

Fukushima Daiichi Nuclear Power Station Unit 3 PCV Internal Investigation (non-submerged area) using a Micro-drone

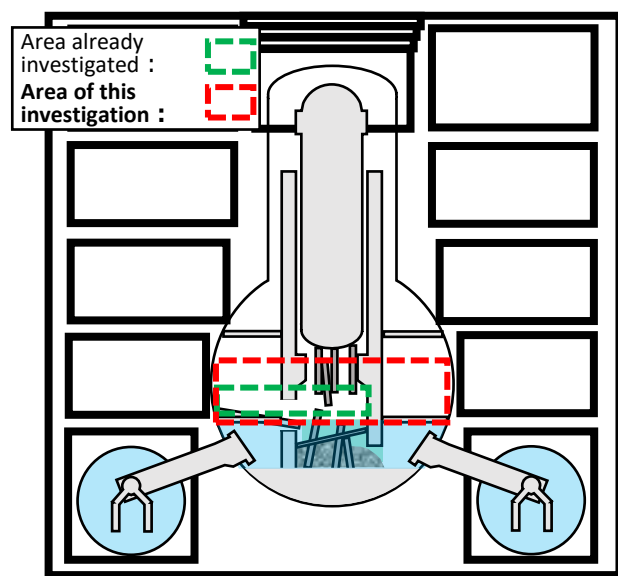
October 30, 2025



Tokyo Electric Power Company Holdings, Inc.

1. Summary

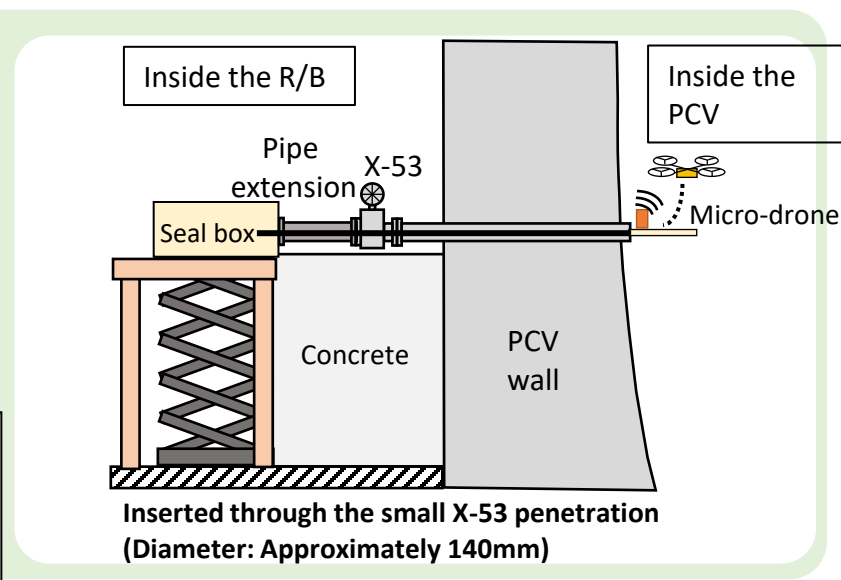
- In July 2025 we announced that we were deliberating design plans for the retrieval of fuel debris from Unit 3, and **that more information needs to be gathered about the inside of the PCV as we prepare for full-scale debris retrieval.**
- However, the water level inside the PCV has remained high since the accident and the penetrations we can use are limited with the **small X-53 penetration (Diameter: Approximately 140mm) being the only penetration currently available for access.**
- Therefore, the investigation devices that have proved successful at other units cannot be used and a new larger diameter access route must be constructed. However, this would require time so **our current plan is to conduct a PCV internal investigation using a small "micro-drone."**
- During this investigation, we plan to investigate the **as of yet unexamined first floor of the D/W and also perform a more meticulous investigation of the inside of the pedestal** that was investigated in 2017 using a submersible ROV.



Cross-sectional diagram of the Unit 3 PCV
internal investigation area

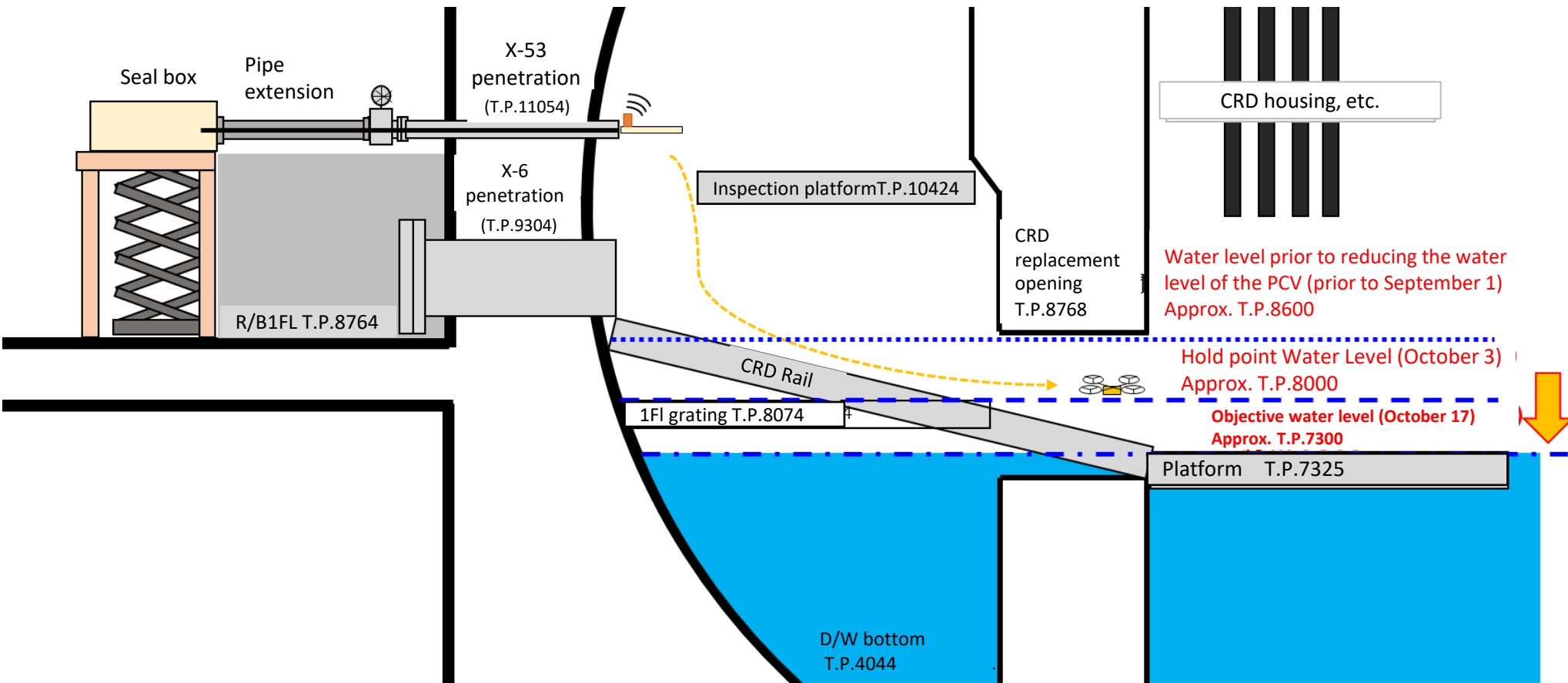


Concept diagram of Unit 3 micro-drone investigation



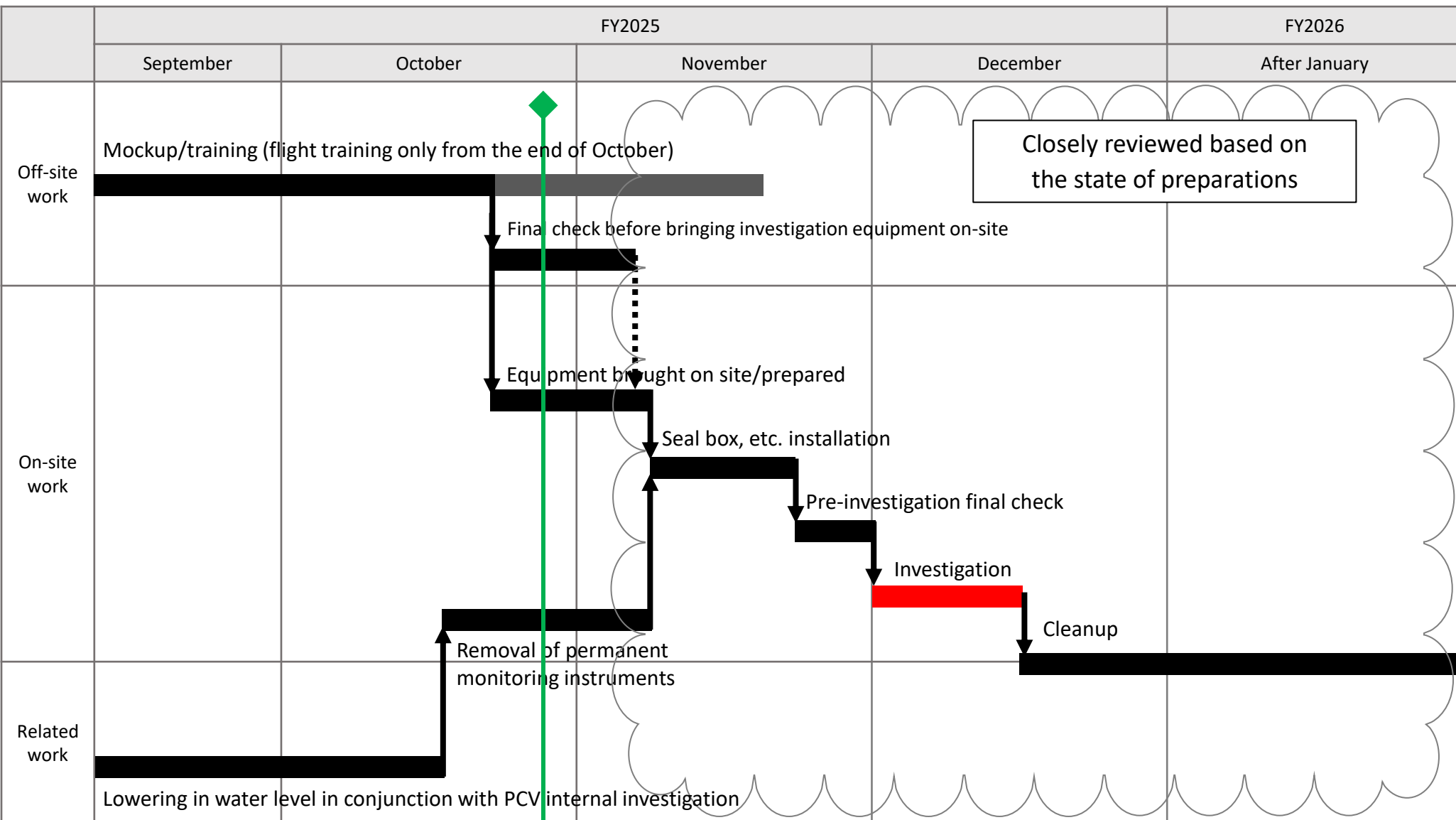
2. Lowering water levels in conjunction with the PCV internal investigation

- Since September 1, we have been lowering the water level inside the PCV by reducing the amount of cooling water injected into the reactor. On October 3, we reached the hold point of approximately T.P.8,000, followed closely by our objective water level of approximately T.P.7,300 on October 17.
- After reaching our objective water level, we did not see any abnormalities in related parameters such as the RPV bottom/PCV temperature gauge until October 23. Consequently, work to remove the permanent monitoring instruments commenced on October 24.
- Going forward we will maintain the current water level and implement the PCV internal investigation.



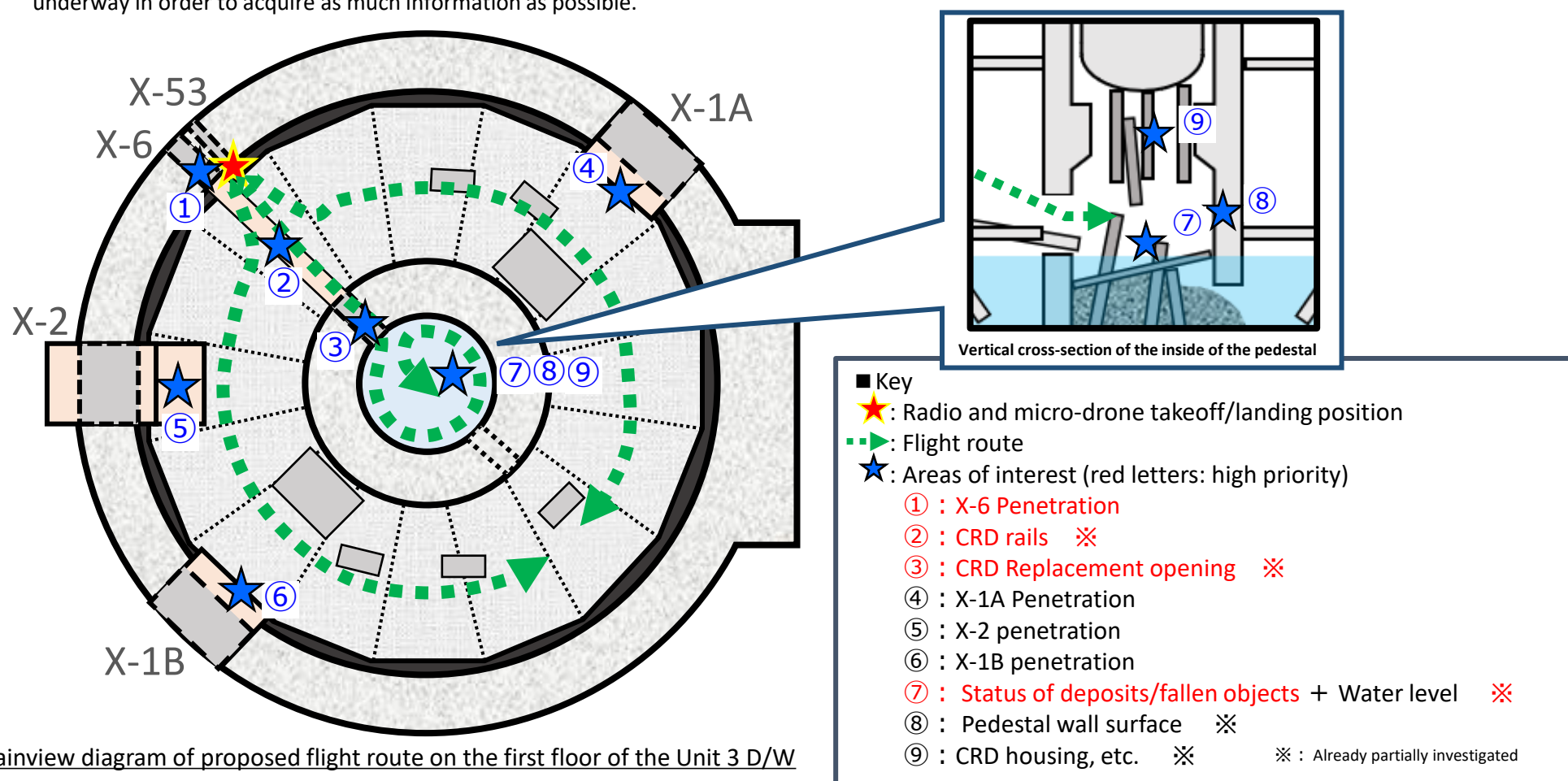
3. Investigation schedule

- On-site preparations, such as the removal of permanent monitoring instruments, has begun in preparation to begin the investigation in December.



[Reference] Investigation details

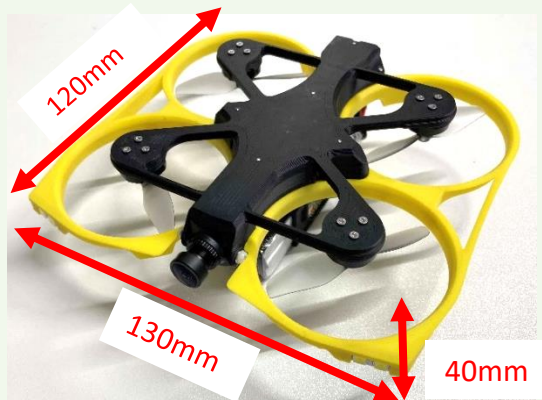
- During this investigation the micro-drawn will be flown on **the first floor of the D/W and inside the pedestal to take footage.**
- The **primary objective of the investigation is to gather information about the inside of the pedestal and the area around the X-6 penetration**, which are important for the side-retrieval of fuel debris and future deposit investigations.
- As with the drone investigation of Unit 1, **the footage will be used to compile point cloud data and the radiation noise will be used to estimate dose rates.**
- Since operating the micro-drone is difficult, the scope of the investigation may be altered depending upon field conditions, however mockup/training is underway in order to acquire as much information as possible.



[Reference] Investigation devices

- Since the area inside the PCV is cramped and dark, an extremely small and highly mobile **"micro-drone"** with photographic capabilities will be installed through the small X-53 penetration.
- As with past investigations, **a seal box will be attached to the X-53 penetration so as to allow the micro-drone to be inserted into the PCV while maintaining PCV isolation.**
- The seal box will contain a total of six drones and two drones will be able to be installed inside the PCV simultaneously (how the six drones are to be used will be determined during mockup/training).

Micro-drone



Held in the palm of the hand for size comparison

Use: Photography (2.7K)
 Dimensions: 130×120×40[mm]
 Weight: 95[g] (Including battery)
 Communications method: Radio
 Flight time: Approximately 13 minutes (the investigation is planned to take 10 minutes)
 Camera performance: Image quality: 2.7K, frame rate: 60fps
 Angle of view: diagonal 140°, Horizontal 135°, vertical 107°
 Lights: 2 LEDs on the left and right sides (total: 380lm)
 Radiation resistance: 200Gy
 Notes: Corresponds to IP52, Two types of cameras: portrait and landscape

Seal box

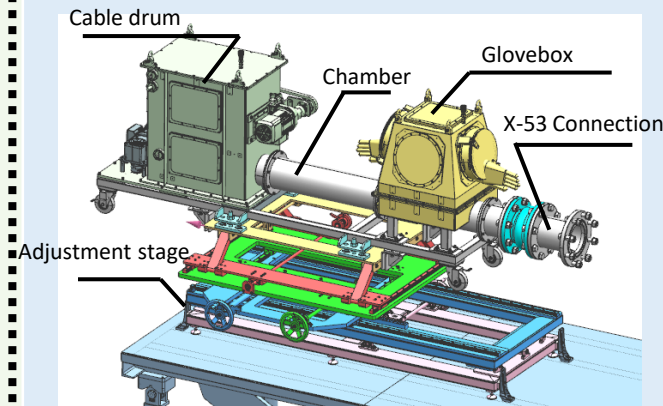


Diagram of Seal box

The drones to be installed are housed in the chamber through which they are installed into the PCV.

Standby drones and recharging equipment are inside the glove box so that drones on the liftoff/landing pad can be switched out while maintaining airtightness.

Dimensions: Approx. 2.6m×0.6m×1.1m
 Weight: Approx. 315kg

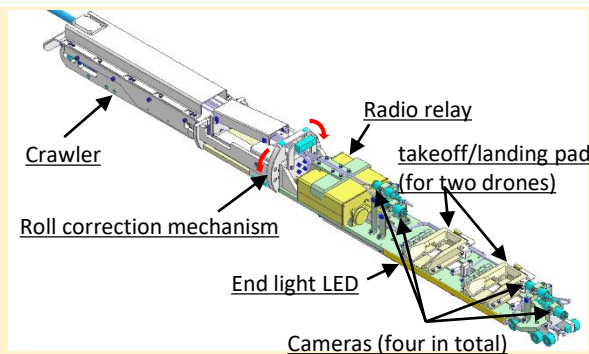


Diagram of installation equipment

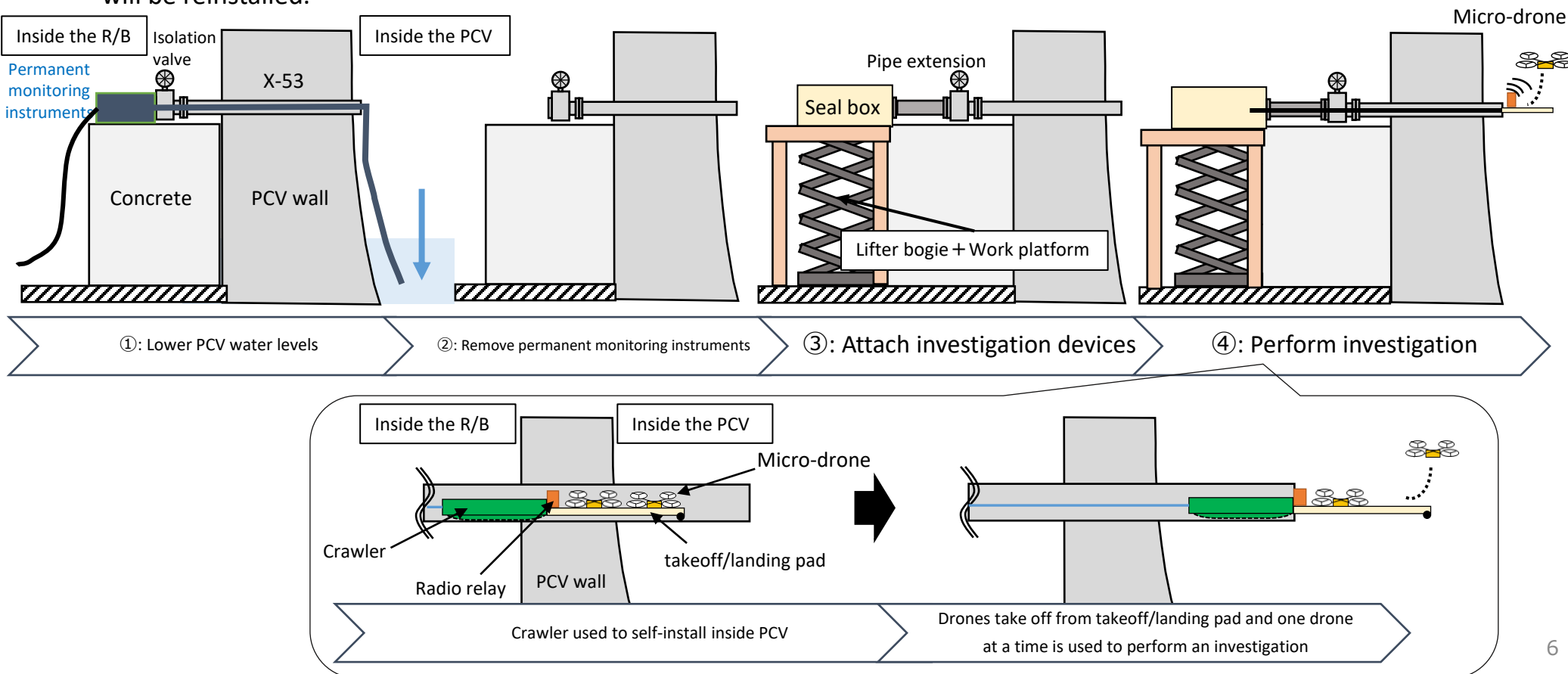
The crawler enables self-installation thereby reducing worker exposure.

Two drones can be installed simultaneously.

Dimensions: Approx. 1.3m×Φ130mm
 Weight: Approx. Approximately 20kg

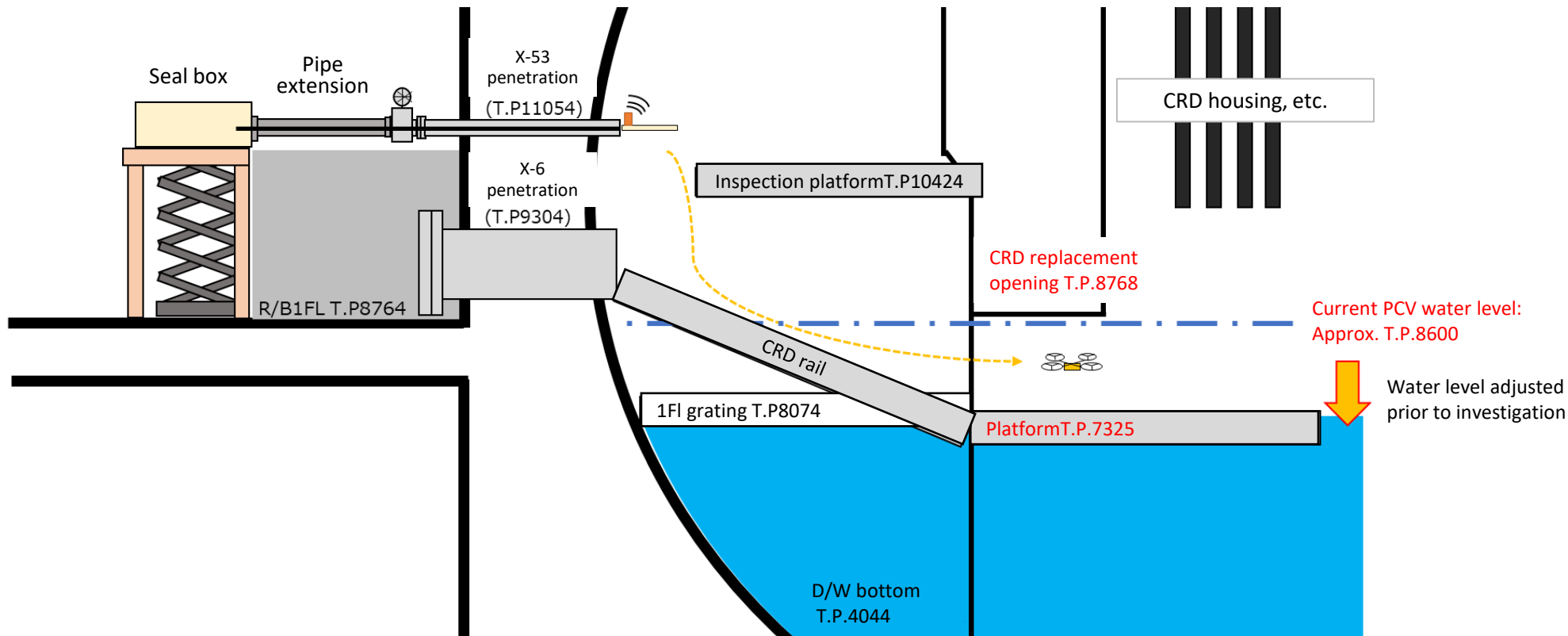
[Reference] Work flow

- Permanent monitoring instruments (water level/temperature gauge) newly installed after the accident are currently inserted through the X-53 penetration.
- And, in order to fly the micro-drone inside the pedestal, the water level inside the PCV must be lowered to the bottom edge of the CRD replacement opening.
- Therefore, as preparations for the investigation, **PCV water level will be lowered and permanent monitoring instruments will be removed after which the investigation devices will be attached and the investigation performed.**
- After the investigation is completed, the investigation devices will be removed and the permanent monitoring instruments will be reinstalled.



[Reference] Lowering water levels in conjunction with the PCV internal investigation

- The Unit 3 PCV water level is being kept at T.P.8264~9264 (Between permanent monitoring instruments L1~L2) and is currently at approx. T.P.8600.
- At this current water level, the CRD replacement opening, which is the access route into the pedestal, is submerged so the water level will be lowered to approximately T.P.7300 (the height of the platform) in order to expose the opening.
- Based on past experience, we know that it is highly possible that the RPV/PCV temperature gauge readings will fluctuate in conjunction with water level reductions. Therefore, a hold point will be established at approximately T.P. 8000 water level. If a change is confirmed, a temperature gauge reliability assessment will be conducted in accordance with a predetermined procedure as necessary.
- We will start decreasing the water level gradually from September with expected completion around October.



Drone flightpath and water levels during the investigation of the inside the pedestal (Concept diagram)