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

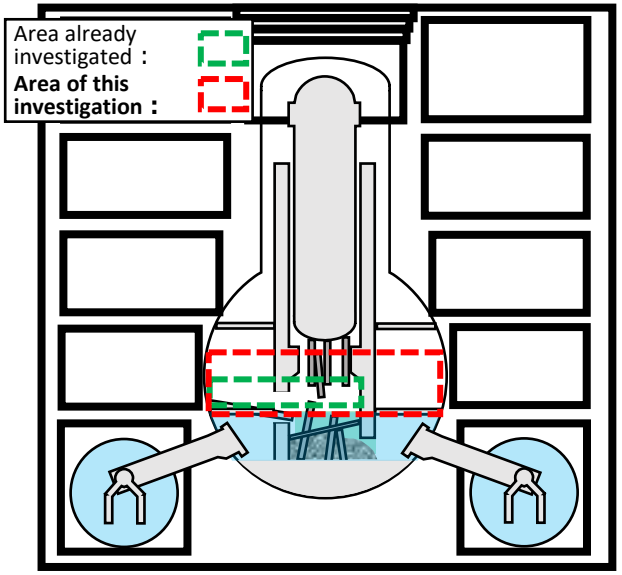
March 26, 2026

TEPCO

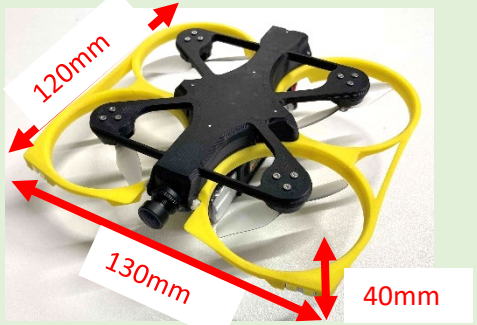
Tokyo Electric Power Company Holdings, Inc.

1. Summary

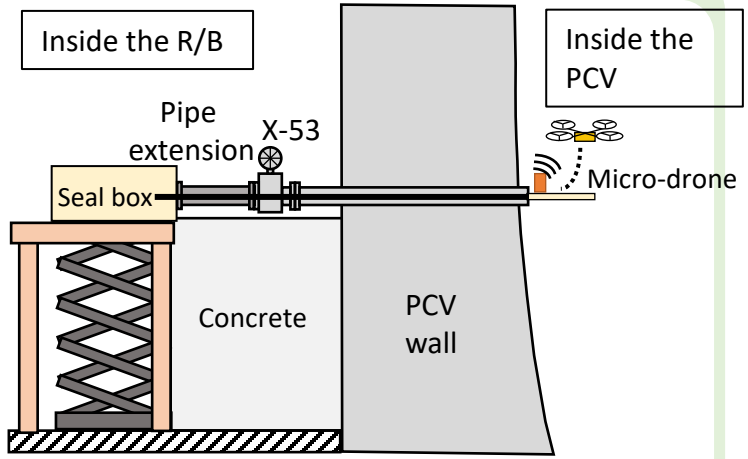
- In July 2025 we announced that we were deliberating design plans for the retrieval of fuel debris from Unit 3, and **that more information needs to be gathered about the inside of the PCV as we prepare for full-scale debris retrieval**.
- However, the water level inside the PCV has remained high since 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



Use: Photography (2.7K)
Dimensions: 130×120×40[mm]
Weight:95[g](Including battery)
Flight time: Approx. 13min. (Investigation is planned to take 10min.)



Inserted through the small X-53 penetration (Diameter: Approximately 140mm)

Concept diagram of Unit 3 micro-drone investigation

2. Investigation history

- Investigations were conducted for **11 days** as planned and a total of **21 flights** were made。
- We were able to obtain **important data (conditions around the X-6 penetration and inside the pedestal) needed to deliberate fuel debris retrieval methods**, which was the main objective of these investigations, and we were also able to implement investigations that focused on specific targets.
- During the investigation period, we did not experience any malfunctions with the insertion devices, nor any drone crashes.

【Planned】 Investigation schedule (Investigation period: 11 days, Maximum number of flights: 21)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11
Area	Outside pedestal	Outside pedestal	Outside pedestal	Outside pedestal	Inside pedestal	Inside pedestal	Inside pedestal	Added	Added	Added	Added
Type	Initial	Point cloud footage	Focal point	Focal point	Initial/Point cloud footage	Focal point	Focal point	Added	Added	Added	Added
First drone	Counter-clockwise (Horizontal)	South side (Horizontal)	South side (Horizontal)	CRD opening (Horizontal)	Initial (Horizontal)	Bottom (Vertical)	Upper① (Vertical)	※1	※1	※1	※1
Second drone	Clockwise (Horizontal)	North side (Horizontal)	North side (Horizontal)	X-6 penetration (Horizontal)	Point cloud conversion (Horizontal)	Middle (Vertical)	Upper② (Vertical)	※1	※1	※1	※2

【Actual】 Investigation schedule (Investigation period: 11 days, Number of flights: 21)

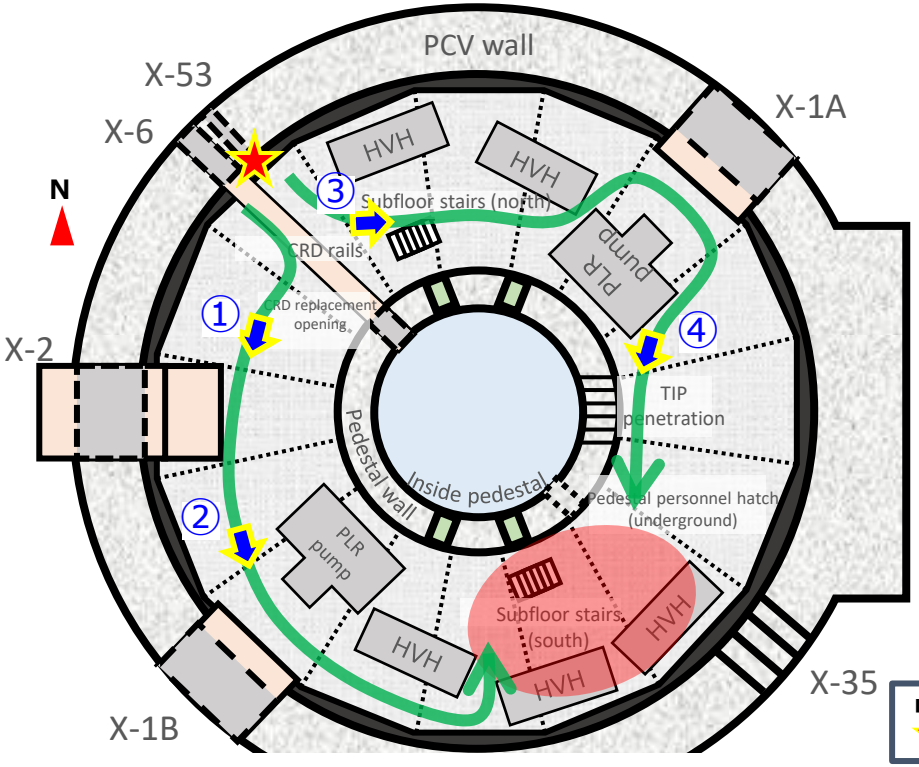
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11
Area	Outside pedestal	Outside pedestal	Outside pedestal	Outside pedestal	Inside pedestal	Inside pedestal	Inside pedestal	In/Outside pedestal	Inside pedestal	In/Outside pedestal	In/Outside pedestal
Type	Initial	Point cloud footage	Focal point	Focal point	Initial/Point cloud conversion	Focal point	Focal point	Additional investigation	Additional investigation	Additional investigation	Additional investigation
First drone	Counter-clockwise (Horizontal)	South side (Horizontal)	South side (Horizontal)	CRD opening (Horizontal)	Initial (Horizontal)	Bottom (Vertical)	Upper① (Vertical)	Inside X-6 Outside pedestal and other areas (Vertical)	Inside pedestal Bottom/Middle (Vertical)	Outside pedestal Point cloud footage (Vertical)	For estimating dose rates (Vertical)
Second drone	Clockwise (Horizontal)	North side (Horizontal)	North side (Horizontal)	X-6 penetration (Horizontal)	Point cloud footage (Horizontal)	Middle (Vertical)	Upper② (Vertical)	Inside pedestal Top (Vertical)	Around the bottom of the RPV (Vertical)	Inside pedestal Point cloud conversion (Vertical)	※2

※1: The plan was to perform additional investigations based on the results of the investigations from the previous seven days.

※2: On the last day, a dosimeter was placed on the TOL pad for the second drone, meaning second drone was not flown.

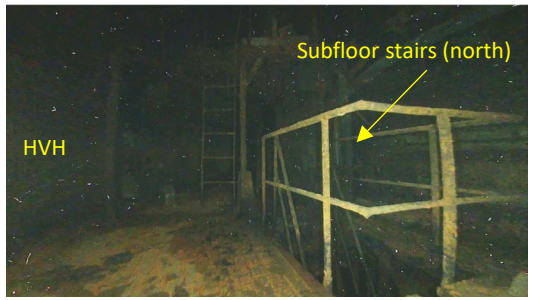
3. Conditions outside the pedestal

- **Fog conditions:** As with Unit 1, fog was seen **outside the Unit 3 pedestal** (visibility was approx. 3m).
- **Ease of radio communication :** It was confirmed that **communications are poor** in the southeast area across from the X-53 penetration where the radio was.
- **Component damage/Obstructions check:** No significant damage or obstructions were seen. (rust and fallen insulation were seen)
- **Flight history:** Excluding the southeast area where comms was poor, flights were implemented clockwise and counterclockwise around the D/W1FL area.
- **Point cloud footage:** The horizontal and vertical cameras were used to take footage for point cloud. Point cloud footage will be implemented going forward.
- **Dose rate: Dose rates in the vicinity of the X-53 penetration were approx. 0.6Gy/h (γ-rays).** The dose rates outside the entire pedestal will be estimated using radiation noise on the recorded footage.

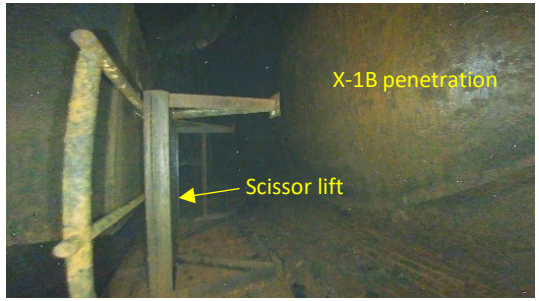


Plainview diagram of proposed flight route on the first floor of the Unit 3 D/W

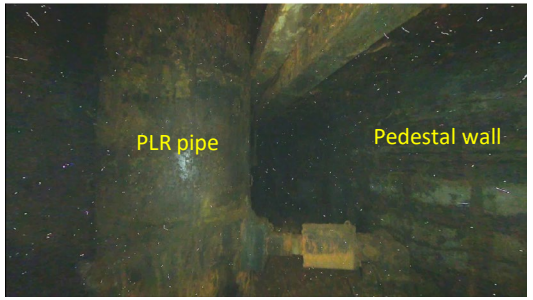
①:Outside the pedestal Northwest area



③:Outside the pedestal North area



②:Outside the pedestal Southwest area



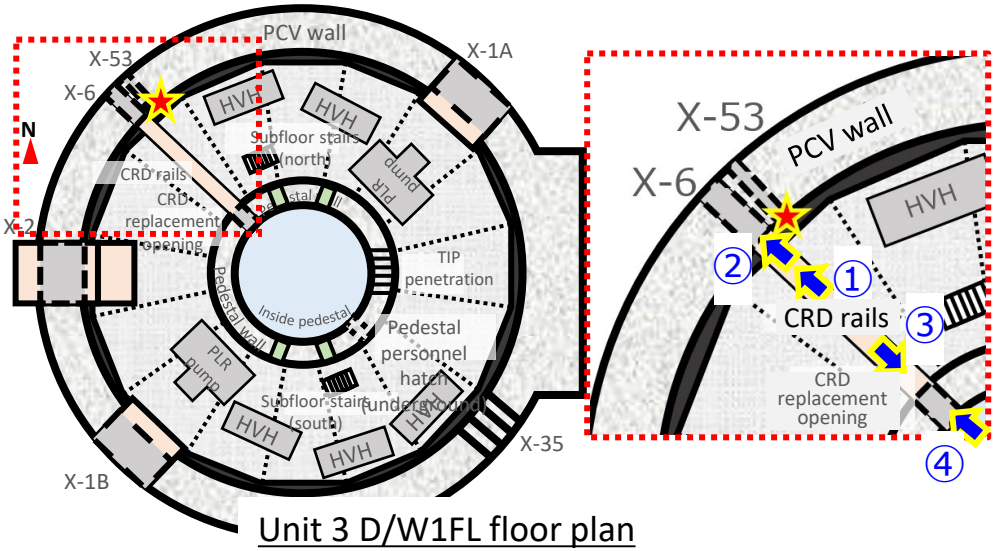
④:Outside the pedestal East area

■Legend
: Radio and drone takeoff/landing position : Ease of radio communication : Low :Flight route

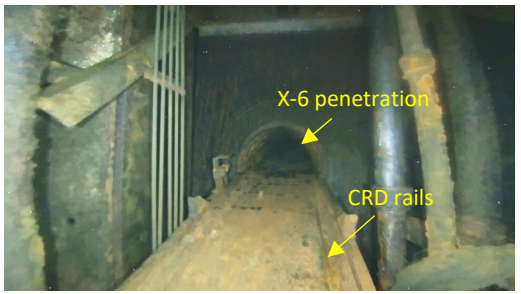
※This document presents the results for the areas where footage was recorded during this investigation.
※ The locations of obstructions, the diagram legend and the direction of photographs are all approximate. The names of structures seen in the photographs are all assumptions assumed valid at current time.

4. Results of focused investigations outside pedestal (around the X-6 penetration)

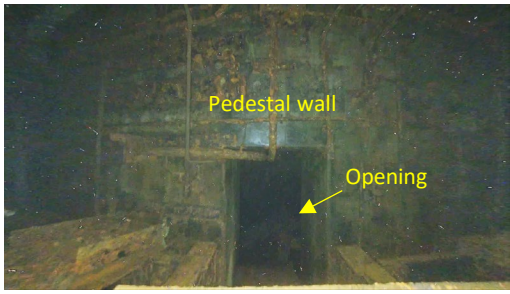
- **X-6 penetration**: No obstructions were found in the vicinity of the penetration. **There are cables throughout the entire penetration** but no deposits like those found at Unit 2 were seen within the areas captured in this investigation.
- **CRD rails**: **No significant damage or obstructions were seen,** but a level difference was found.
- **CRD replacement opening**: **No obstructions were found in the vicinity of the opening.**



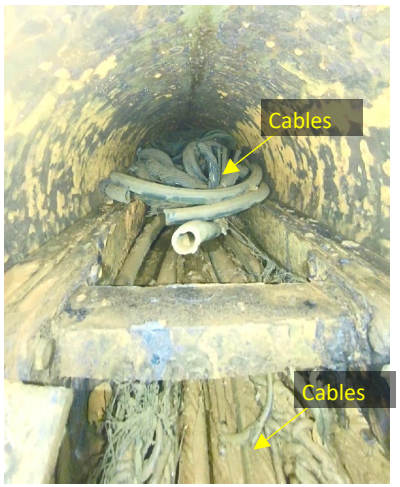
Unit 3 D/W1FL floor plan



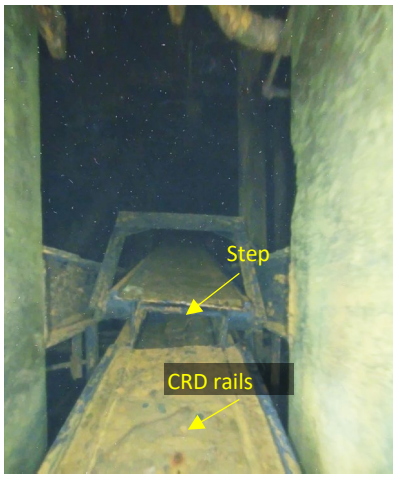
①:External view of X-6 penetration



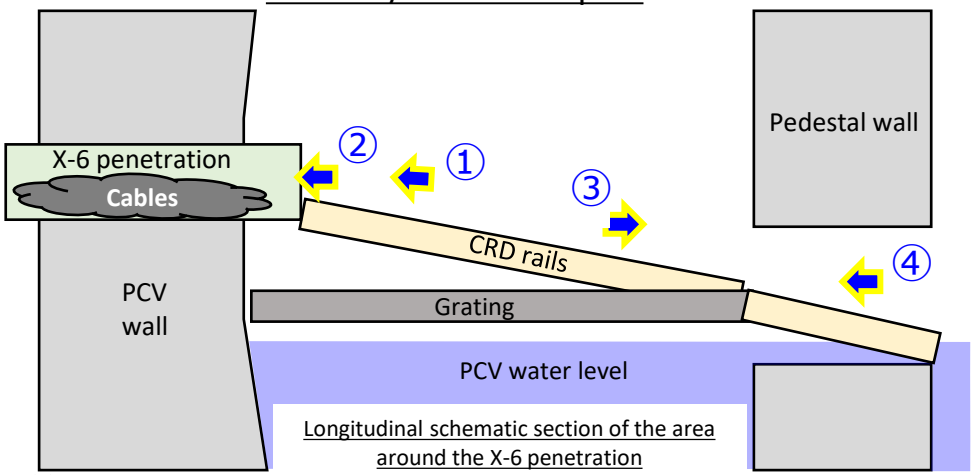
③: External view of CRD replacement opening



②:Inside the X-6 penetration



④:CRD rails level difference area



Longitudinal schematic section of the area around the X-6 penetration

■Legend
★: Radio and drone takeoff/landing position

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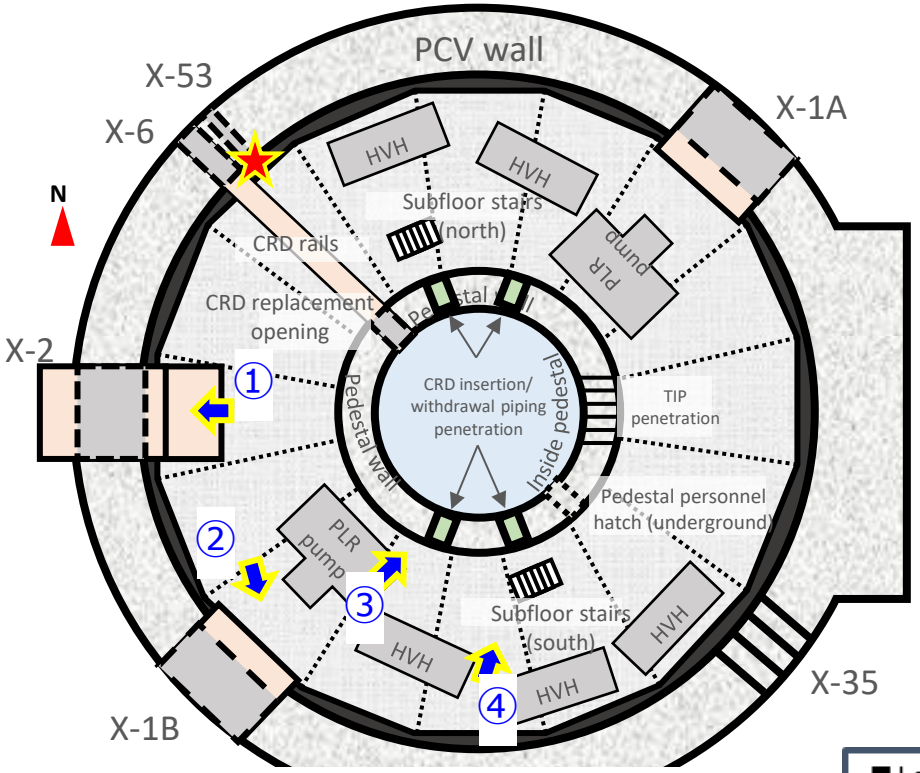
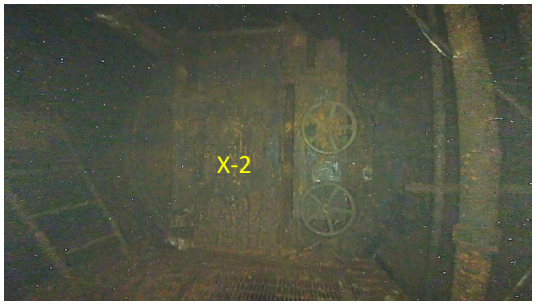
5. Results of focused investigation outside pedestal（South side area)

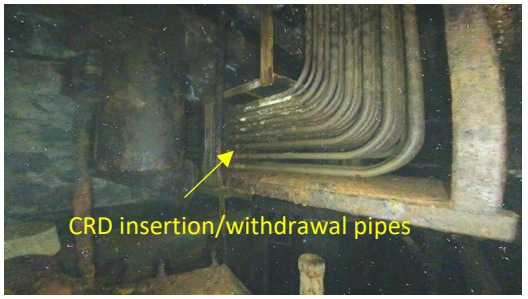
- **X-2 penetration、X-1B penetration**: **No obstructions nor damage or deformation** of the penetration were found.
- **CRD insertion/withdrawal pipes (south)**: **No damage or deformation** of the pipes on the southwest side were found. Communications were poor in the aforementioned area on the southeast side so no confirmation was possible because the area could not be flown.
- **Subfloor stairs (south)**: **No obstructions nor damage or deformation** of the stairs were found.
- **X-35 penetration**: Communications in the southeast area outside the pedestal were poor, so no confirmation was possible because the area could not be flown.



Plainview diagram of proposed flight route on the first floor of the Unit 3 D/W



①:X-2 penetration



③:CRD insertion/withdrawal pipes (Southwest)

②:X-1B penetration

④:Subfloor stairs (South)

■ Legend
★: Radio and drone takeoff/landing position

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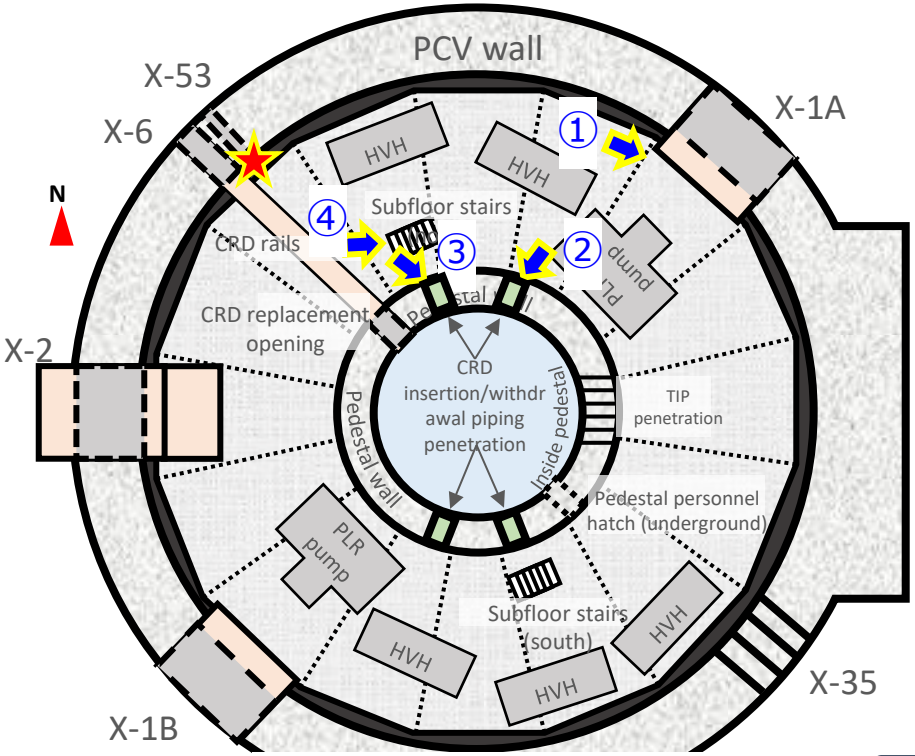
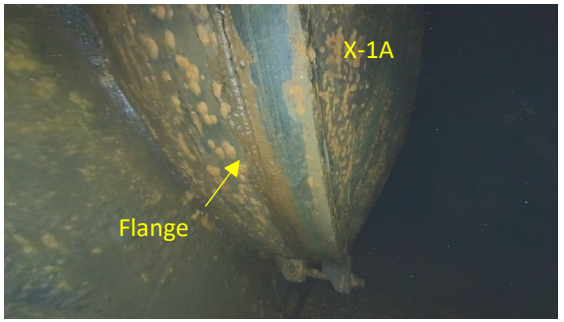
6. Results of focused investigation outside pedestal (North side area)

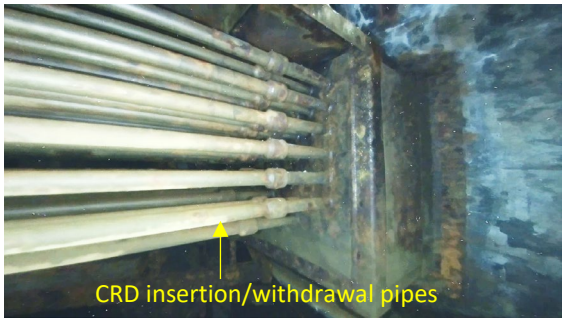
- **X-1A penetration**: **No obstructions nor damage or deformation** of the penetration were found.
- **CRD insertion/withdrawal pipes (North): No damage or deformation was found to the pipes** in the northwest and northeast.
- **Subfloor stairs (North)**: **No obstructions nor damage or deformation** of the stairs were found.



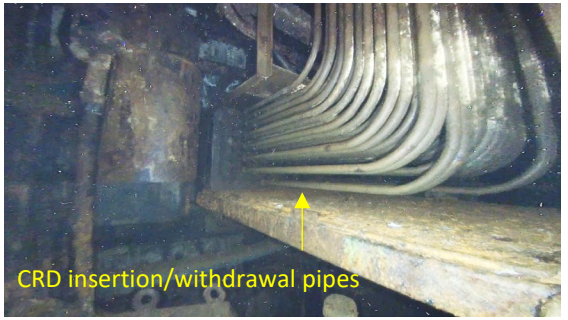
Plainview diagram of proposed flight route on the first floor of the Unit 3 D/W



①: X-2 penetration (Flange)



③: CRD insertion/withdrawal pipes (Northwest)



②: CRD insertion/withdrawal pipes (Northeast)

④: Subfloor stairs (North)

■ Legend
★: Radio and drone takeoff/landing position

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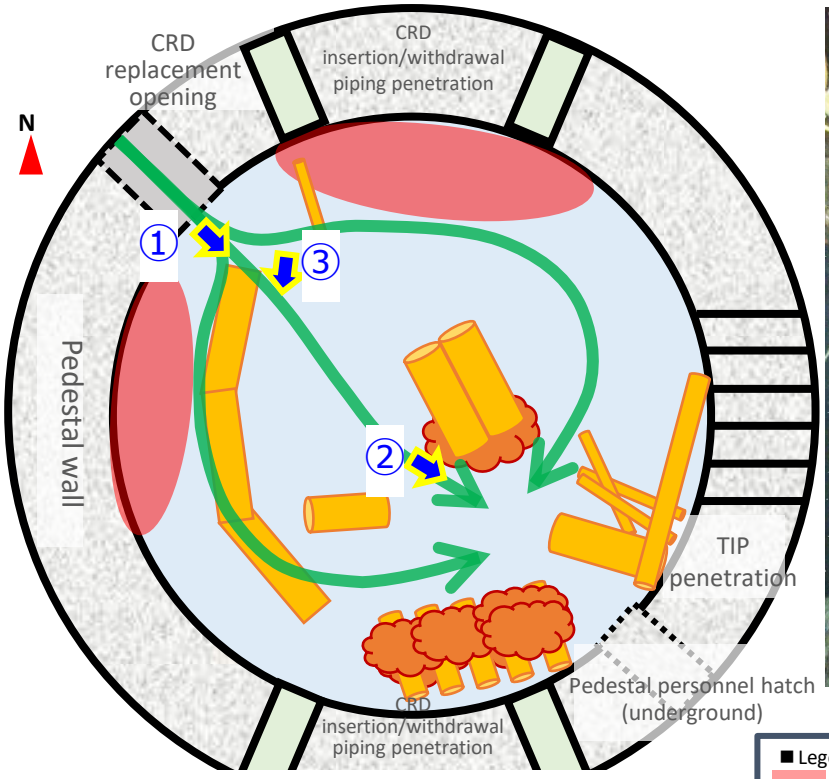
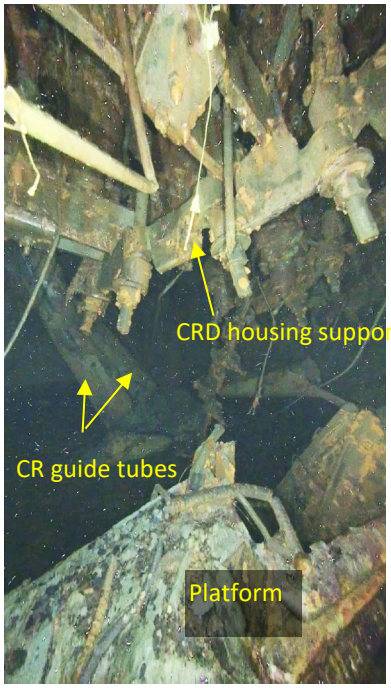
7. Conditions inside the pedestal

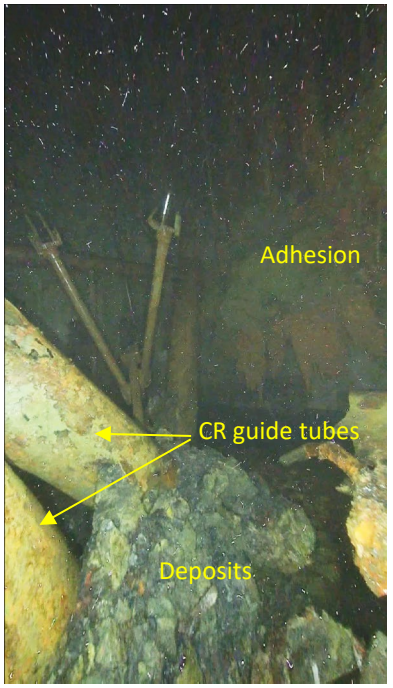
- **Fog conditions:** As with Unit 1, fog was seen **inside the Unit 3 pedestal** (visibility was approx. 3m)
- **Ease of radio communication: C**ommunications near the **CRD replacement opening,** which shadows the radio, **were poor.**
- **Component damage/Obstructions check :** We confirmed that the CRD housing and CR guide tubes have fallen (drone flight is possible).
- **Flight history:** Excluding the area near the CRD replacement opening where **c**ommunications were poor, **flights were implemented in clockwise, counterclockwise, and inward (toward the center) directions.**
- **Point cloud footage:** The horizontal and vertical cameras were used to take footage for point cloud. Point cloud footage will be implemented going forward.
- **Dose rate:** The dose rates outside the entire pedestal will be estimated using radiation noise on the recorded footage.



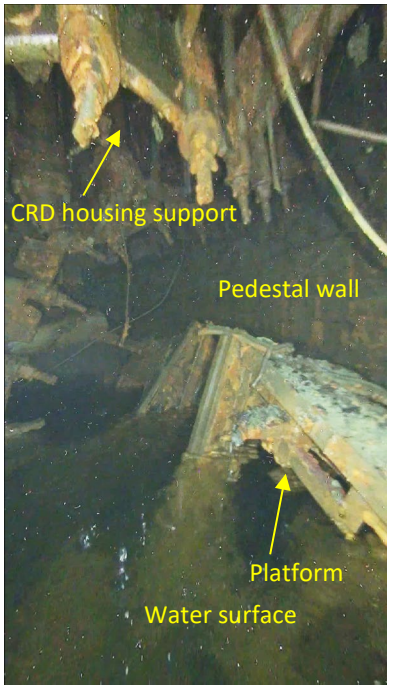
Plainview diagram of Unit 3 inside the pedestal



①: Towards the center



②: Towards the southeast



③: Towards the southwest

■ Legend
:Ease of radio communication : Low
:Flight route
:Primary obstruction
:Deposits/Adhesions

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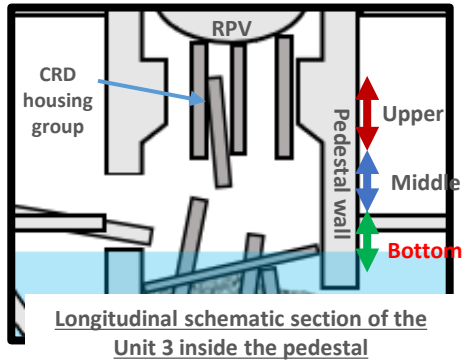
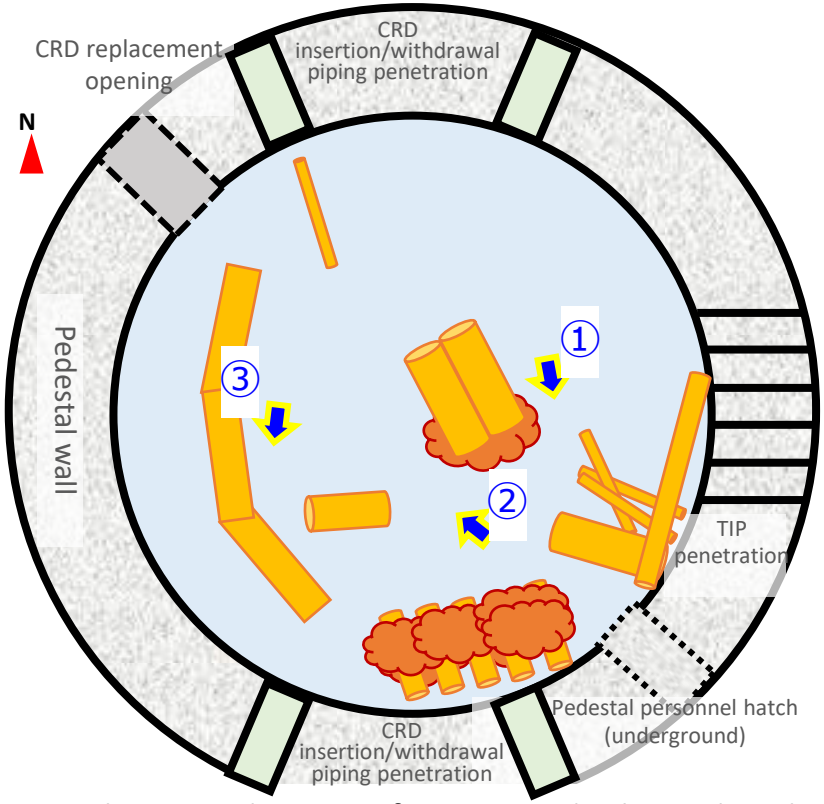
8. Results of focused investigation inside pedestal (Bottom)

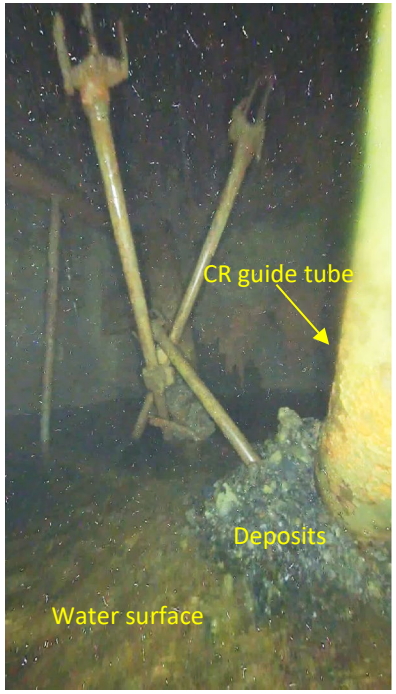
- **Deposits**: **Deposits were found at the base of the CR guide tubes in the middle.** It is assumed that there are CR guide tubes in the water as well.
- **Fallen structures: CR guide tubes,** which are structures in the RPV**, were found**
- **CRD replacement machine related equipment: Deformation of the platform was found.** The presence of other equipment is currently being reviewed through detailed analysis of the footage.
- **Water in the PCV:** By comparing the height of the water surface with the surrounding structures, it was confirmed that the water level inside the PCV is consistent with the value converted from the S/C pressure gauge (and the level outside the pedestal is approximately the same).



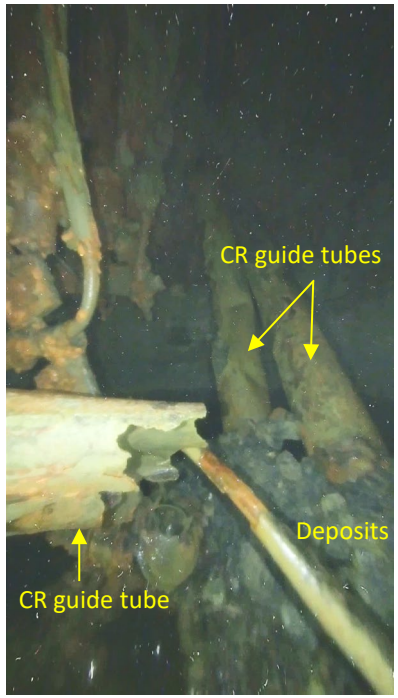
Longitudinal schematic section of the Unit 3 inside the pedestal



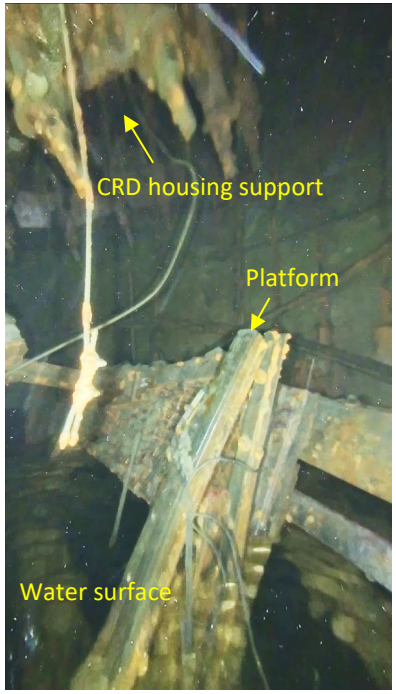
Plainview diagram of Unit 3 inside the pedestal



①:Deposits



②: Fallen structures



③: CRD replacement machine related equipment (Platform)

■Legend
:Primary obstruction :Deposits/Adhesions

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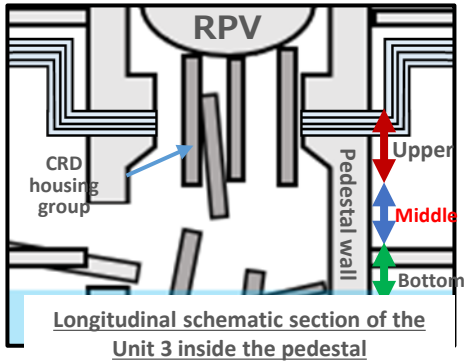
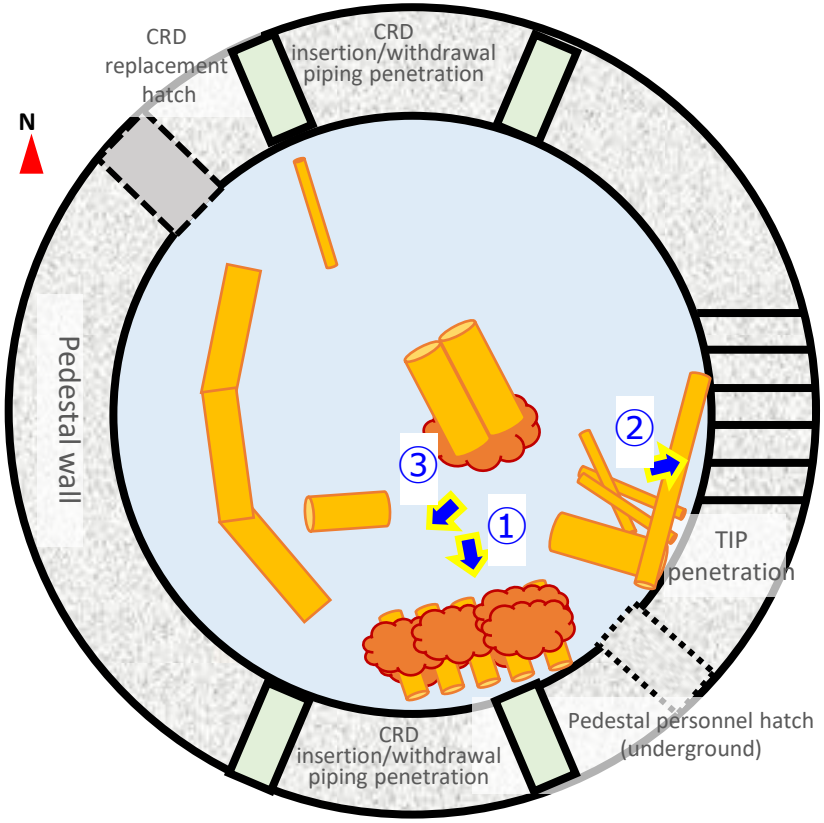
9. Results of focused investigation inside pedestal (Middle)

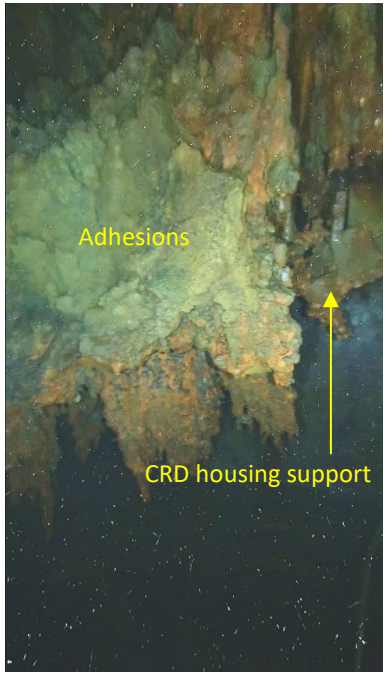
- **Adhesions**: **The CRD housing group on the south side was found to have clump-like adhesions.**
- **Pedestal wall surface**: **No significant damage was seen** within the scope of photography
- **TIP penetration**: The index tube was confirmed to be damaged
- **Fallen structures: The CRD housing group,** which is a RPV bottom structure**, was found to be tilted**



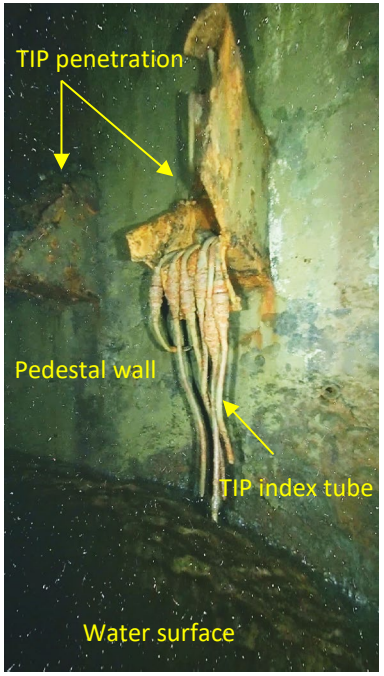
Longitudinal schematic section of the Unit 3 inside the pedestal



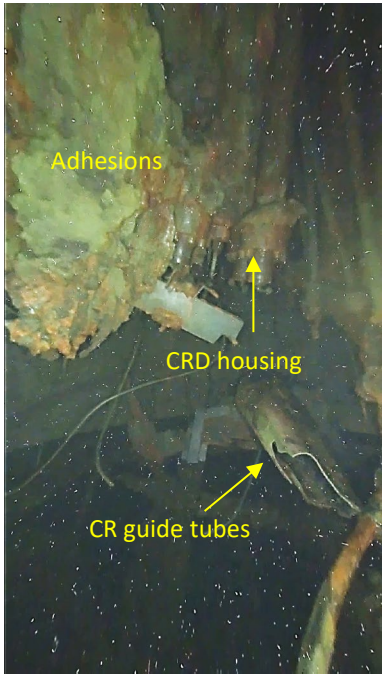
Plainview diagram of Unit 3 inside the pedestal



①:Adhesions



②:TIP penetration and Pedestal wall



③: Fallen upper structures (CRD housing group)

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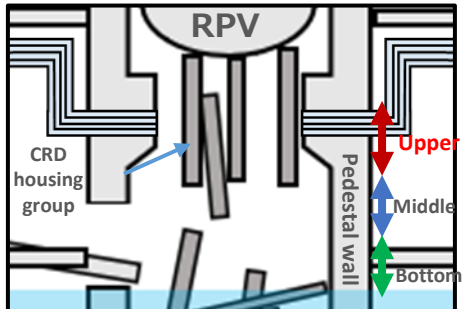
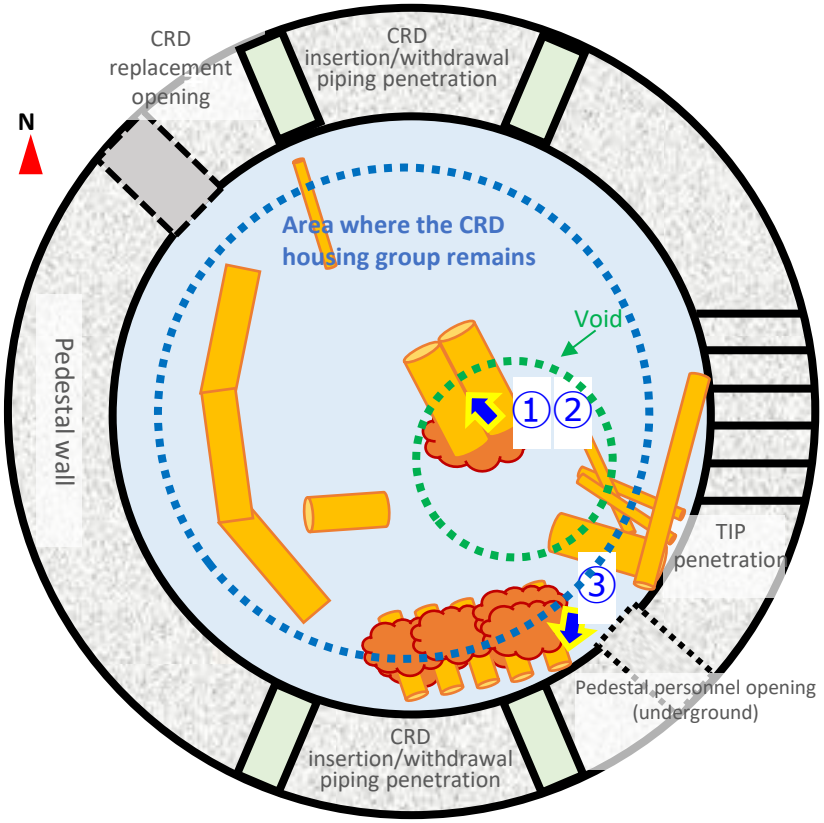
10. Results of focused investigation inside pedestal (Upper)

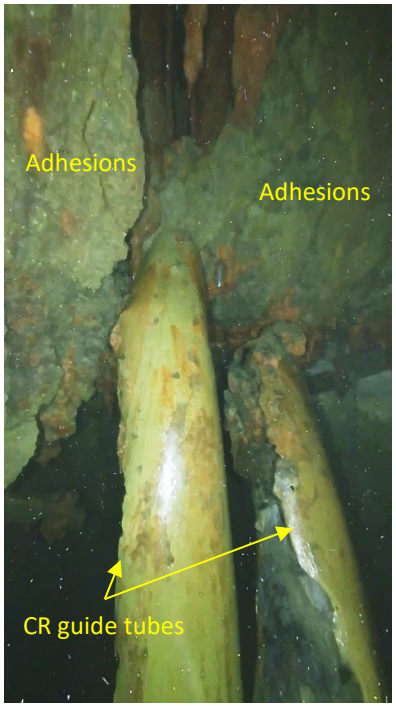
- **Adhesions**: **Clump-like adhesions found on the CRD housing group** located the middle to the southeast
- **CRD housing group:** Although tilting and deformation are observed, most of the structures remain near their original positions. **Voids were found in the upwards direction from the middle to the southeast.**
- **CRD insertion/withdrawal pipes**: Only the southeast portions could be photographed, and **pipe damage was found.**



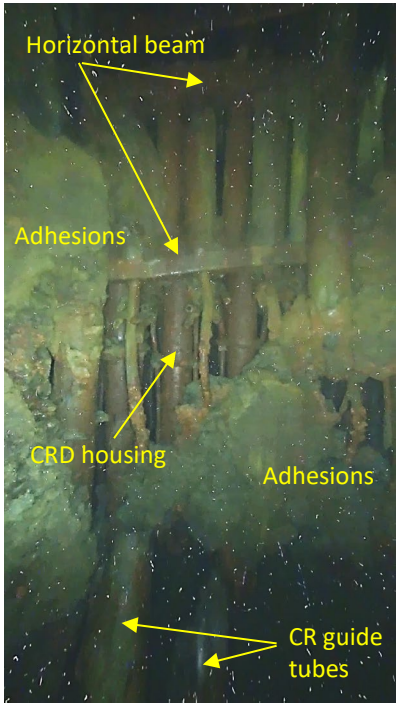
Longitudinal schematic section of the Unit 3 inside the pedestal



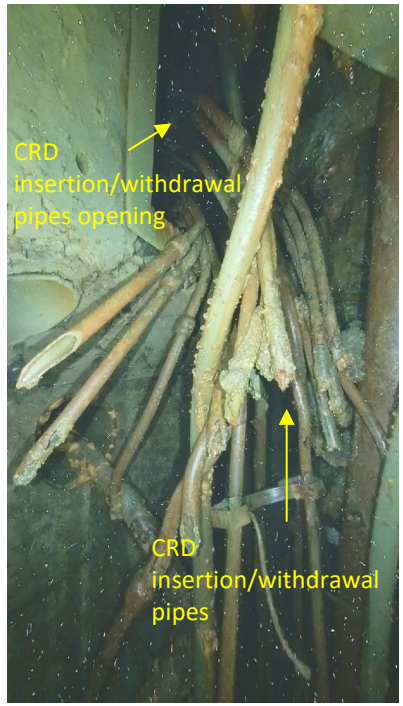
Plainview diagram of Unit 3 inside the pedestal



①:Below arrow



②:Above arrow



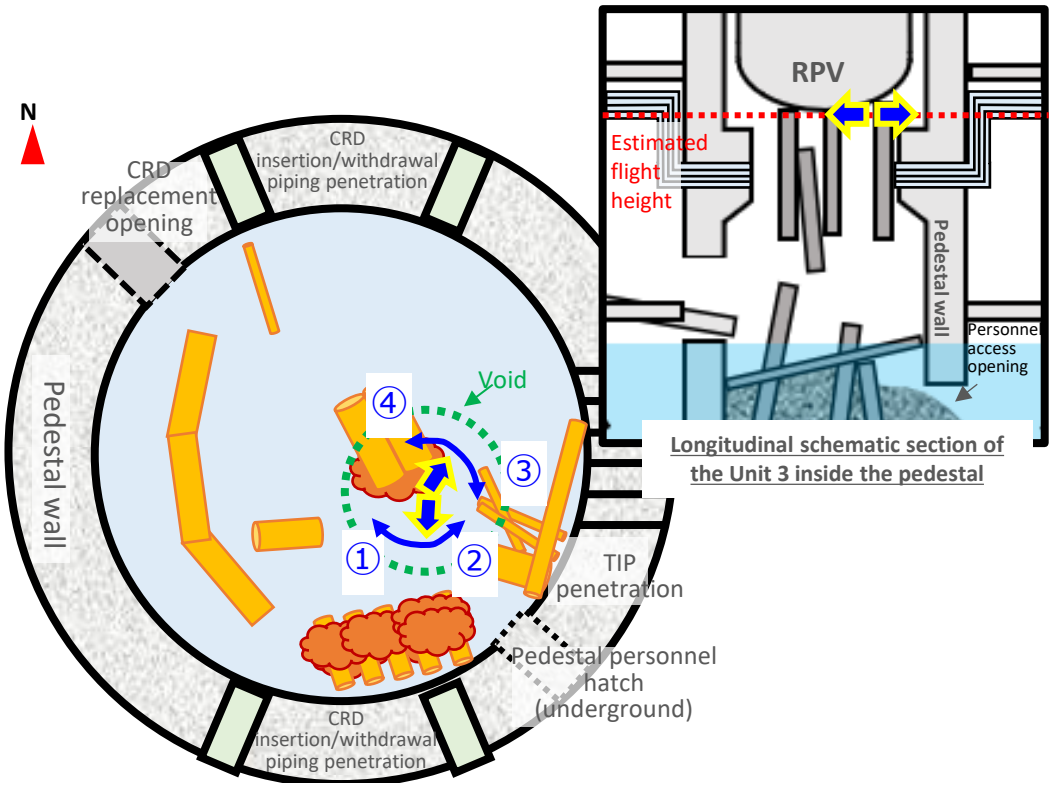
③:CRD insertion/withdrawal pipe (Southeast)

■Legend
:Primary obstruction :Deposits/Adhesions

※This document presents the results for the areas where footage was recorded during this investigation.
※ The locations of obstructions, the diagram legend and the direction of photographs are all approximate. The names of structures seen in the photographs are all assumptions assumed valid at current time.

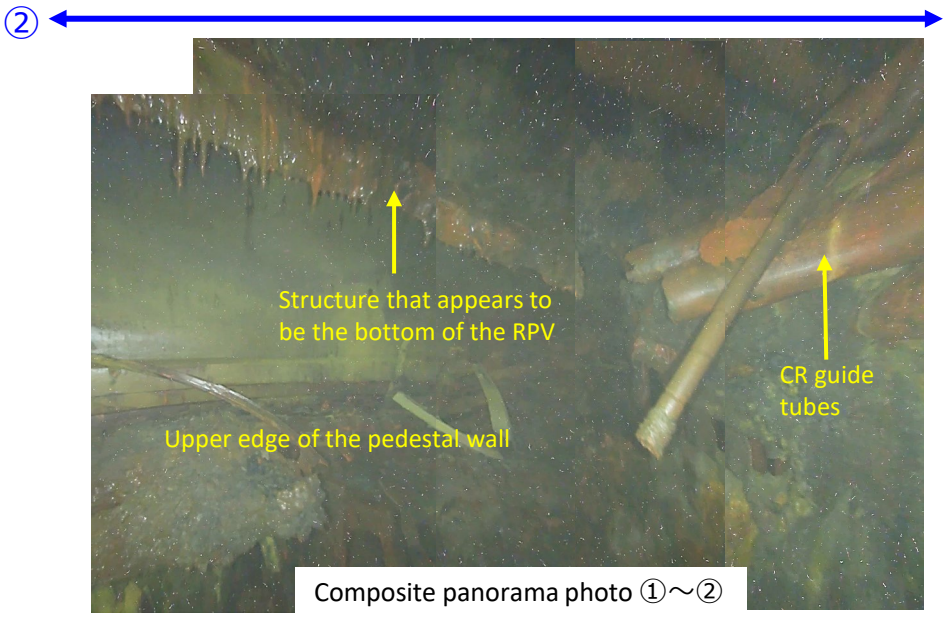
11. Results of the investigation near the bottom of the RPV inside the pedestal

- **Footage from the vicinity of the bottom of the RPV** was acquired by flying the drone as high as communications would allow from the void seen during the investigation of the top.
- **A structure that could be the bottom of the RPV and lying CR guide tubes were seen.**
- It is assumed that there is a void further up.

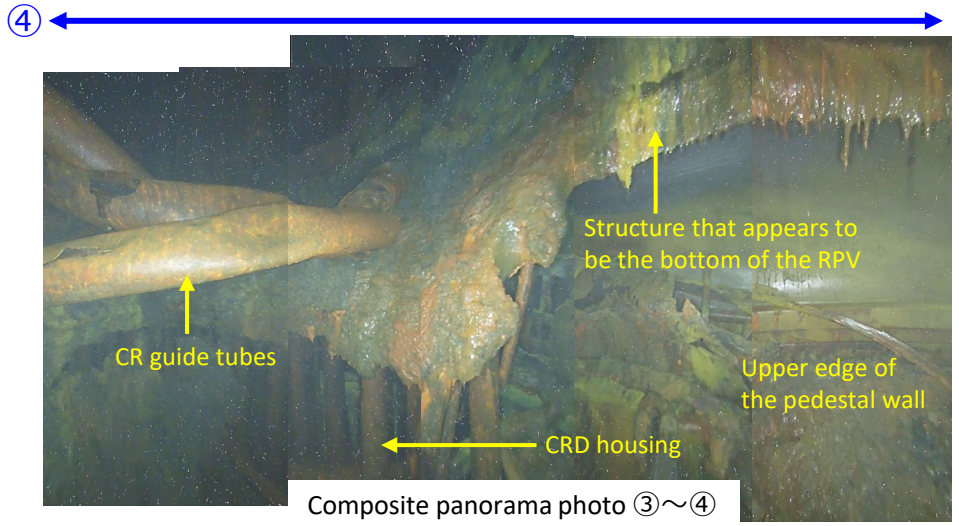


Plainview diagram of Unit 3 inside the pedestal

Longitudinal schematic section of the Unit 3 inside the pedestal



Composite panorama photo ①～②



Composite panorama photo ③～④

■Legend
:Primary obstruction :Deposits/Adhesions

※This document presents the results for the areas where footage was recorded during this investigation.
※ The locations of obstructions, the diagram legend and the direction of photographs are all approximate. The names of structures seen in the photographs are all assumptions assumed valid at current time.

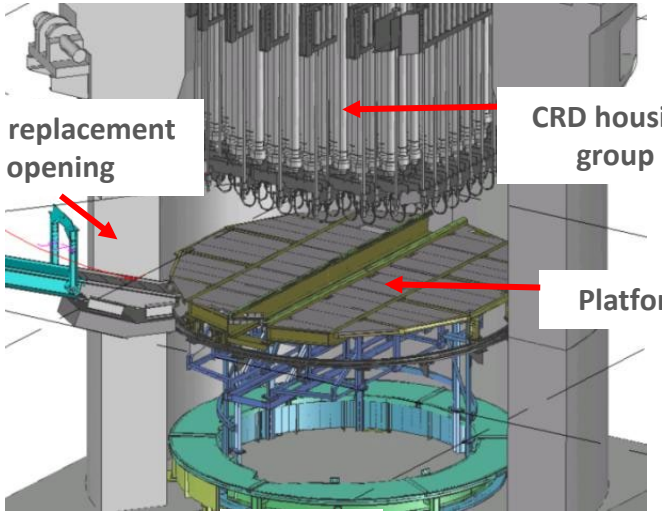
12. Future plans

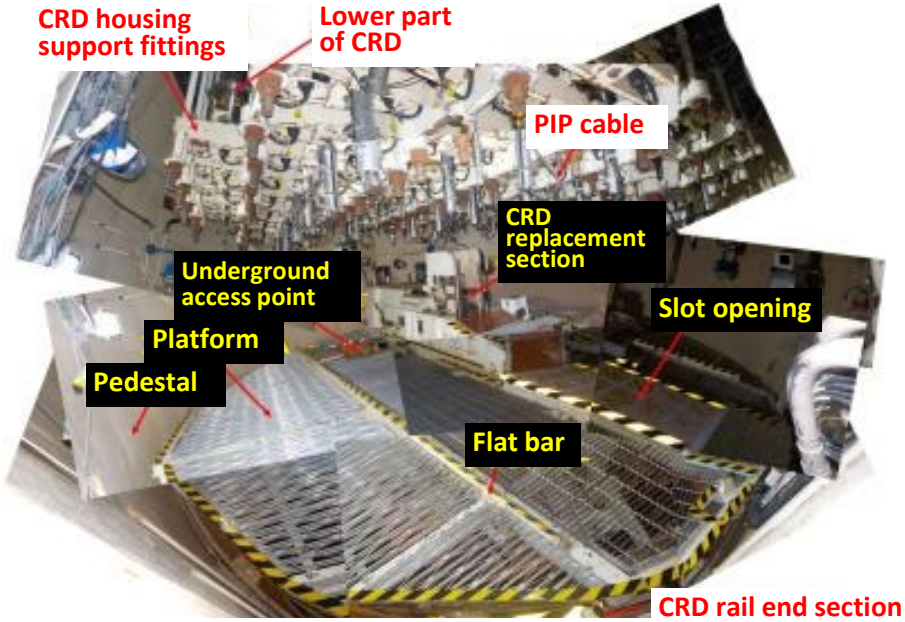
- The following analysis will be performed based on the acquired footage:
  - **Structure identification**: The obtained footage will be examined in detail to identify the fallen and deformed structures.
  - **Point cloud conversion of footage**: The footage acquired from inside and outside the pedestal will be used to generate a point cloud.
  - **Dose rate estimates**: The dose rates measured in the vicinity of the X-53 penetration and the radiation noise from footage will be compared to estimate dose rates inside and outside the pedestal.

- The data from inside the PCV obtained through this investigation will be combined and reflected them in future internal investigations.
  - **The effect of the camera anti-fogging measures**: As the camera anti-fogging measure what a repellent was applied the camera lenses and lenses were kept warm until liftoff. This greatly reduced fogging.
  - **Comms conditions inside the PCV**: Compared with Unit 5 communications conditions inside the Unit 3 PCV were poor. It is assumed that this is because the signal is being absorbed by the water inside the PCV.
  - **The effect of the vertical camera**: It was confirmed that, even in the PCV environment, the drone could fly while avoiding obstacles in the same manner as with the horizontal camera. It was also verified that adequate illumination reached both upward and downward directions, allowing clear images to be captured.

[Reference] The structures inside the pedestal and inside the RPV (Reactor Pressure Vessel)

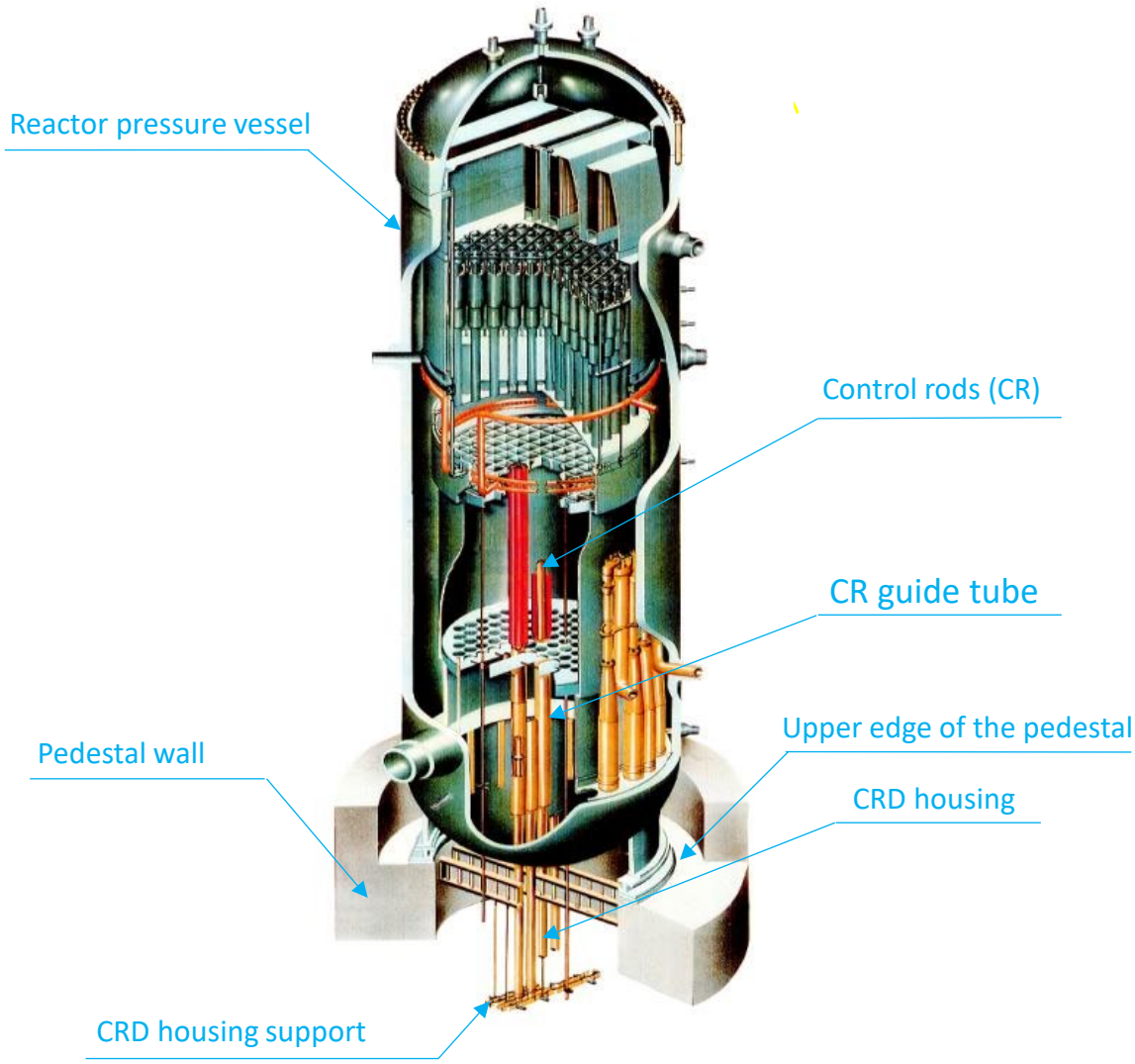
Structures inside the pedestal





[Reference] Inside the Unit 5 pedestal

Structures inside the RPV (Reactor Pressure Vessel)



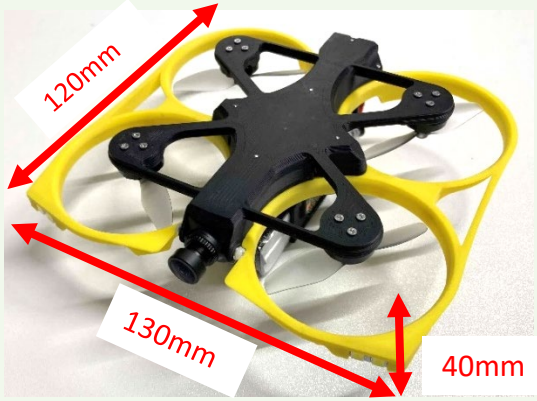
[Reference] Released video of the Unit 3 PCV Internal Investigation (non-submerged area) using Micro-drones

- Released video on March 12, 2026 Outside the pedestal area
  - https://www4.tepco.co.jp/en/news/library/archive-e.html?video_uuid=15798&catid=69631
- Released video on March 19, 2026 Inside the pedestal
  - https://www4.tepco.co.jp/en/news/library/archive-e.html?video_uuid=15806&catid=69631
- Released video on March 19, 2026 Area near the bottom of the reactor pressure vessel
  - https://www4.tepco.co.jp/en/news/library/archive-e.html?video_uuid=15807&catid=69631

[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

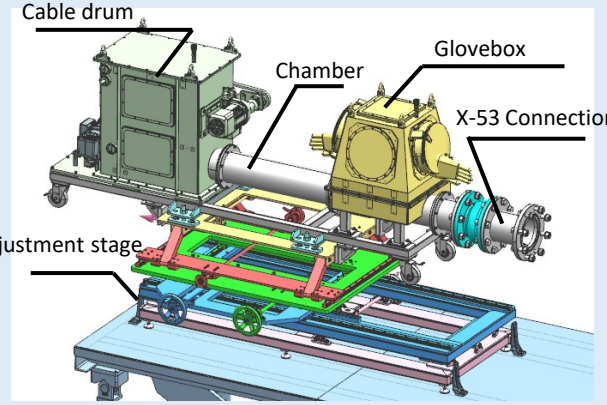


Diagram of Seal box

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

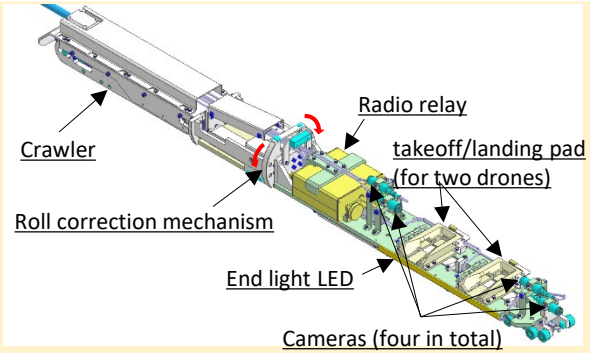


Diagram of installation equipment

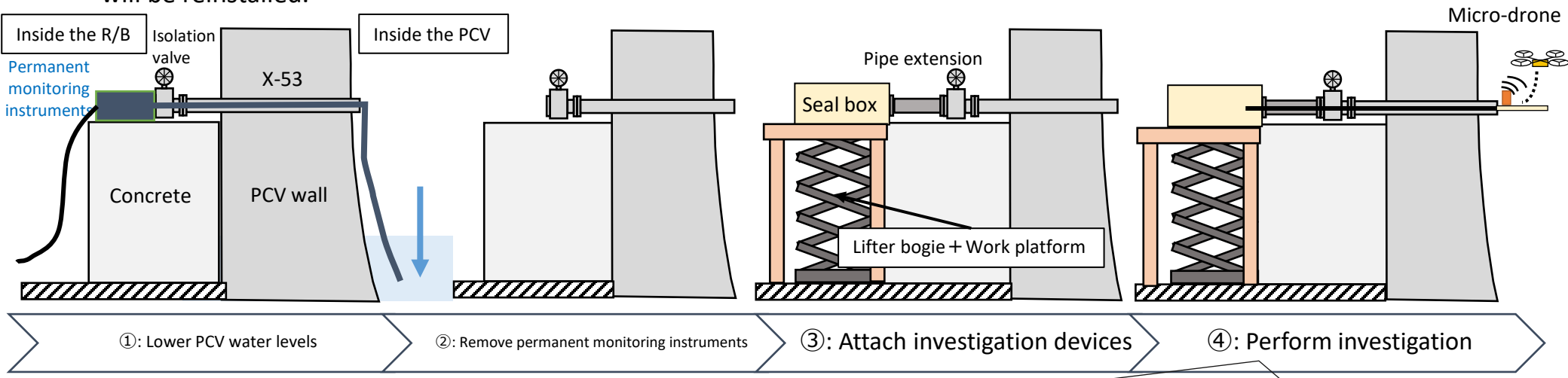
The crawler enables self-installation thereby reducing worker exposure.

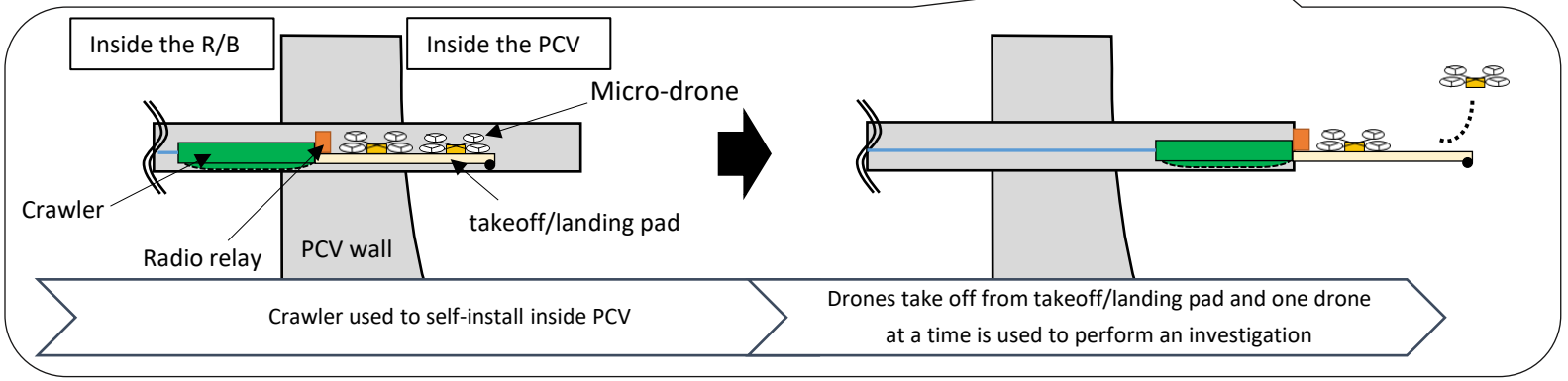
Two drones can be installed simultaneously.

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.





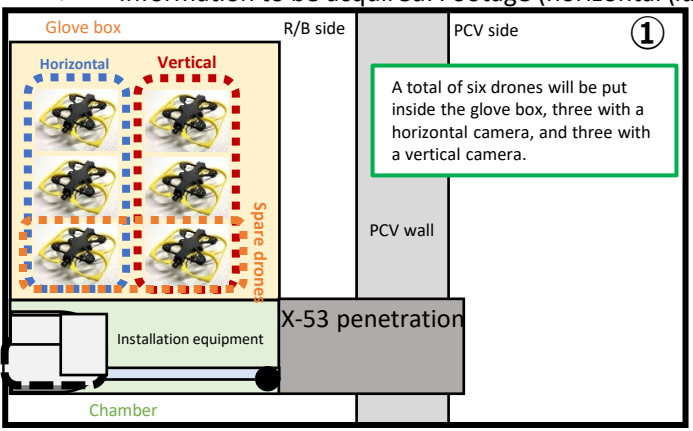
[Reference] Investigation plan ~Information on the entire investigation①~

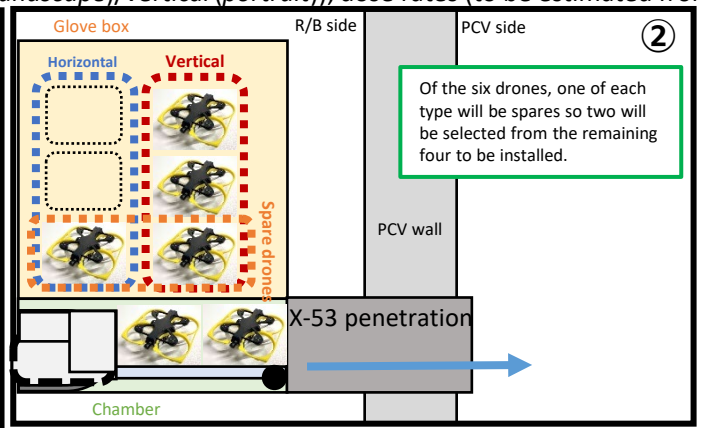
- Investigation details and flight routes will be created for each flight based on Mockup/training results.
- The method by which drones are to be used will be determined based on worker exposure doses and the radiation resistance of drones.

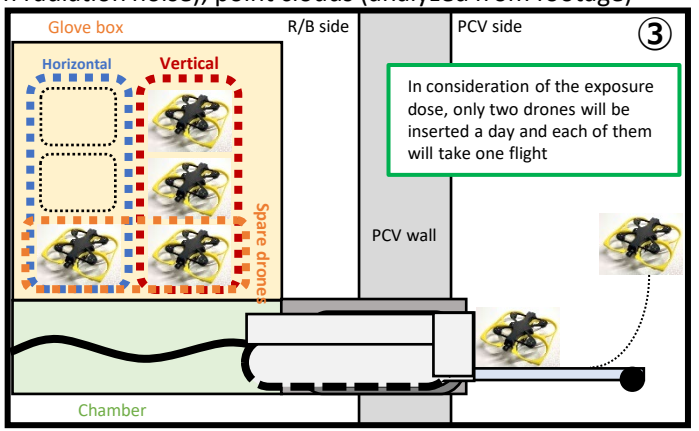
【Main objective】

Collect information in the vicinity of the X-6 penetration and inside the pedestal which will be important for accessing from the side to perform deposit investigations and retrieve fuel debris.

➢ Information to be acquired: Footage (horizontal (*landscape*)/vertical (*portrait*)), dose rates (to be estimated from radiation noise), point clouds (analyzed from footage)







Planned drone usage: One installation per day consisting of two flights with two out of the six drones to be used as spares

Investigation schedule※1(Investigation period: 11 days; Maximum number of flights: 21)

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11
Area	Outside pedestal	Outside pedestal	Outside pedestal	Outside pedestal	Inside pedestal	Inside pedestal	Inside pedestal	Added	Added	Added	Added
Type	Initial	Point cloud footage	Focal point	Focal point	Initial/ Point cloud footage	Focal point	Focal point	Added	Added	Added	Added
First drone	Counter-clockwise (Horizontal)	South side (Horizontal)	South side (Horizontal)	CRD hatch (Horizontal)	Initial (Horizontal)	Bottom (Vertical)	Top① (Vertical)	※2	※2	※2	※2
Second drone	Clockwise (Horizontal)	North side (Horizontal)	North side (Horizontal)	X-6 penetration (Horizontal)	Point cloud creation (Horizontal)	Middle (Vertical)	Top② (Vertical)	※2	※2	※2	※3

※1： The investigation period will be decided based on the radiation resistance of the drone. The order, number of days, and investigation details may be changed in accordance with field conditions.
※2： The scope of the additional investigation will be determined based on findings from the investigation up to the 7th day.
※3： On the final day, a dosimeter will be placed on the liftoff/landing pad for the 2nd drone, so the 2nd drone will not be flown.

[Reference] Investigation plan ~Information on the entire investigation ②~

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- Drone flights inside and outside the pedestal on the D/W1FL (hereinafter referred to as, “outside the pedestal”) can be broadly classified as **“Initial flights,” “point cloud footage flights,” and “focal point flights.”**
  - Initial flights: Investigations performed prior to the main investigation in order to determine the range of radio communications in new flight areas.
  - Point cloud footage flights: Used to obtain footage that can be used to improve the accuracy of point cloud data.
  - Focal point flights: Conduct detailed investigations in the areas identified in advance.
- “**Additional investigations**” shall be performed after the investigations of the outside and inside of the pedestal **in accordance with conditions inside the PCV.**
  - Additional investigations: Additional investigations implemented due to new knowledge gained during the investigations of the outside and the inside of the pedestal, and to perform tasks that time did not allow for during the original schedule.

1. Investigations outside the pedestal (4 days)

i. Initial flights: One flight around the entire circumference of the pedestal and one flight to focus on the PCV walls and the pedestal walls.
ii. Point cloud footage flights: One flight on the south side and one flight on the north side to obtain point cloud data around the outside of the entire pedestal.
iii. Focal point flights: Flights on the south side, north side, and around the X-6 penetration to acquire data on predetermined the areas identified.

2. Investigations inside the pedestal (3 days)

i. Initial flights: One flight around the entire inner circumference.
ii. Point cloud footage flights: Footage taken of the entire inside of the pedestal in order to form a point cloud.
iii. Focal point flights: Flights to be flown on the bottom, middle, and top areas in order to acquire data on predetermined the areas identified.

3. Additional investigations (4 days)

i. Additional investigations on new focal points and new knowledge.
ii. Additional investigations to perform tasks that time did not allow for during the investigations of the outside and inside of the pedestal mentioned above.

※：The order/investigation details may be changed in accordance with field conditions.