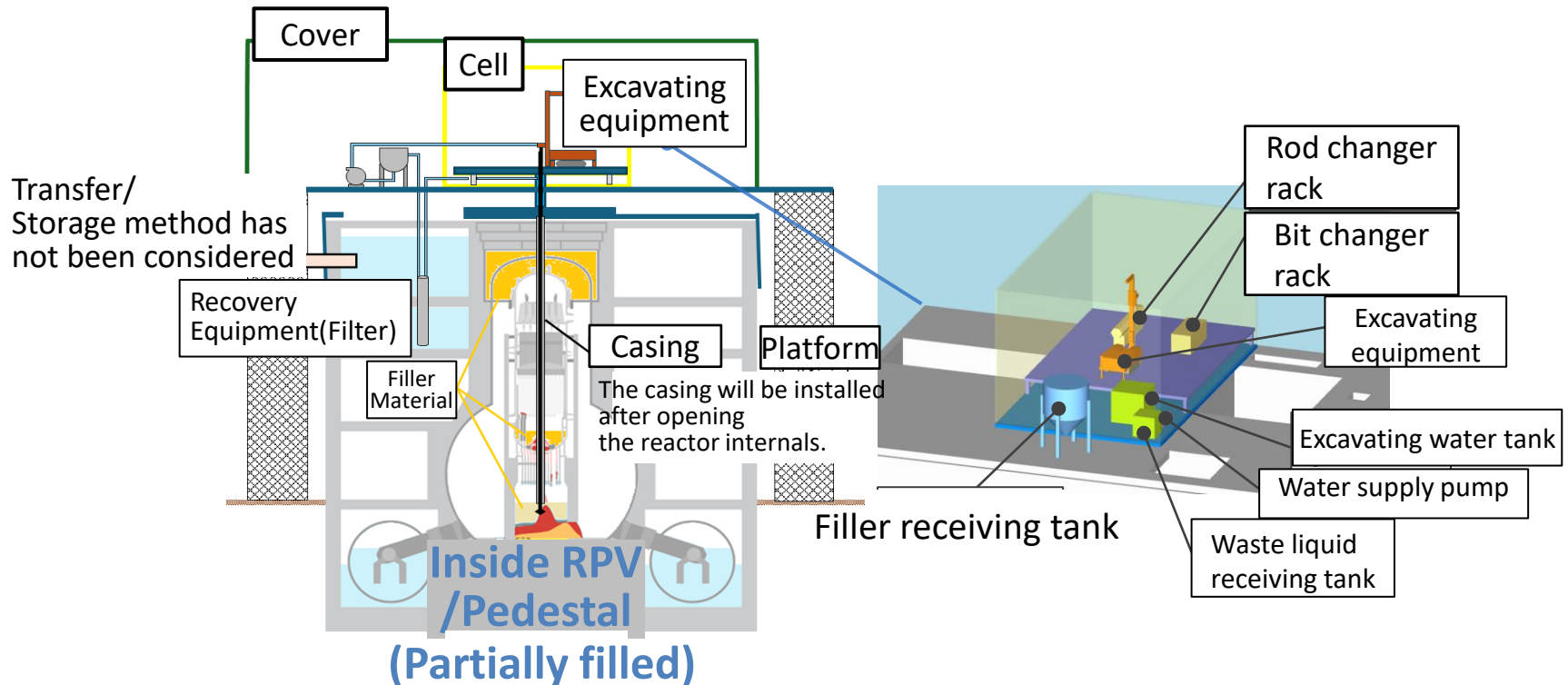
## (2) Submersion method



The figure is provided by TEPCO

## 2-1 Review of the Previous Side Event

### (3) Filling and solidification method



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## 2-2 Update from the Previous Side Event

### Recommendations for the selection of retrieval methods

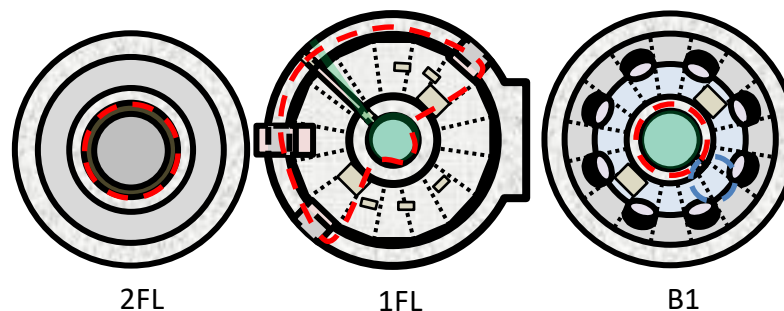
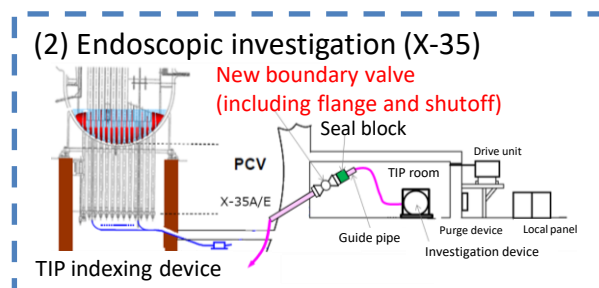
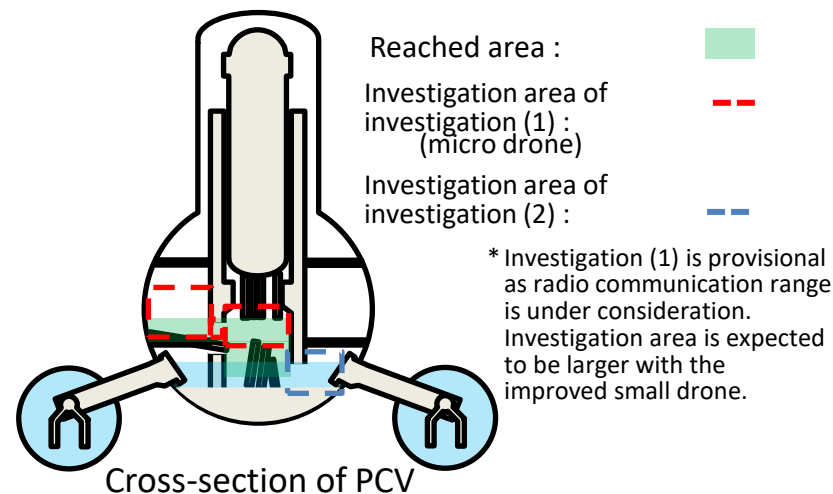
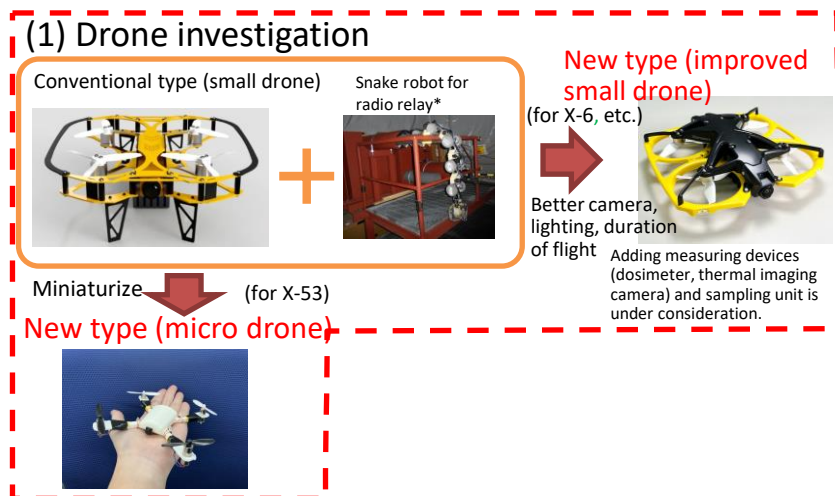
- Enough understandings of the situation inside the reactor are a prerequisite for its design and for ensuring its safety at any retrieval method.
- Accelerating progress of internal investigations is important in the future, however, it is essential to make parallel progresses on the selection of a retrieval method and its engineering.



- Start design studies and research and development utilizing the partial submersion method option functions based on the partial submersion method
  - In parallel with this, internal investigations on a small-scale through top-access will be conducted.
  - A retrieval method utilizing water shielding functions will also be studied.

## 2-2 Update from the Previous Side Event

### Investigation of inside of Unit 3 PCV

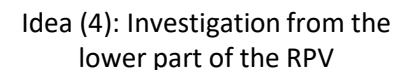
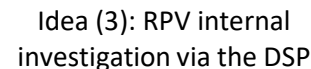


Floor map of PCV

Figures are provided by TEPCO Holdings, Inc.



## Internal Investigation of Unit 3 RPV



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## 2-2 Update from the Previous Side Event

### Future Course of Action

#### (1) TEPCO's engineering study for large-scale retrieval method

- ✓ TEPCO will start more detailed engineering study based on the recommendation in the Sub-committee report.
- ✓ It is important to address issues presented in the report such as internal investigations and research and development (R&D), as well as engineering studies.

#### (2) Development of safety assurance concept

- ✓ The concept of securing safety / judgement criteria and their basis should be clarified at an early stage, then reflected in the basis design and detailed design based on the views and suggestions from the regulatory side.

#### (3) Follow-up by the Sub-committee

- ✓ The Sub-committee will continue to follow up TEPCO's engineering, R&D activities.

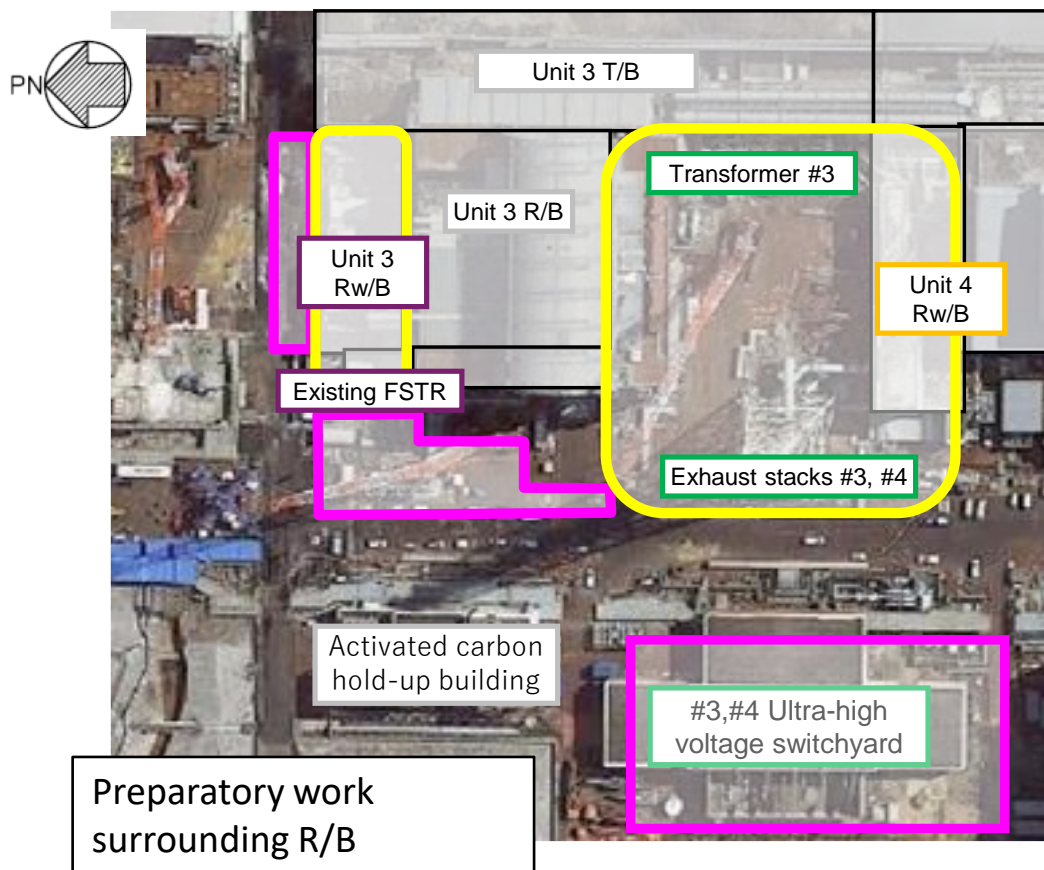
#### (4) Communications with local governments and residents

- ✓ The contents of the report and implementation status of TEPCO's engineering study will be fully shared through dialogue with local governments and residents in the affected area.







## 2-2 Update from the Previous Side Event: Future Course of Action



### (1) TEPCO's engineering study for large-scale retrieval method: Improvement around Unit 3



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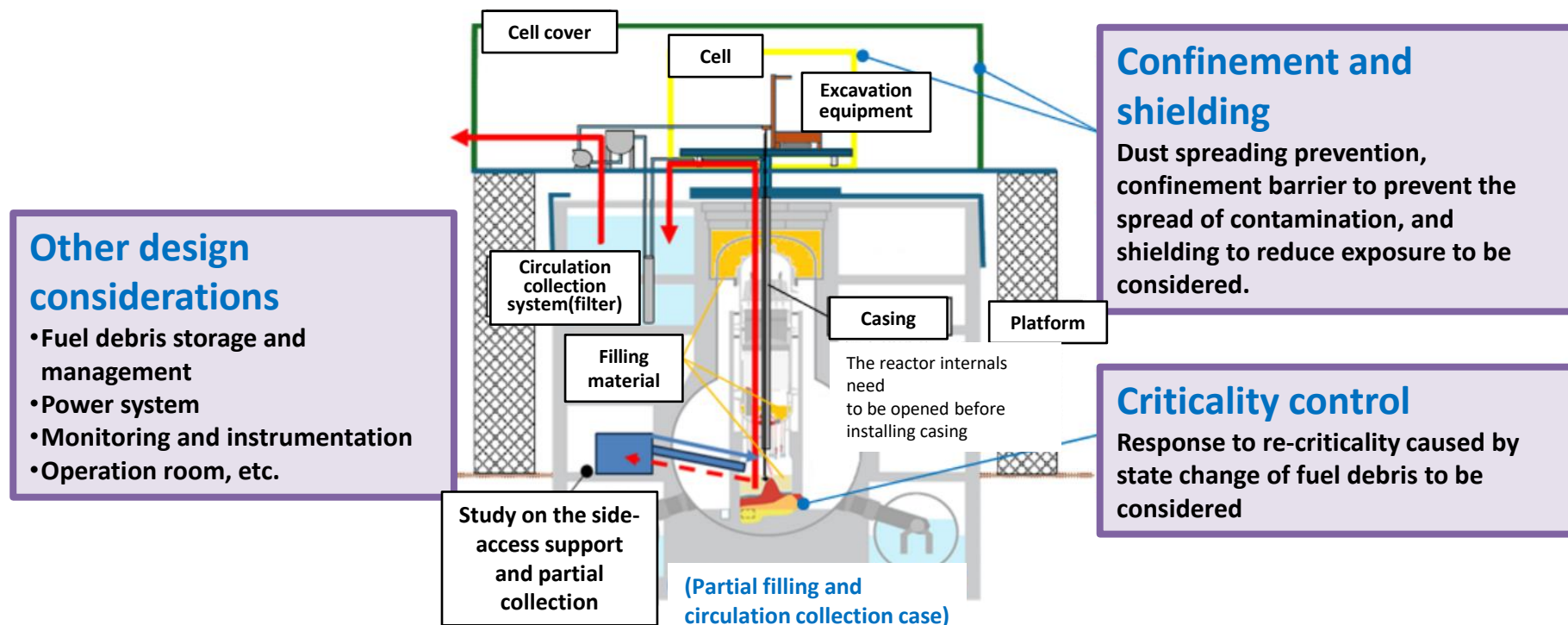
- ✓ Remove SFP cover at the top of the building, and install a new cover for retrieval
- ✓ Build working platforms to the north and south of the building to be used for top-access retrieval
- ✓ Build additional building in the south yard

	: Removal plan drafted		: Removal under consideration (moderate likelihood)
	: Removal under consideration (low likelihood)		: Not included

Legend :		Obstacles in work areas (buildings and yards)
		Obstacles in work yards (buildings and yards)

## 2-2 Update from the Previous Side Event: Future Course of Action

### (2) Development of safety assurance concept: Concept of Ensuring the Safety



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Figure. An example of the retrieval method (conceptual study)

The NDF and TEPCO Holdings will exchange opinions regarding the safety assurance concept with the Regulatory Authority.

## 2-2 Update from the Previous Side Event: Future Course of Action

### **(3) Follow-up by the Sub-committee: Technological Development**

Research and development in the Subsidy Project of Decommissioning, Contaminated Water and Treated Water Management.

- Technologies for investigating the inside of the reactor pressure vessel
- Technologies for improving the environment inside the reactor building
- Development of analytical techniques for exposure dose evaluation
- Liquid processing system (alpha ray emitting nuclide removal technology)
- Technology for storing, transporting and storing fuel debris
  - Acquisition of dust scattering rate data
- Fuel Debris Retrieval Methods

## 2-2 Update from the Previous Side Event: Future Course of Action

### (4) Communications with local governments and residents

Understanding by local communities is essential to a steady progress of the decommissioning.  
The NDF took a leading part in starting regular two-way communications.

#### Past records of FDNPS fuel debris retrieval method explanatory sessions

- **Location:** 13 municipalities in Fukushima Prefecture
- **Dates:** June 9 (Sun) to June 29 (Sat), 2024  
90 mins per one session (explanations 30 mins + Q&A 60 mins)
- **Organizer:** The NDF
  - \* The Sub-Committee for the Evaluation of Fuel Debris Retrieval Methods had a direct dialogue with the local communities.
- **Participants:** 122 (total for all sessions) Live streamed on YouTube

Second series of the explanatory sessions is planned to be held in November to December 2024 at 16 locations, adding to the 13 municipalities above. The explanatory sessions will be held twice a year in the following years.

Thank you for the attention!