

# **Fukushima Daiichi Nuclear Power Station Unit 2 PCV Internal Investigation/ Status of Fuel Debris Trial Retrieval**

March 27, 2025

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International Research Institute for Nuclear Decommissioning  
Tokyo Electric Power Company Holdings, Inc.

# 1. PCV internal investigation and trial retrieval plan overview

In order to guarantee work safety and prevent the spread of contamination, the following equipment will be installed at the penetration to the Unit 2 primary containment vessel (hereinafter referred to as, "X-6 penetration") that will be used for the PCV internal investigation and also as a preparatory stage of trial retrieval.

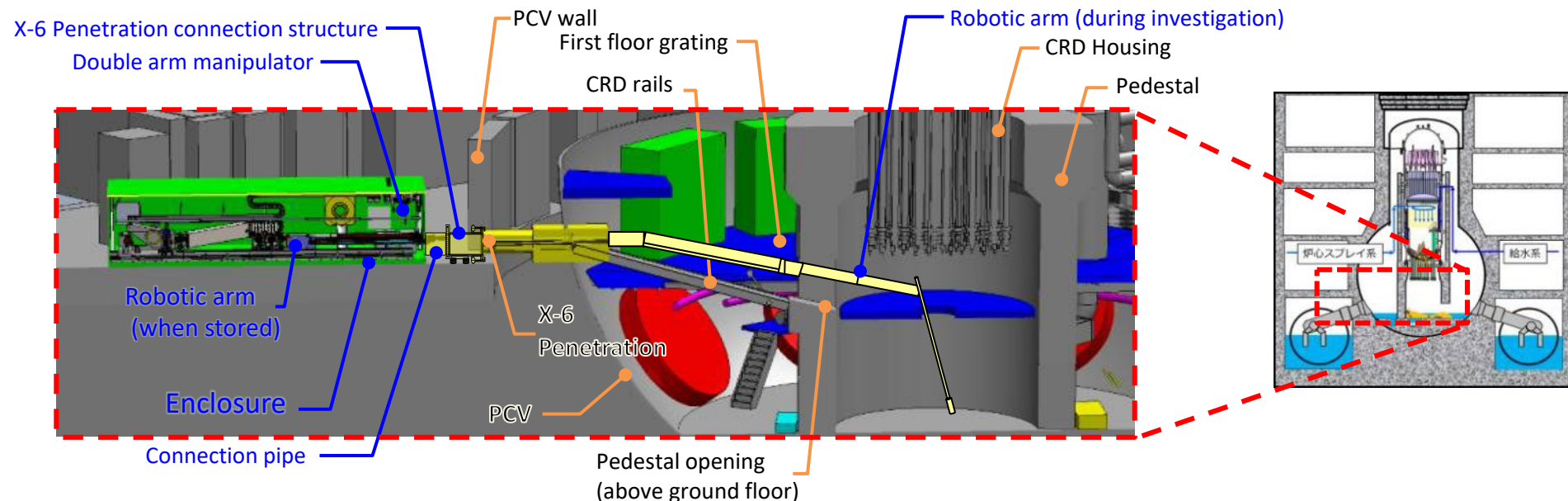
<Already installed>

- The X-6 Penetration connection structure isolates the inside of the PCV from the outside
- The connection pipe shields radiation
- The telescopic device

<To be installed>

- A metal box that contains the robotic arm (enclosure)

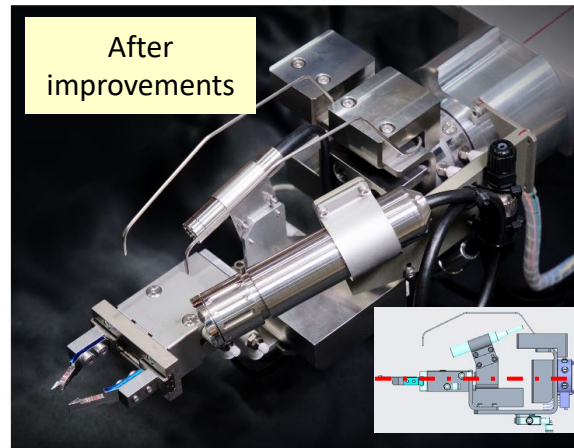
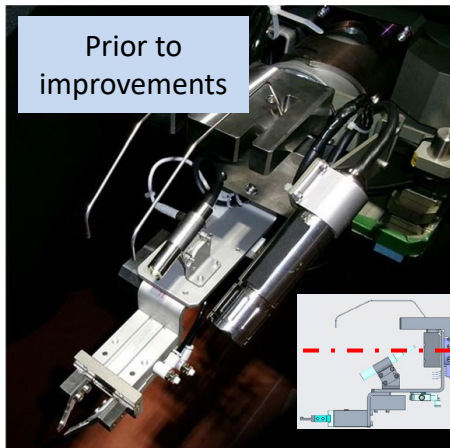
After installation of the aforementioned equipment, the robotic arm shall be fed into the PCV through the X-6 penetration to remove obstacles inside the PCV while also conducting internal investigations and moving forward with the trial retrieval of fuel debris.



Unit 2 internal investigation/trial retrieval plan overview

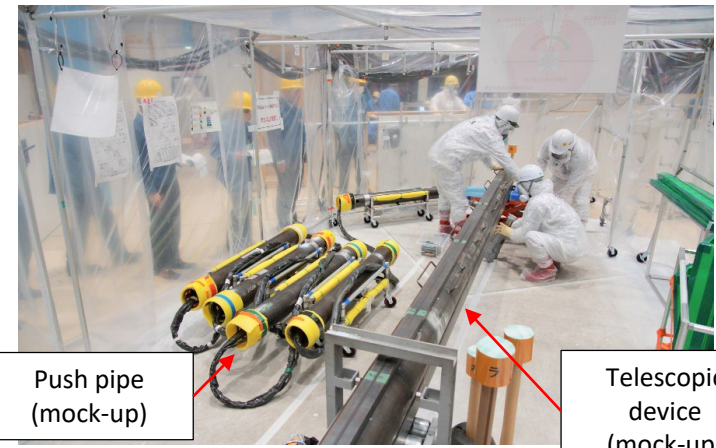
## 2. Status of retrieval fuel debris with the telescopic device

- The end jig of the telescopic device has been improved and verification tests completed at the factory. Also, the end jig exchange training and the camera exchange training on the end of the arm was conducted in a simulated environment.
- Moreover, using a mock-up push pipe, training was conducted on pipe installation and removal in a simulated environment.
- Currently, on-site verification is being conducted at the Fukushima Daiichi Nuclear Power Station using the actual telescopic device.

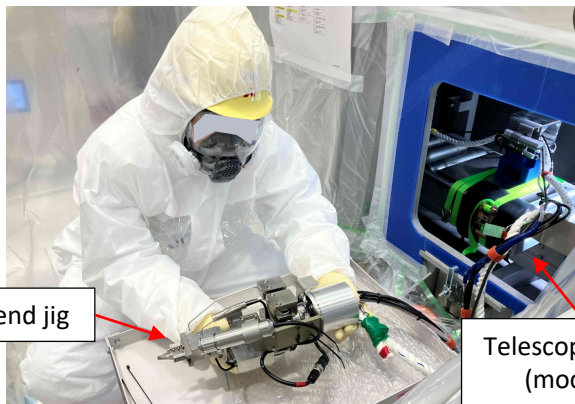


Improved end jig

(Stability has been improved by moving the location of the gripper to the center of rotation of the end jig)



Push pipe training



End jig exchange training



Camera exchange training

\* On the other side hatch was opened for filming

### 3. Work schedule

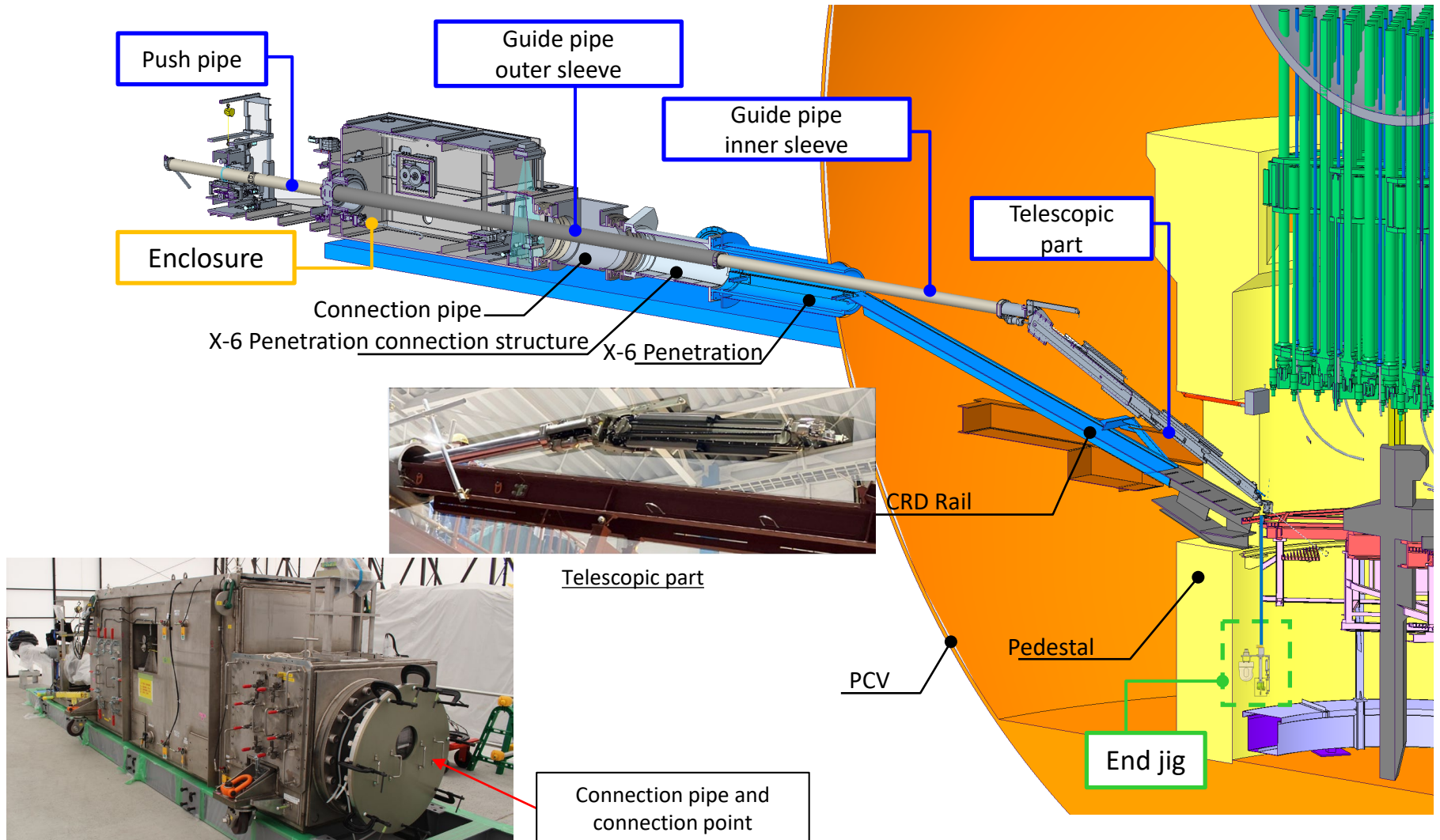
- In preparation to sample additional fuel debris with the telescopic device the improvement to stabilize lowering of end jig of the telescopic device has been completed and verification tests completed at the factory. Also, trainings have been conducted based on previous work results.
- Currently, on-site verification is being conducted at the Fukushima Daiichi Nuclear Power Station using the actual telescopic device. As soon as preparation is ready, we will proceed with the replacement of the cameras (two cameras on the end of the arm) and the end jig of the telescopic device.
- We are aiming the commencement of the next fuel debris trial retrieval using the telescopic device in April.
- For the robotic arm, in light of the discovery of degrading components found during testing, similar components have been replaced and a full inspection is underway. We are also deliberating how to take measures in light of the telescopic device camera nonconformity.
- Based on additional fuel debris trial retrieval using the telescopic device and the test status of the robot arm, we will closely examine the details of the process so that we can safely and carefully proceed with the trial retrieval.

		FY2024				FY2025
		Q1	Q2	Q3	Q4	
Telescopic device	Deposit removal/ device manufacturing/ installation preparations, etc.	[Solid bar]			Preparation for Second	
	Debris sampling			First		Second
Robotic arm	Inspection/maintenance, etc., and any additional development required based upon once-through tests/test results	[Solid bar]				[Dashed box]
	Installation preparation, etc./access route construction					[Dashed box]
	Internal investigation/debris sampling					[Dashed box]

[Solid bar] : Past achievements      [Dashed box] : Start and end dates are under scrutiny

# [Reference] Sampling Debris with the Telescopic Fuel Debris Trial Retrieval Device

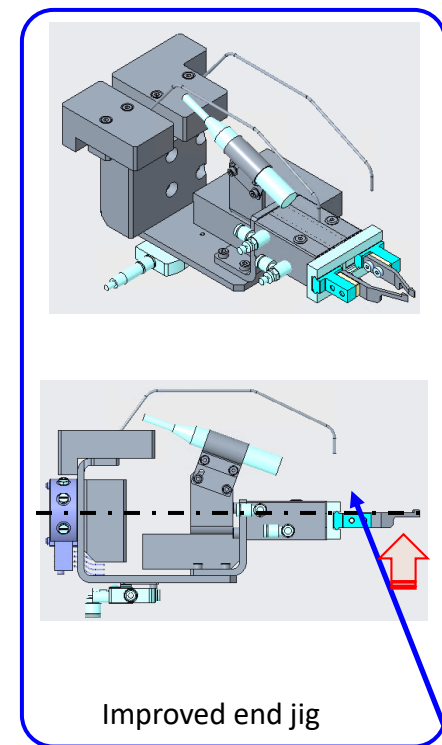
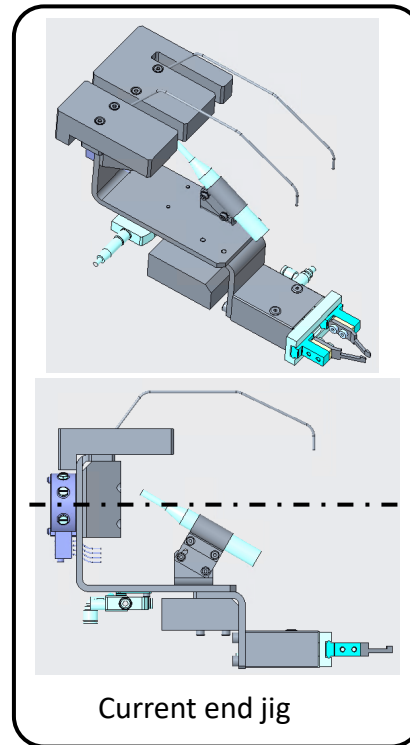
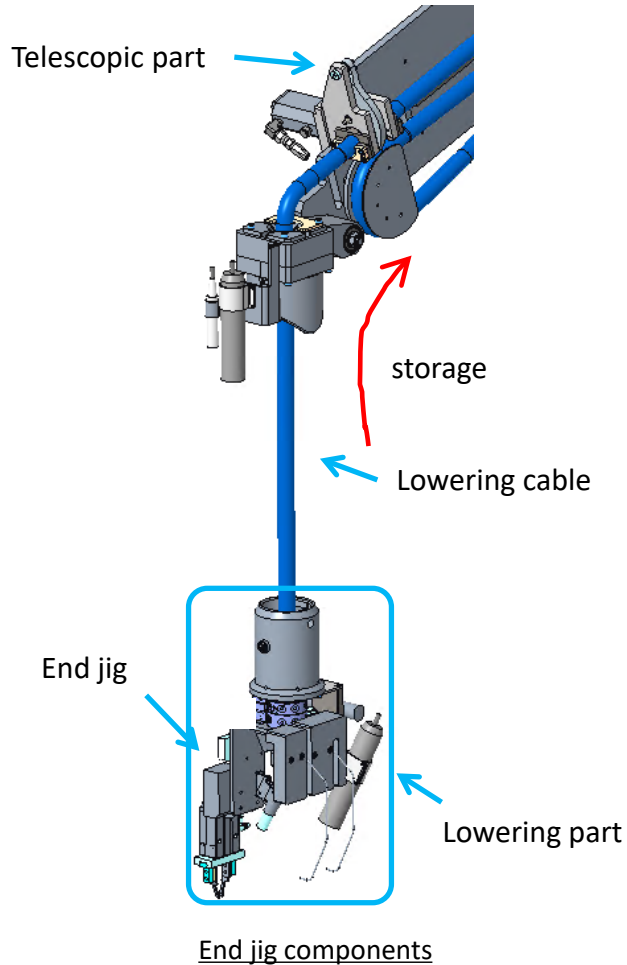
- We assume that the attributes and distribution of fuel debris will be quite varied, so in order to increase sample size and expand our knowledge we will continue to use the telescopic device, which is already installed on site and has proven successful, to take additional fuel debris samples.



Telescopic device

# [Reference] Additional Debris Sampling with the Telescopic Fuel Debris Trial Retrieval Device **TEPCO**

- During the first fuel debris sampling, time was required to maneuver the end jig because the lowering part was not stable. So we are deliberating how to improve the maneuverability of the end jig before sampling additional fuel debris.

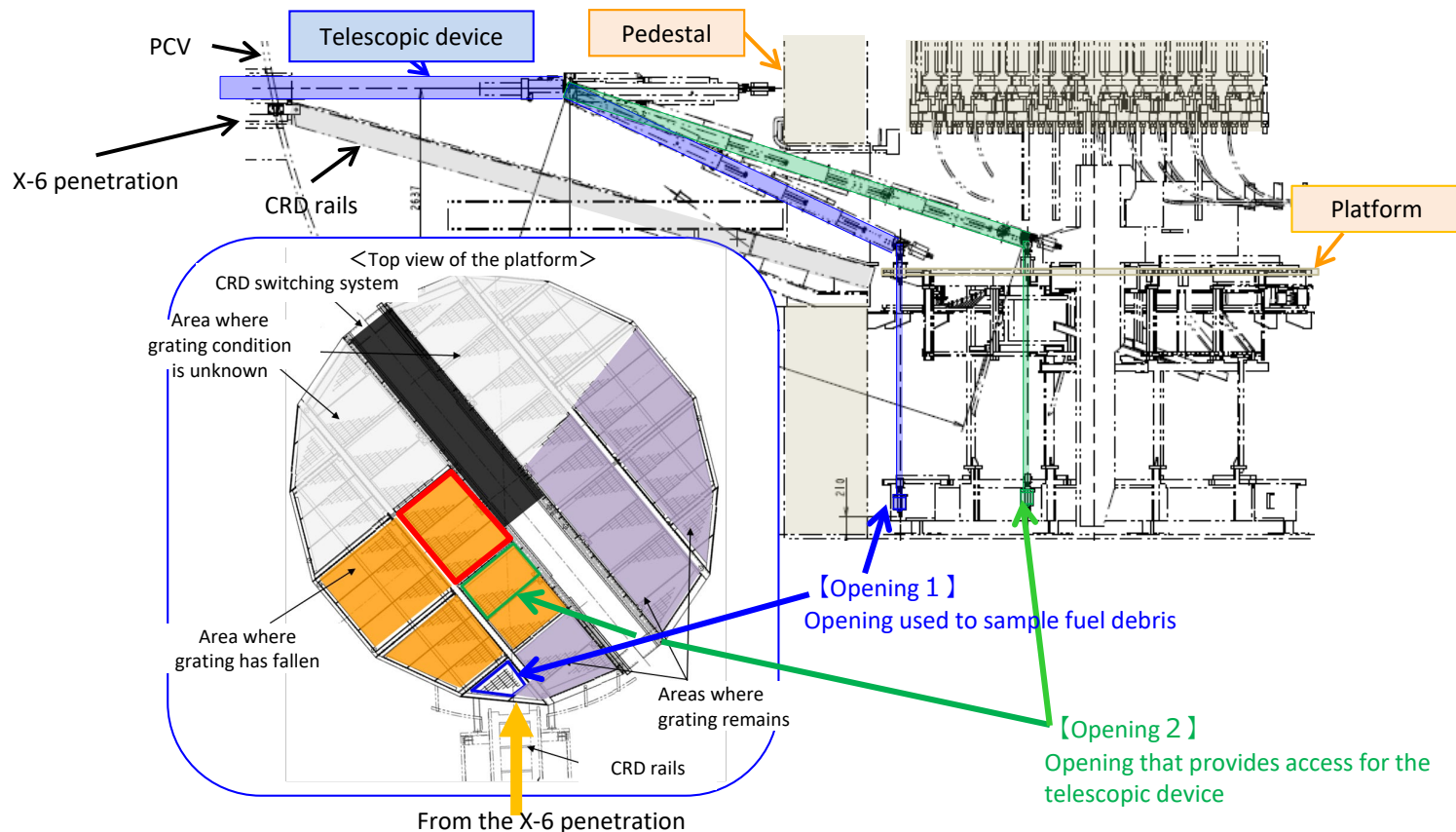


Concept diagram of end jig improvements

Stability has been improved by moving the location of the gripper to the center of rotation of the end jig

# [Reference] Workplan for retrieval fuel debris with the telescopic device **TEPCO**

- There are two openings in the platform that provide access to the bottom of the pedestal with the telescopic device (openings 1 and 2 in the figure below).
- During work in October 2024, the tip jig was lowered through the front-most opening 1 in the pedestal (CRD rail side), and sampled fuel debris.
- The details of opening 2 on the far side in the pedestal have not been confirmed in previous Investigation.
- The second trial retrieval is planned from two viewpoint, that are understanding the internal condition of the pedestal and sampling from a different point than the first retrieval point.
  - ① Investigate the condition of opening 2 on the platform.
  - ② Fuel debris sampling is planned from opening 2. However, since the remaining grating on the platform is confirmed in previous Investigation, the status of opening 2 will be checked on the day of trial retrieval to determine whether access to the bottom of the pedestal is possible from opening 2.
  - ③ If the bottom of the pedestal cannot be accessed through opening 2, as with the last retrieval, the end jig will be lowered through opening 1 and fuel debris sampled from the bottom of the pedestal.

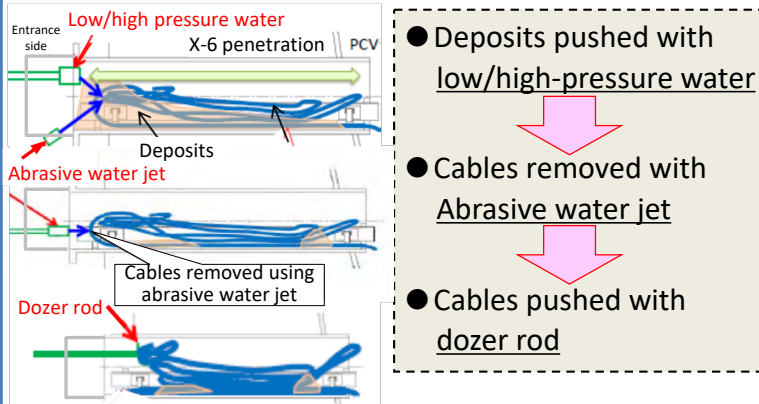


1. Isolation chamber installation

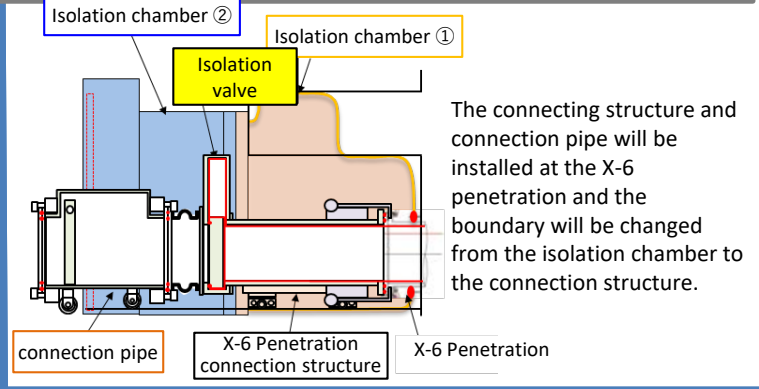
2. Opening of the X-6 penetration hatch

3. Removal of deposits from inside the X-6 penetration

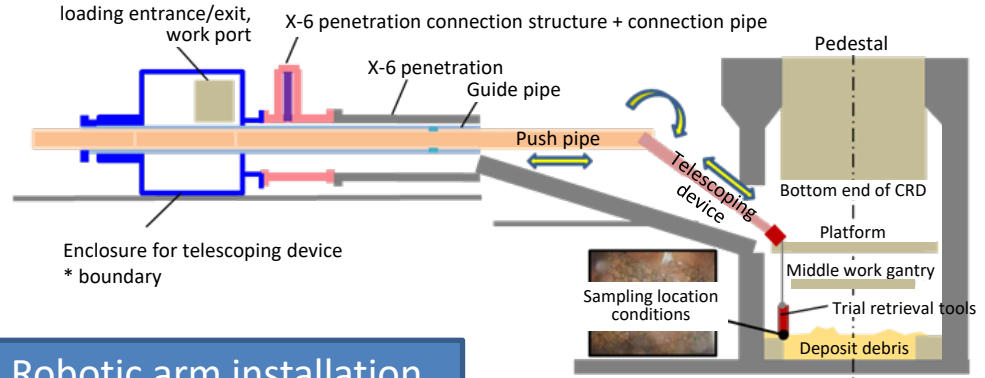
Removing deposits/cables from inside the X-6 penetration



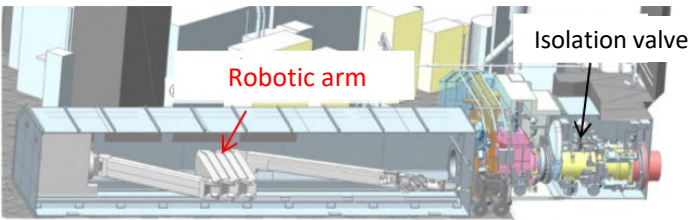
4. Installation of X-6 penetration connection structure and connection pipe



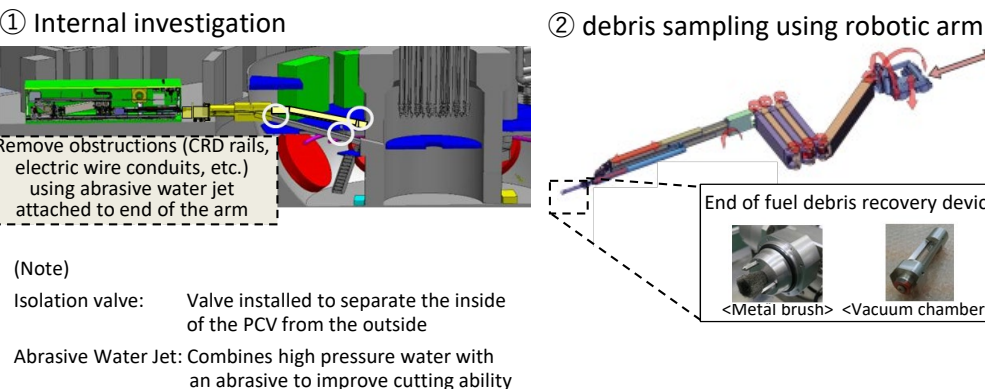
5. Installation of telescopic device  
6. Trial retrieval (debris sampling using telescopic device)



7. Robotic arm installation



8. Internal investigation/debris sampling using robotic arm



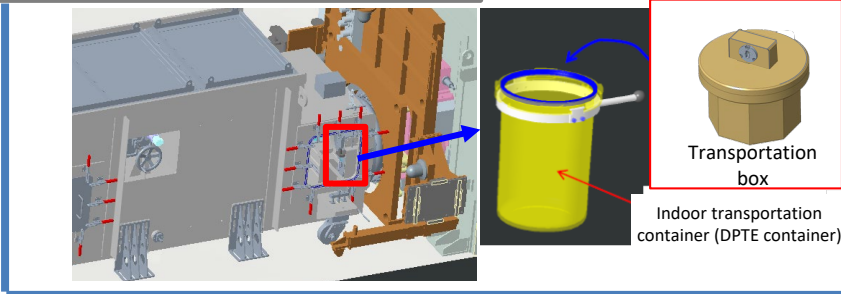


# [Reference] Field Preparation Work Progress

## Primary Steps of the Fuel Debris Trial Retrieval (Internal Investigations/Debris Sampling)

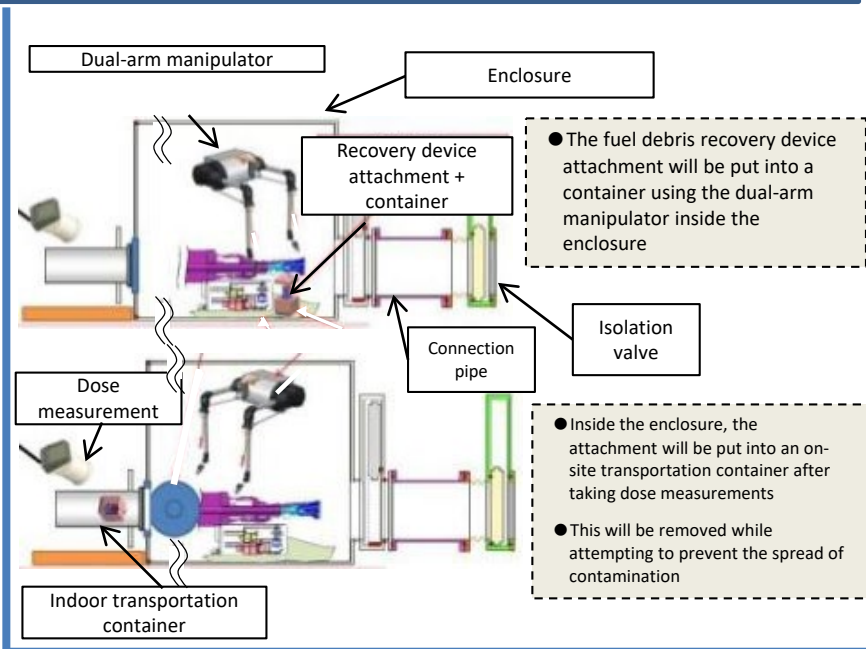
↓ (From Step 6 on the previous slide)

### 9-1. Collection of fuel debris

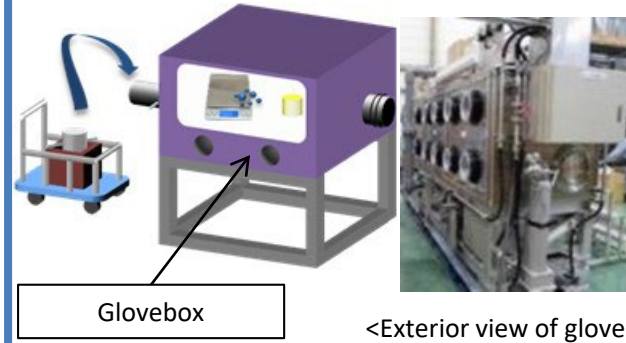


↓ (From Step 8 on the previous slide)

### 9-2. Inserting the fuel debris recovery device attachment into a container, Inserting into an on-site transportation container/Dose measurements

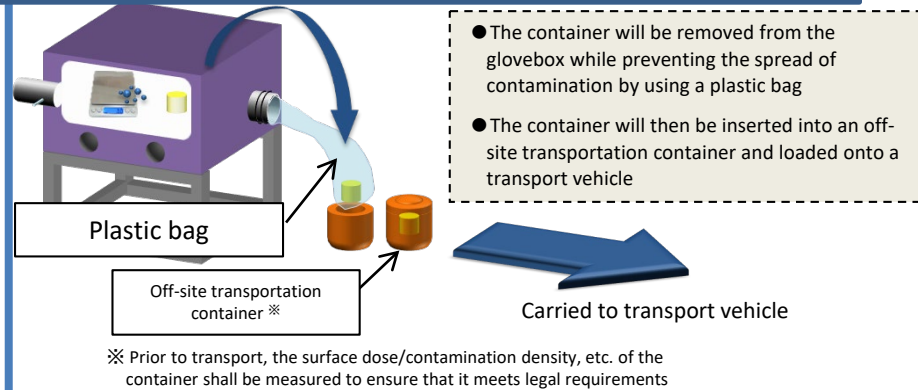


### 10. Insertion into glovebox/Measurement



- The collected samples will be put into a negative pressure glovebox
- The samples will be subjected to various measurements inside the glovebox and then put into a container

### 11. Container removal/Insertion into transportation container /Removal from premises



### 12. Off-site transport and off-site analysis

(Note)  
 DPTE Container is an abbreviation of “Double Porte pour Transfert Etanche”.  
 By opening/closing the lid of the container and double door of the glove box at the same time, it allows the items to be transferred while maintaining a sealed environment.

# [Reference] Environmental Impact (1/2)

- During fuel debris trial retrieval, the gas from inside the primary containment vessel was prevented from leaking to the outside environment through the construction of a boundary.
- There have been no significant fluctuations in data from monitoring posts or dust monitors neither prior to or after work.
- Data from monitoring posts/dust monitors near site borders can be found on TEPCO's website

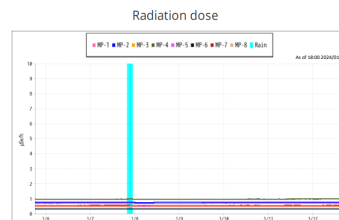
Reference URL: [https://www.tepco.co.jp/en/hd/decommission/data/monitoring/monitoring\\_post/index-e.html](https://www.tepco.co.jp/en/hd/decommission/data/monitoring/monitoring_post/index-e.html)  
<https://www.tepco.co.jp/en/hd/decommission/data/monitoring/dustmonitor/index-e.html>

## Radiation Dose measured at Monitoring Post of Fukushima Daiichi Nuclear Power Station

The following is the radiation doses of the air measured by the monitoring posts (MP1-8) at Fukushima Daiichi Nuclear Power Station.

### Monitoring post (MP1 - MP8)

Monitoring points



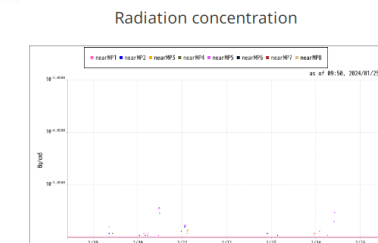
MP Unit : μSv/h Wind Velocity Unit : m/s  
 ○Measurement value (2024/01/12 18:00)

MP1	MP2	MP3	MP4	MP5	MP6	MP7	MP8	Wind Direction	Wind Velocity
0.517	0.793	0.490	0.987	0.703	0.315	0.566	0.530	northwest	1.4

## Radioactive Concentration measured at Dust Monitors near the Site Boundary of Fukushima Daiichi Nuclear Power Station

The following are radioactive concentrations in the air measured near the monitoring posts (MP1-8) at the site boundary of Fukushima Daiichi Nuclear Power Station.

Monitoring points



Radioactive Particles Monitor Unit : Bq/m³ Wind Velocity Unit : m/s  
 ○Measurement value (2024/01/25 09:50)

nearMP1	nearMP2	nearMP3	nearMP4	nearMP5	nearMP6	nearMP7	nearMP8	Wind Direction	Wind Velocity
1.0E-06	1.0E-06	1.0E-06	1.0E-06	1.0E-06	1.0E-06	1.0E-06	1.0E-06	northwest	4.4

# [Reference] Environmental Impact (2/2)

- During fuel debris trial retrieval, the work will be performed with constant monitoring of plant parameters.
- Primary containment vessel temperature data can be found on TEPCO's website.

Reference URL: [https://www.tepco.co.jp/en/hd/decommission/data/plant\\_data/unit2/pcv\\_index-e.html](https://www.tepco.co.jp/en/hd/decommission/data/plant_data/unit2/pcv_index-e.html)

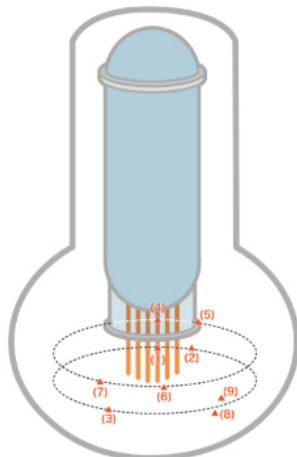
## [Reference] Screen image of our website

### Temperatures measured inside the Unit 2 Primary Containment Vessel at Fukushima Daiichi Nuclear Power Station

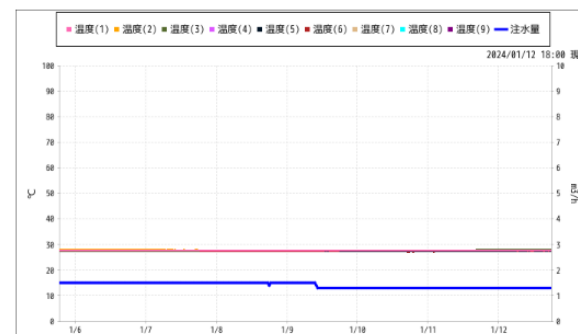
Here are the measurement results of temperatures inside the Unit 2 Primary Containment Vessel at Fukushima Daiichi Nuclear Power Station.

#### Monitoring points

Unit 2 reactor containment vessel



#### Temperature



Temperature Unit: °C. Water Injection Unit: m³/h

○ Measurement value (2024/01/12 18:00)

温度(1)	温度(2)	温度(3)	温度(4)	温度(5)	温度(6)	温度(7)	温度(8)	温度(9)	注水量
27.5	27.8	27.9	27.7	27.4	27.3	27.2	-	-	1.3