

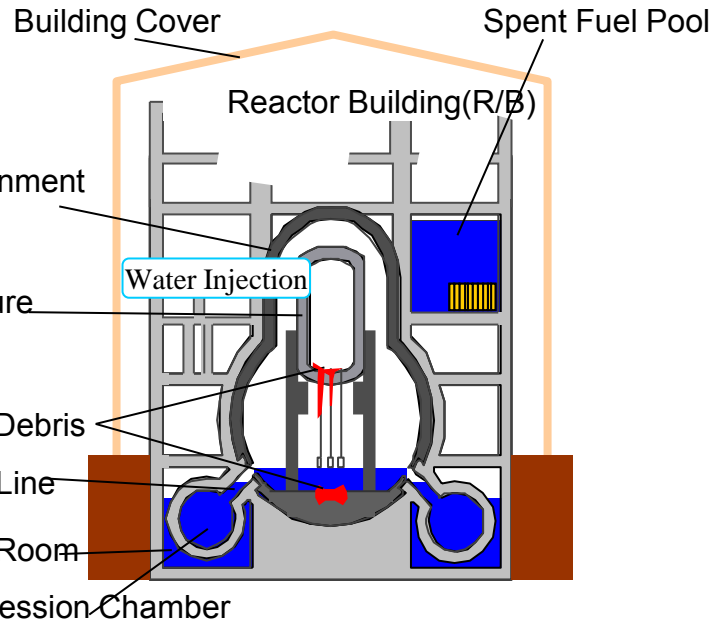
# The Efforts toward Decommissioning of Fukushima Daiichi Nuclear Power Station

July 2014

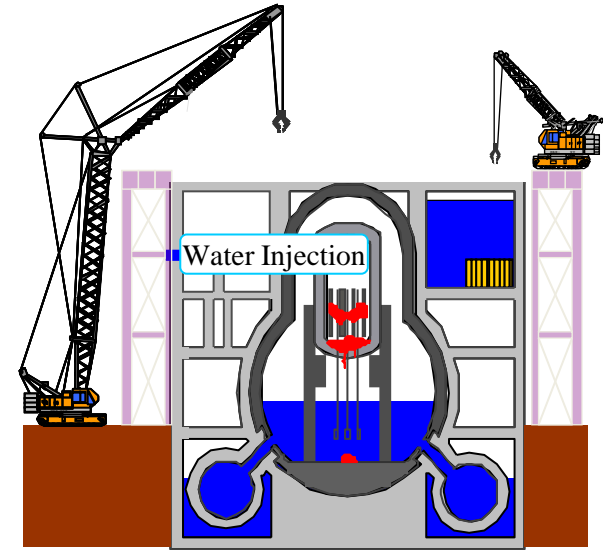
Ministry of Economy, Trade and Industry

# Current Status of Fukushima Daiichi Nuclear Power Station

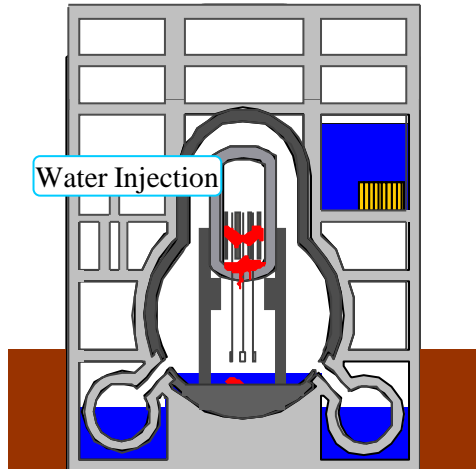
## Unit 1



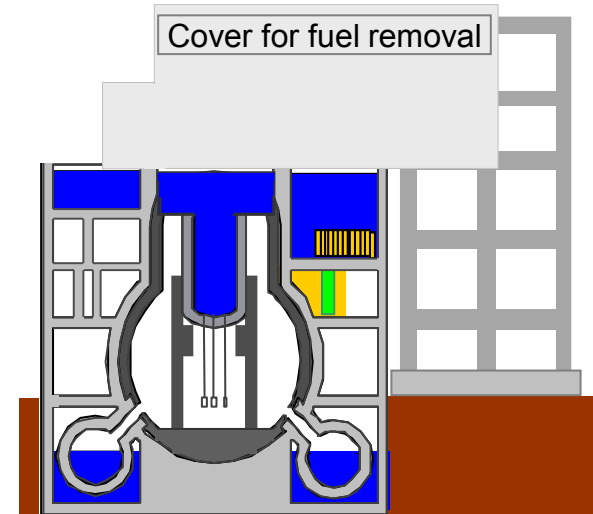
## Unit 3



## Unit 2



## Unit 4



# Main Schedule of Decommissioning (Mid-and-Long-Term Roadmap)

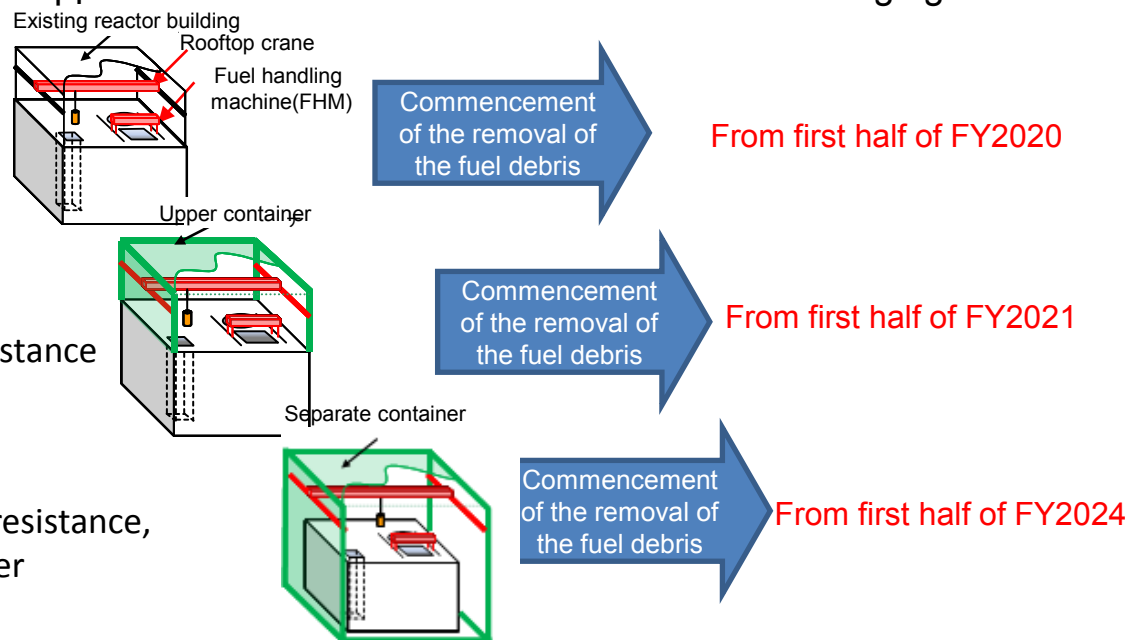
	The First Period		The Second Period (Target for FY2020)			The third period (30-40 years later)
	2012	2013	(Early)	(Middle)	(Late)	
Spent Fuel	Rubble removal and installation of cover cranes					
			★ Fuel retrieval from inside spent fuel pool/Storage			Transport
Stop Leakage	Investigation of inside of containment vessel					
			Repair & Stop leakage/ Submerging containment vessel			
Fuel Debris (Corium)	Dose reduction of inside of reactor building					
				Investigation of Inside the core/ sampling		★ Fuel Debris Retrieval
Decommissioning	Consideration of decommissioning scenario and technologies					
					Design of equipment	Decommissioning Construction
Processing of radioactive waste	Research and development needed for safe processing and disposal of solid waste					
						Manufacturing waste body, etc.

# Fuel and Fuel Debris Retrieval Plan by Unit

- ◇ The commencing time of fuel debris retrieval of units may vary depending on each unit's condition, process flow of on-site operations, etc. On the other hand, we proceed with the research and development for fuel debris retrieval as a common project effectively.
- ◇ Currently, locations and properties of fuel debris, damaged parts of reactor containment/pressure vessels are not clearly determined. However, we assume the submersion approach is the most reliable method and are working on it in terms of reduction of radiation exposure during working, etc.
- ◇ However, there may be cases in which submerging reactor containment vessels up to their upper level is difficult. Therefore, we are also considering about innovative approach which retrieve fuel debris without submerging the reactor containment vessels.

## Example: In case of Unit 2

- (1) When the existing reactor building can be decontaminated and the FHM can be restored.
- (2) When the reactor building has sufficient seismic resistance for a container to be constructed on its upper level.
- (3) When the reactor buildings lacks sufficient seismic resistance, necessitating the construction of a separate container



## Schedule of each Unit (fastest plan)

	Fuel retrieval	Fuel debris retrieval		Fuel retrieval	Fuel debris retrieval
Unit 1	Second half of FY2017	First half of FY2020	Unit 3	First half of FY2015	First half of FY2021
Unit 2	Second half of FY2017	First half of FY2020	Unit 4	November 2013	—

# Efforts toward Consideration of Innovative Approach for Fuel Debris Retrieval

- ◇ The decommissioning and contaminated water management is a difficult and unprecedented project in the world. Therefore, it is necessary to bring domestic and overseas wisdom together and work as a global team.
- ◇ In January 2014, we started to request for information (RFI) through International Research Institute for Nuclear Decommissioning (IRID) on innovative approach for fuel debris retrieval, etc. As the result, we received 194 items of technical information (40% of them is from foreign countries).
- ◇ Based on the results of RFI, we started soliciting projects to be considered on June 27 for realizing innovative approach which retrieves fuel debris without submersing and essential technologies which support such a innovative approach (the solicitation ends on August 27).  
<Results of RFI>

## A Investigation of inside of PCV/RPV

- A1. Conceptual study of methods (e.g. how to put investigation equipment such as cameras inside, etc.) :33 items
- A2. Needed technologies (e.g. altimeter measurement technology of cameras, dosimeters, thermometers, etc.): 58 items

## B Fuel Debris Retrieval

- B1. Conceptual Study of methods (e.g. access to fuel debris inside containment vessels, etc.): 43 items
- B2. Needed technologies (e.g. fuel debris retrieval technologies, such as cutting, suctioning fuel debris): 60 items



### <Solicited Projects>

### 【Considered RFI】

- I. Concept study project of innovative approach for fuel debris retrieval (B1)
- II. Feasibility study project of visual and measurement technologies for innovative approach (Part of A2)<sup>※1</sup>
- III. Feasibility study project of cutting fuel debris and dust collection technologies for innovative approach (Part of B2)<sup>※2</sup>

※1 Only altimeter measurement technologies and technologies for determining whether materials inside the core are fuel debris are not are targeted. Some of the technologies are already solicited by another projects (e.g. muon technology).

※2 Only technologies for retrieving fuel debris are targeted. Other technologies are to be considered after the methods are determined.

# Flow Chart of Research and Development, etc. relating to Decommissioning and Contaminated Management Water of Fukushima Daiichi NPS

## of Fukushima Daiichi NPS

◇ We will start retrieving fuel debris after ensuring the work environment inside reactor buildings by reducing radiation dose, etc. At the same time, other measures for assurance of on-site safety, such as corrosion protection and preventing of criticality, will be also taken.

### 【Submersion Approach (retrieval of fuel debris with it submerged in water)】

- (1) Top submersion (if water can filled up to upper part of PCV)
- (2) Partial submersion (if fuel debris is handled underwater though water cannot be filled up to upper part of PCV)

