Unit 2 Primary Containment Vessel Internal Investigation

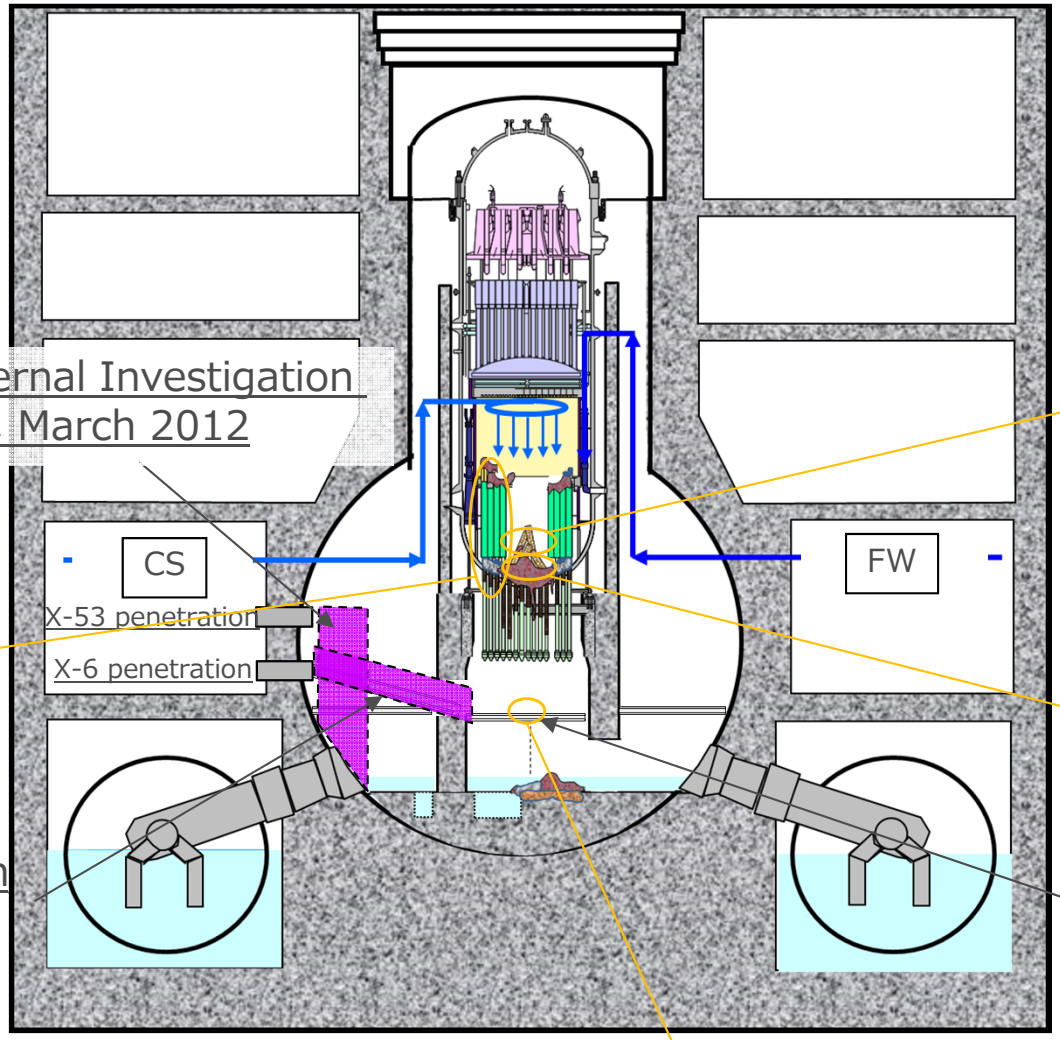
December 21, 2017

IRID TEPCO

Tokyo Electric Power Company Holdings, Inc.

1. Conditions inside the Unit 2 Primary Containment Vessel

- According to accident development analysis, it is assumed that part of the melted fuel fell to the plenum at the bottom of the Reactor Pressure Vessel (RPV) or onto the pedestal, with some still remaining in the core.



PCV Internal Investigation
January, March 2012

Muon measurement suggests that most of the fuel debris is at the bottom of the RPV.

Muon measurement suggests that there is fuel on the outer periphery of the core

It is assumed that there is a hole either at or near the center of the RPV based on the conditions of the surrounding CRD observed during the PCV Internal Investigation and from the damage seen to grating.

CRD Rail Investigation
August 2013

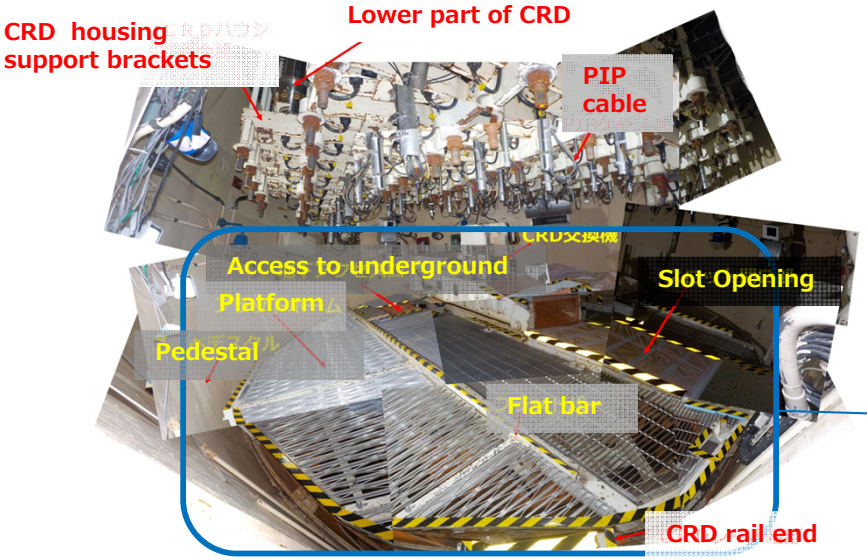
Pedestal Internal Investigation
January, February 2017

: Past Investigation Area

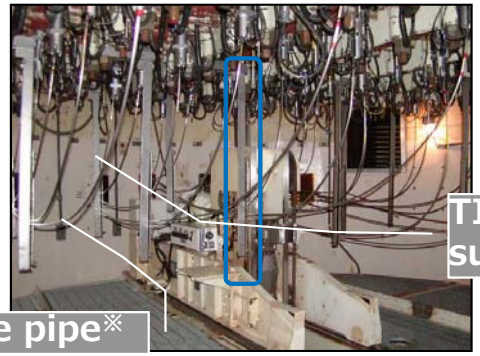
Steam was observed during the PCV Internal Investigation.

2. Primary Containment Vessel Internal Investigation results in Jan. – Feb. 2017

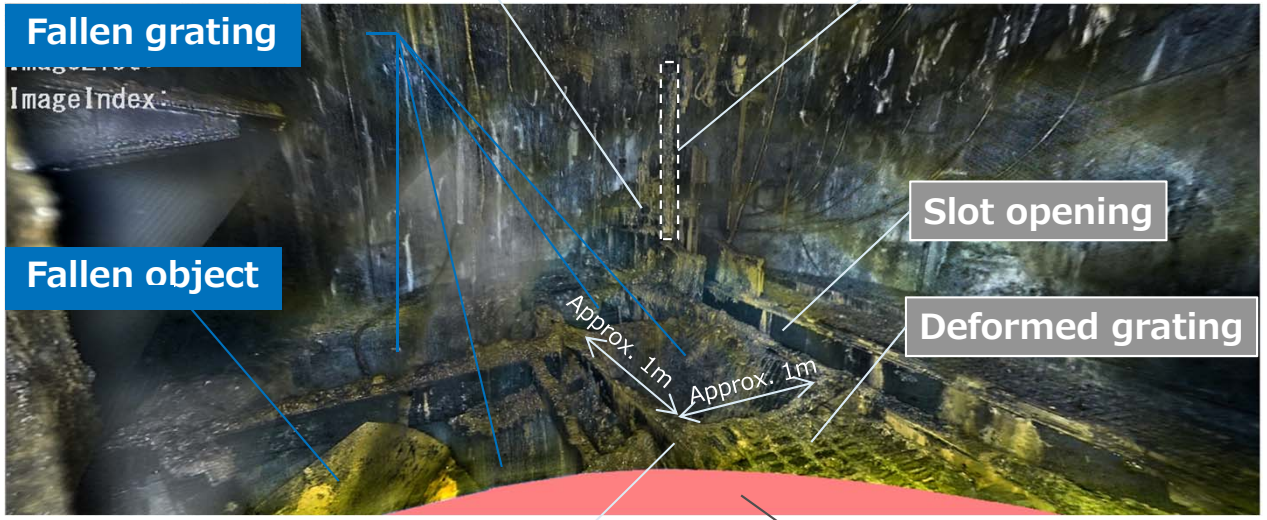
- It was found that a part of grating was missing during the pre-investigation of the inside of the pedestal conducted through the guide pipe during the Primary Containment Vessel (PCV) Internal Investigation from January to February, 2017.



(Reference) Inside Unit 5 pedestal



(Reference) Photo taken during periodic inspection inside Unit 2 pedestal

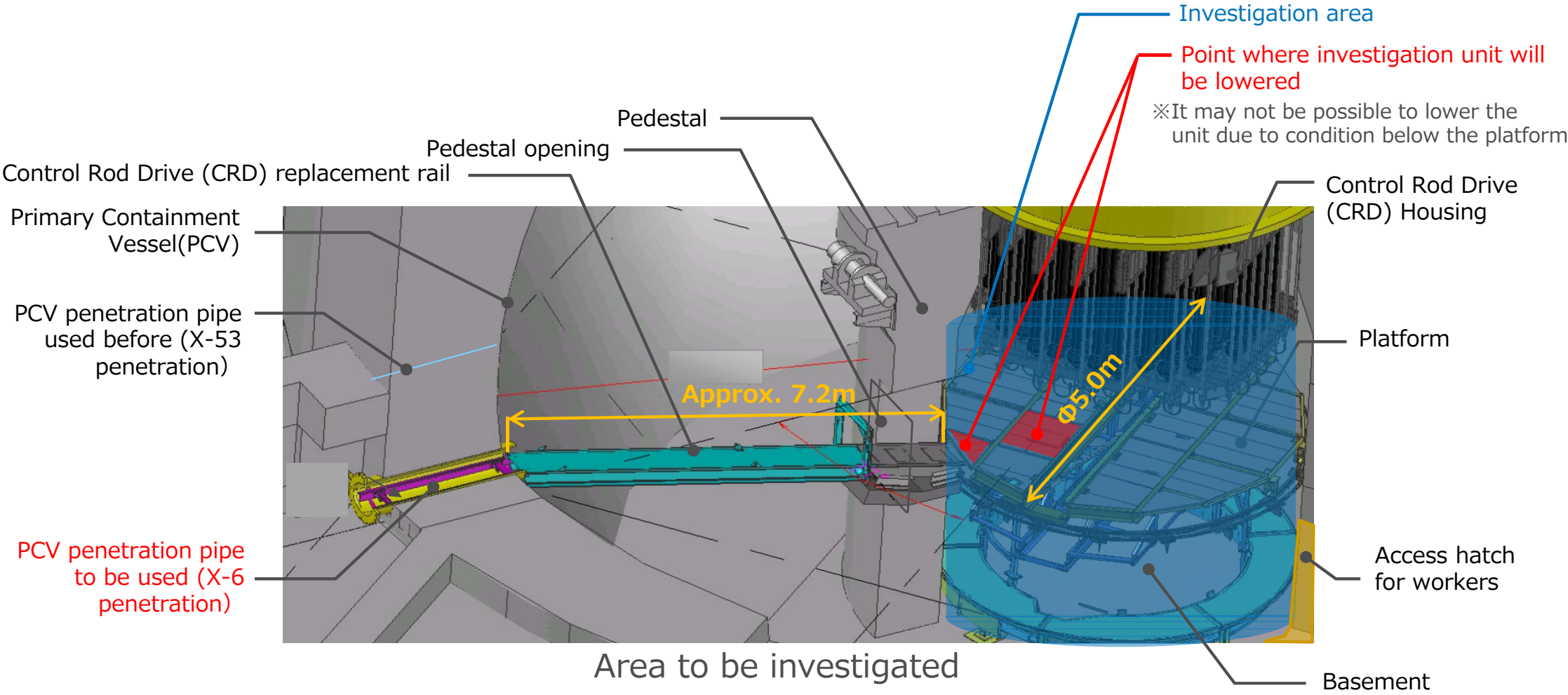


※ The TIP guide pipe and its supports were removed to inspect Unit 5.

Images provided and processed by the International Research Institute for Nuclear Decommissioning (IRID)

3. Outline of the next PCV Internal Investigation

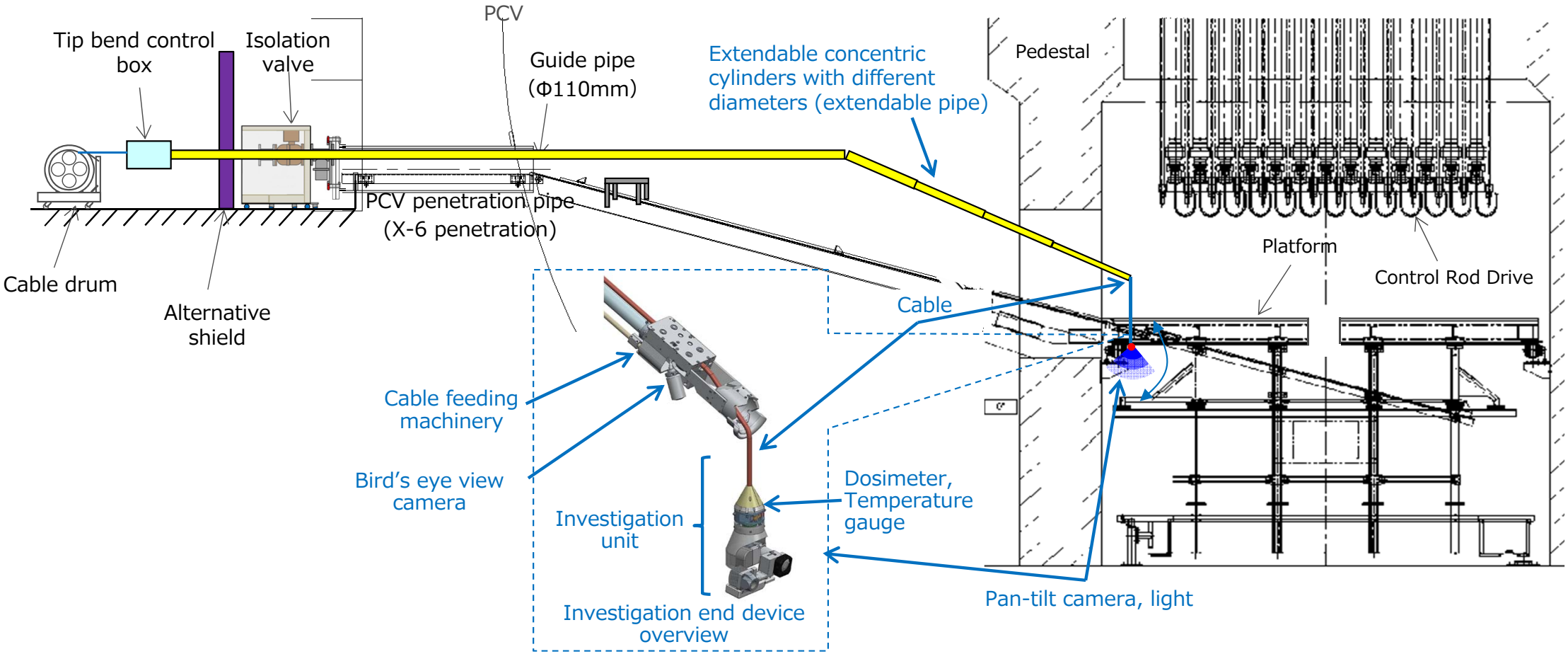
【Plan】:Conditions under the platform where fuel debris may exist will be examined.



Area to be investigated

4. Investigation method (1/2)

- The telescopic device used in the PCV internal investigation conducted between Jan. to Feb. 2017 will be improved so that it can extend further and has an investigation unit (camera, dosimeter and temperature gauge) affixed to the end.
- After the investigation device reaches the area above the missing part of the grating inside the pedestal, the investigation unit will be lowered to examine under the platform.
- This improvement will enable the investigation device to reach the end of the guide pipe inside the pedestal, much further than during the investigation conducted in January~February, and allow conditions above the platform, such as the CRD housing, to be reexamined.

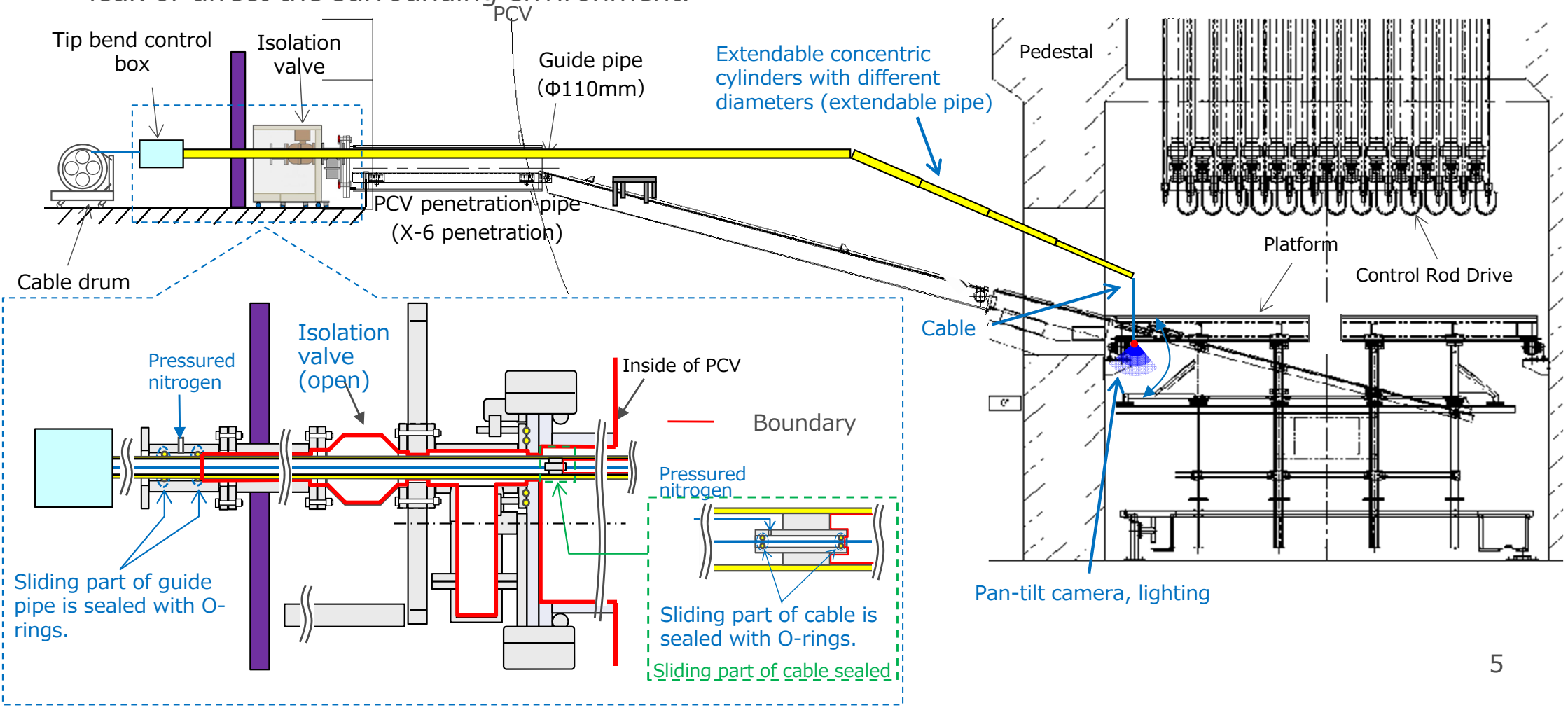


Outline of pre-investigation inside the pedestal (Telescopic investigation device)

Images provided by the International Research Institute for Nuclear Decommissioning (IRID)

4. Investigation method (2/2)

- Just like the PCV internal investigation conducted in January~February, a boundary will be formed as shown below by sealing the sliding part of the guide pipe with double O-rings and pressurizing the pipe with nitrogen to prevent gas inside PCV from leaking outside and affecting the surrounding environment during the investigation.
- A similar boundary will be formed for the sliding part of the cable as well.
- Dust concentration will be monitored during the operation to check that gas inside the PCV does not leak or affect the surrounding environment.



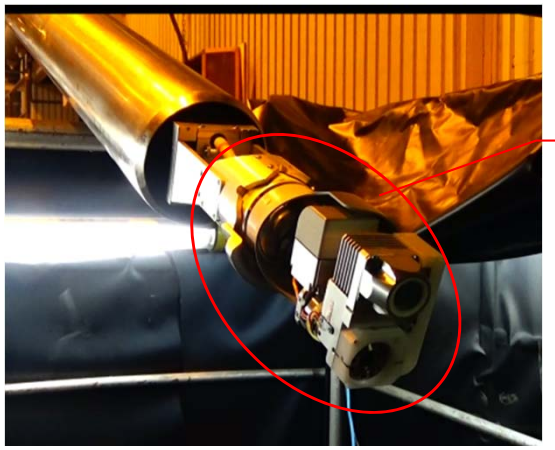
5. Main equipment improvements (1/4)

No.	Coming investigation	Previous investigation
①	Guide pipe and extendable pipe have been lengthened. End of the device can reach about 1.4m from the inside wall of the pedestal.	End of the device could reach about 0.1m from the inside wall of the pedestal.
②	Lowering mechanism added. (Cable feeding mechanism added)	No lowering mechanism
③	Dosimeter and temperature gauge mounted in addition to camera	Only camera mounted
④	Fogging countermeasures added. (Distance between camera and light can be adjusted to improve visibility.)	Distance between camera and light was fixed.

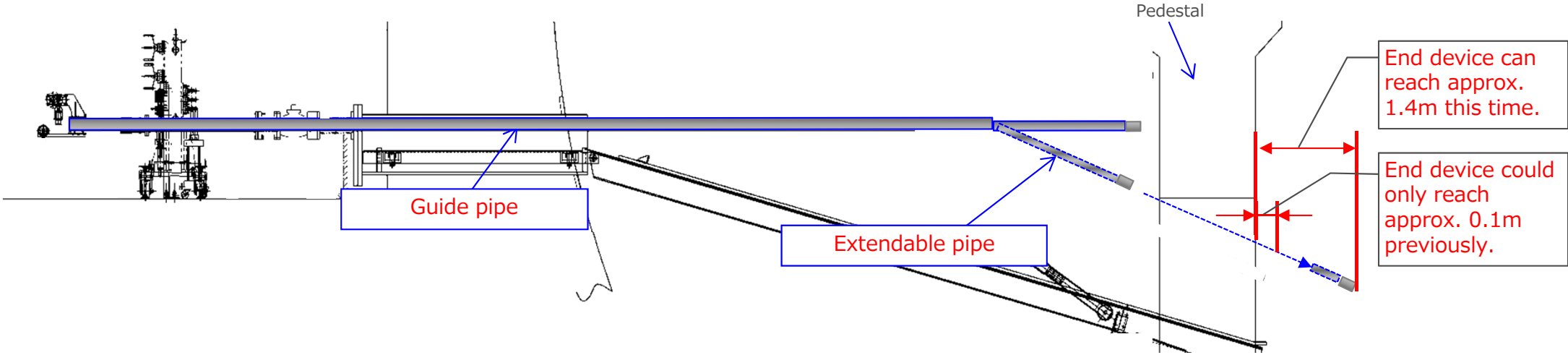
5. Main equipment improvements (2/4)
① Lengthening of guide pipe and extendable pipe

- The guide pipe has been lengthened by making the investigation device on the end (investigation unit) smaller and lighter, and by strengthening the guide pipe.

End device used during the previous investigation

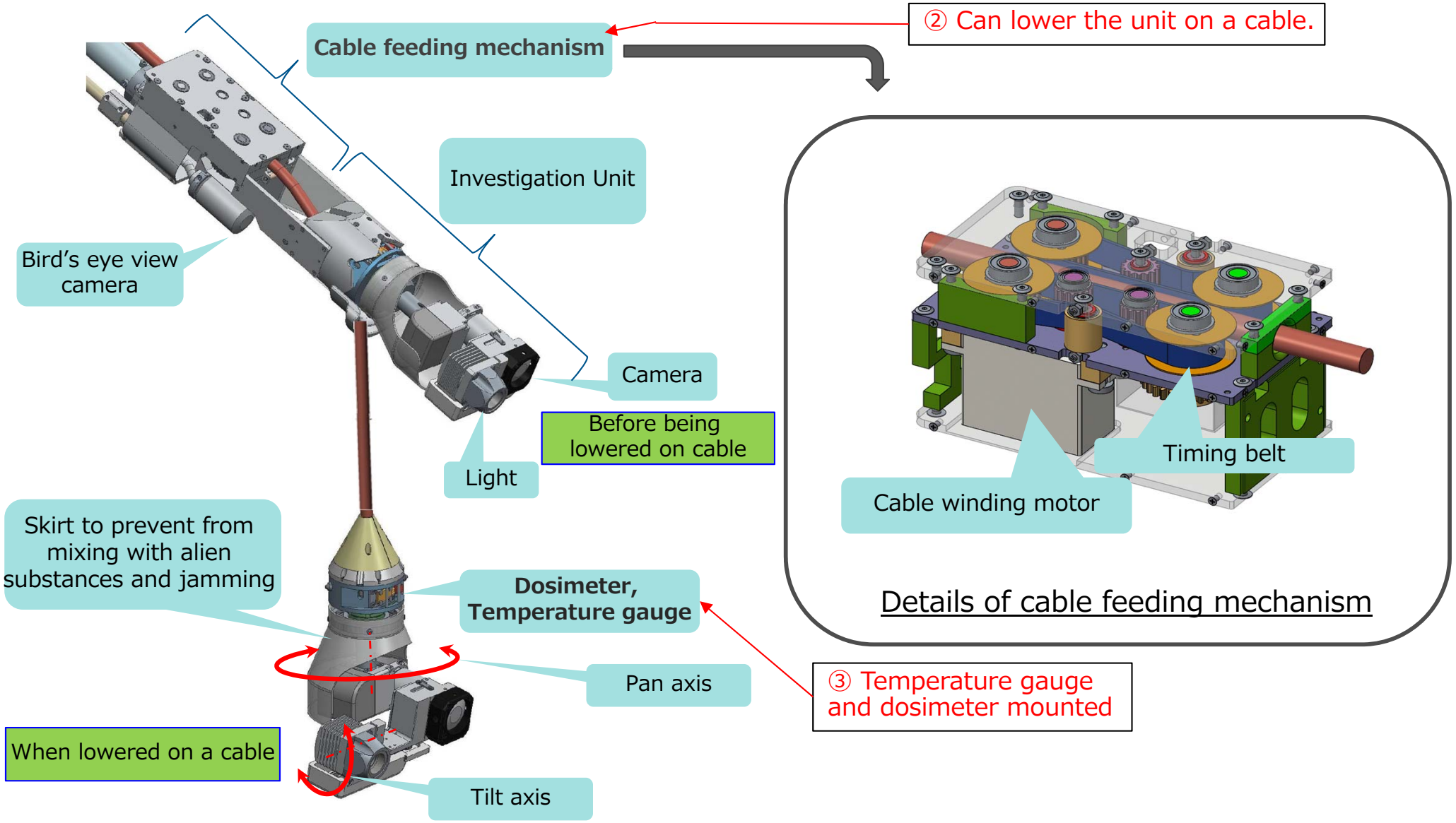


Smaller and lighter end device (investigation unit)



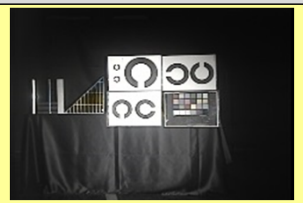
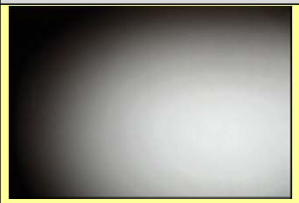
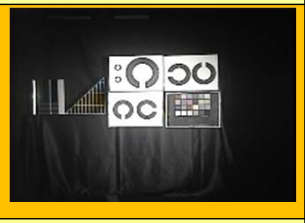
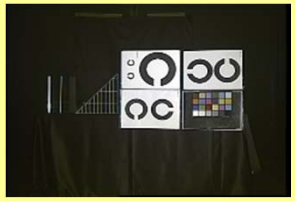
Images provided by the International Research Institute for Nuclear Decommissioning (IRID)

5. Main equipment improvements (3/4)
②Lowering mechanism, ③dosimeter and temperature gauge

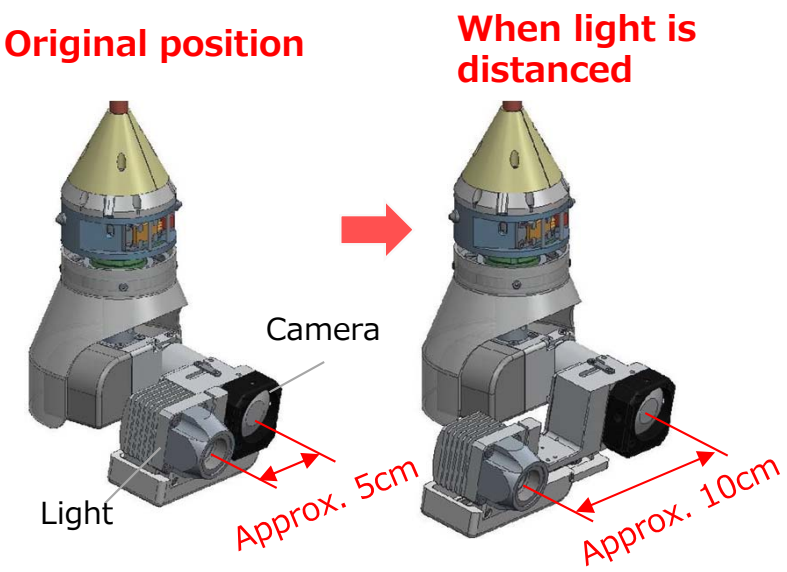


Investigation End device outline view

5. Main equipment improvements (4/4)
④ Fogging countermeasures

Distance between camera and light	Light transmission :100% Distance:5m	Light transmission : 20%/3m Distance :5m	
		Image before processing	Image after processing
Before counter-measures: Approx. 5cm			
After counter-measures: Approx. 10cm			
Previous investigation			

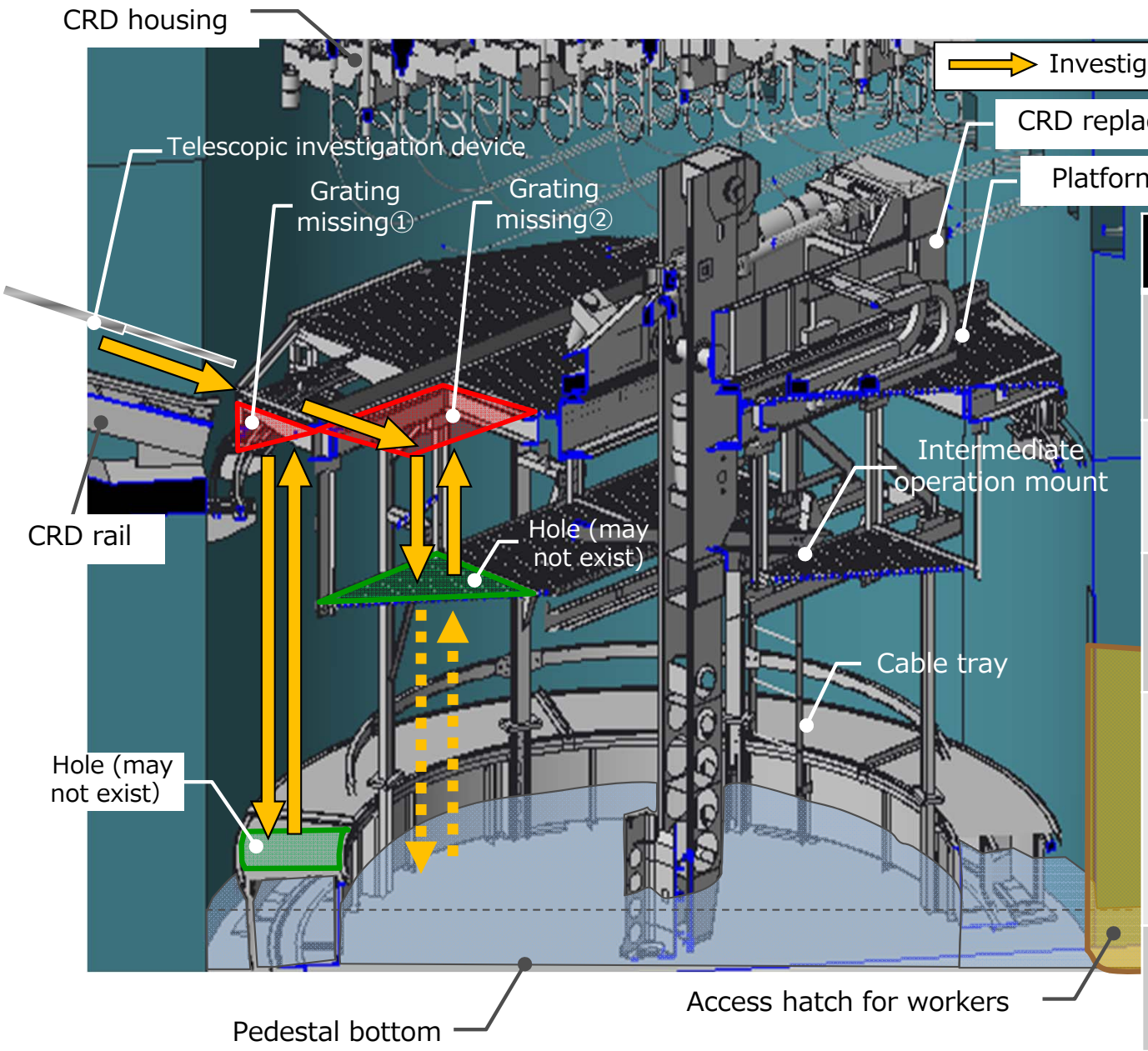
④ Distance between camera and light can be enlarged.



Motion of light when responding to fog (concept diagram)

Images provided by the International Research Institute for Nuclear Decommissioning (IRID)

6. PCV internal investigation point



Investigation point	Expected information
Lower part of the CRD housing	・Damage to lower part of the CRD housing
Upper part of the platform	・Conditions above the grating (fallen objects, fuel debris deposits, etc., missing grating)
Intermediate operation mount	・Conditions above the grating (fallen objects, fuel debris deposits, etc., missing grating)
Pedestal bottom	・Fallen objects on the pedestal bottom and fuel debris deposits, etc. ・Damage to cable tray (to assume whether fuel debris has fallen to the pedestal base)
Access hatch for workers	・Damage to the cable tray to assume whether debris leaked outside the pedestal

7. Process flow plan

Operation	FY2017		
	December	January	February
Advance preparation	Training As of 12/21 Shipping ▽ On site preparation		
PCV internal investigation		PCV internal investigation	