Fukushima Daiichi Nuclear Power Station Unit 2 Primary Containment Vessel Internal Investigation Results

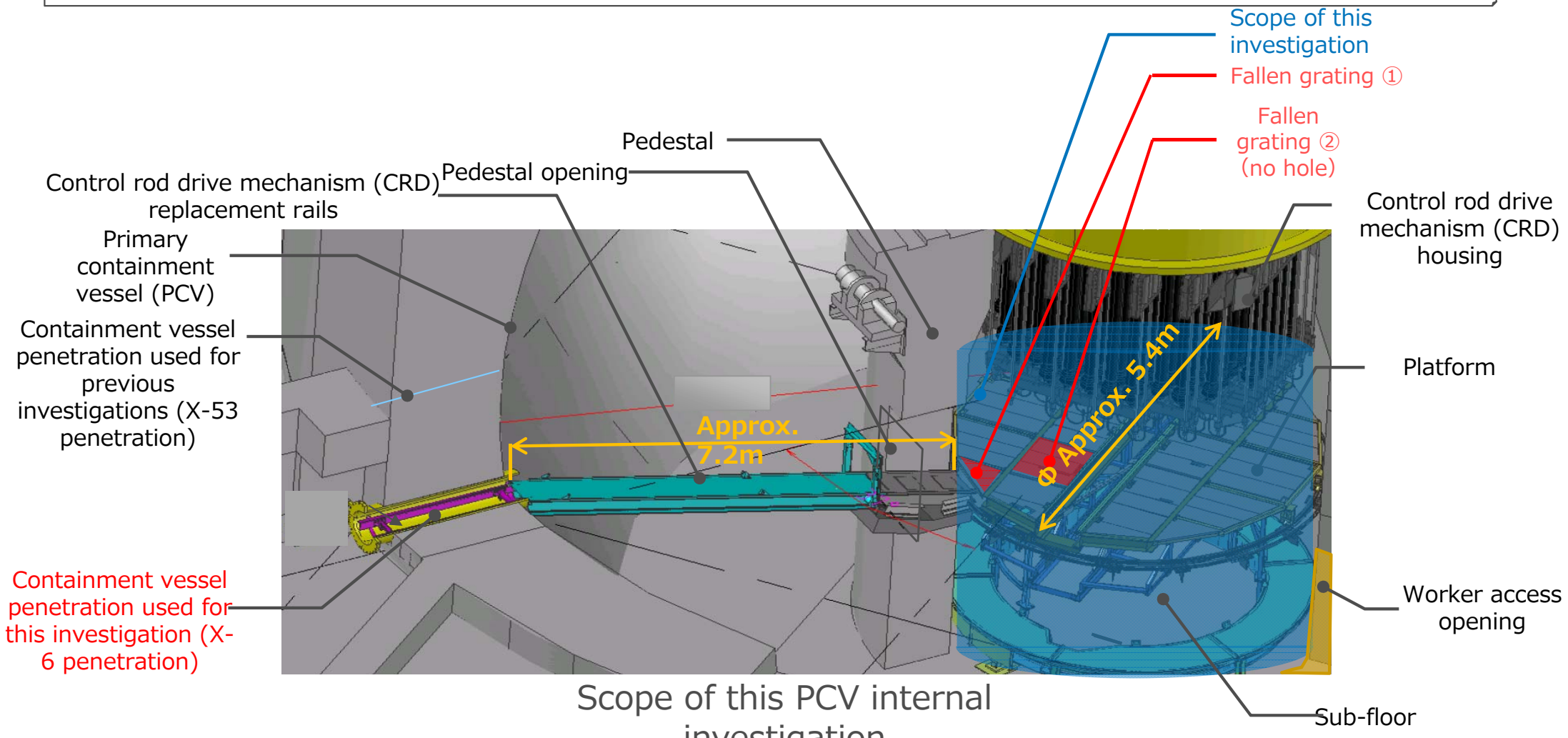
February 1, 2018

IRID TEPCO

Tokyo Electric Power Company Holdings, Inc.

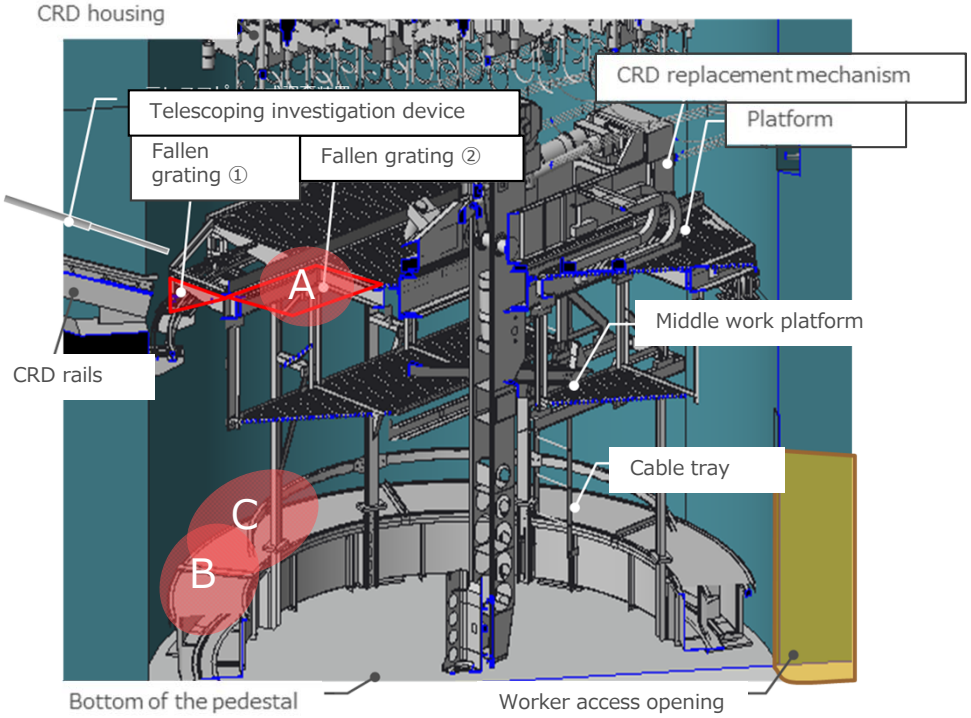
1．Primary Containment Vessel Internal Investigation Overview

【Investigation Plan】：The area underneath the platform, where fuel debris may exist, was checked.



Scope of this PCV internal investigation

2. January 19 Investigation Results (1/3)



- The entire bottom of the pedestal was found to be covered with sandy and clay-like deposits.
- Some fuel assembly components (top tie-plate) have fallen to the bottom of the pedestal and deposits thought to be fuel debris were found in the vicinity of these fallen components.

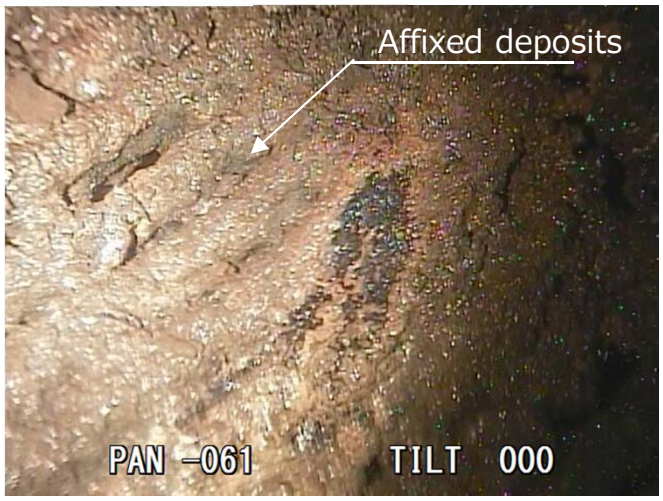


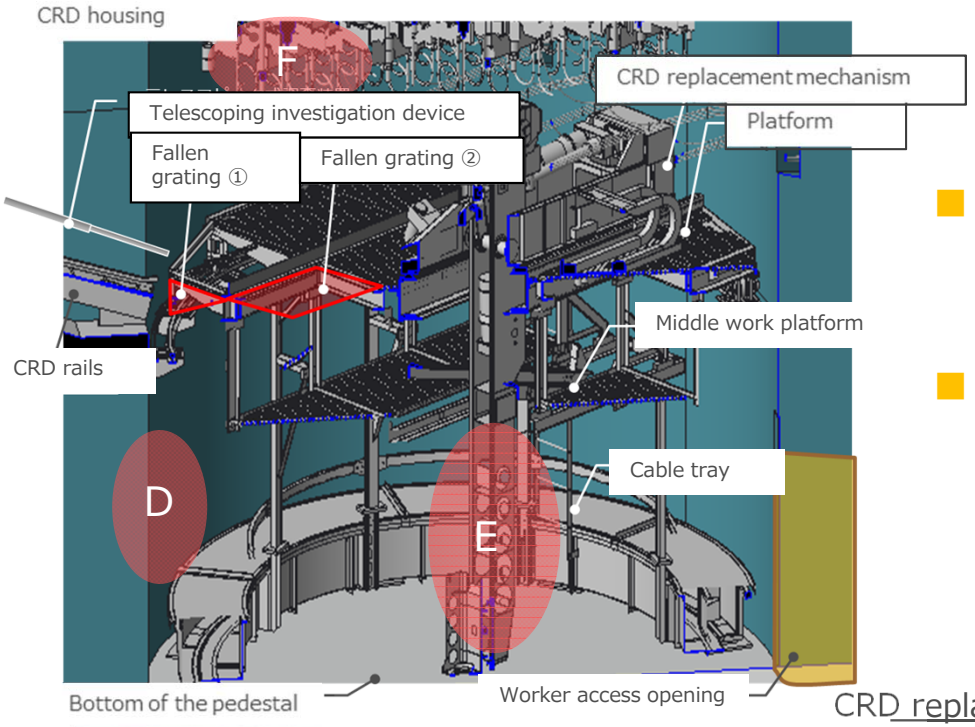
Photo location A Fallen grating ②

Photo location B Bottom of pedestal

Photo location C Bottom of pedestal

Photos provided by: International Research Institute for Nuclear Decommissioning (IRID)

2. January 19 Investigation Results (2/3)



- No significant damage was see on the inner wall of pedestal
- No significant damage was seen to existing structures inside the pedestal (CRD replacement mechanism)
- The CRD housing supports were found to be in the same condition as was seen during the January~February 2017 investigations.

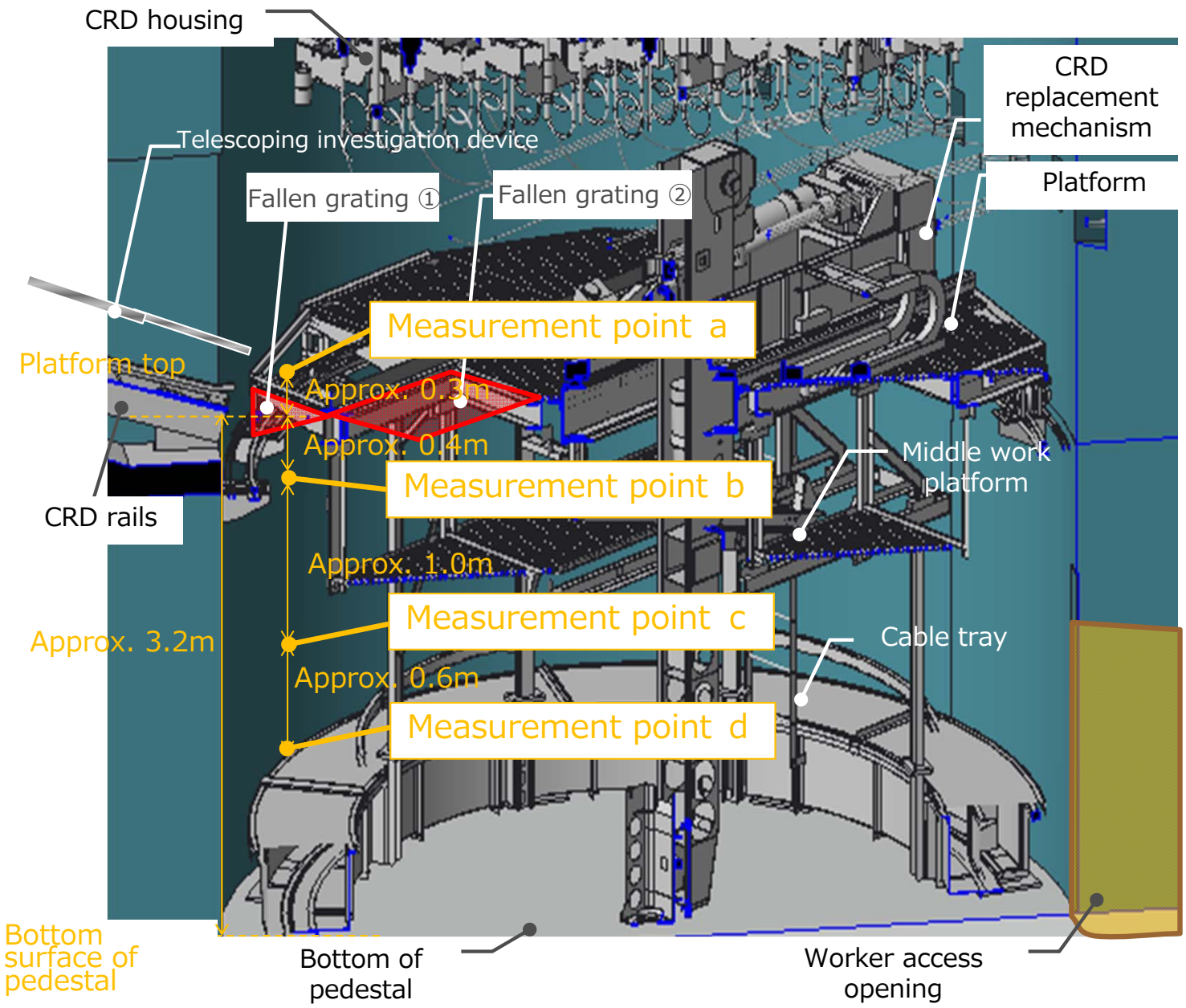
Photo location D Surface of inner wall of pedestal

Photo location E CRD replacement mechanism

Photo location F CRD housing support

Photos provided by: International Research Institute for Nuclear Decommissioning (IRID)

2. January 19 Investigation Results (3/3)



Measurement point	Dose rate※1,2 [Gy/h]	Temp.※2 [℃]
a	7	21.0
b	8	21.0
c	8	21.0
d	8	21.0

【Reference: Outside the pedestal※3】
Dose rate: Max. 42[Gy/h]
Temp.: Max. 21.1[℃]

※1 : Calibrated with Cs-137 radiation source
※2 : Error: Dosimeter: ±7%
Temp. Gauge: ±0.5℃
※3 : Reference value because the measurement equipment is housed inside the survey unit

3. Summary

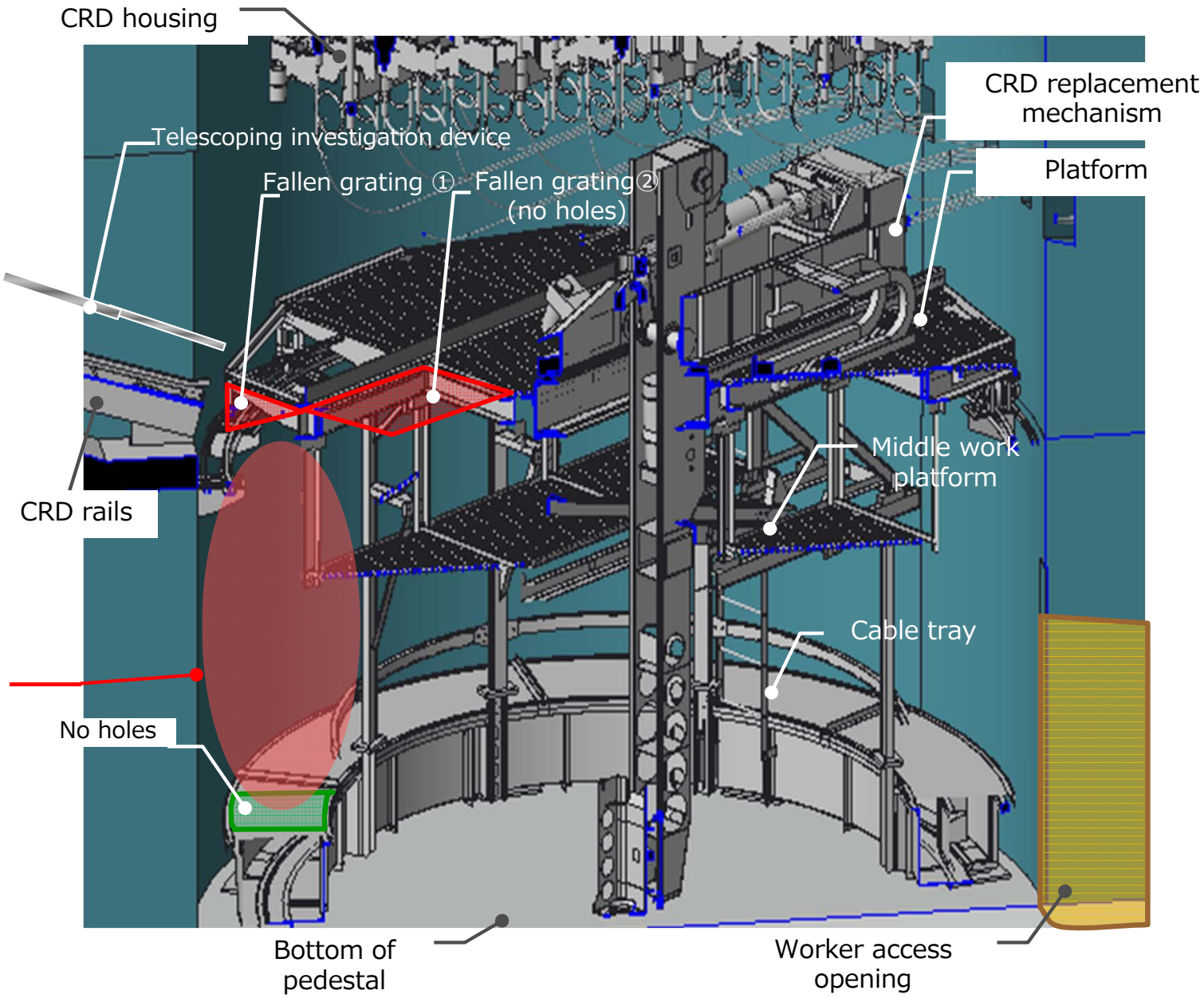
【 Investigation Results Summary 】

- The entire bottom of the pedestal was found to be covered with sandy and clay-like deposits.
- Some fuel assembly components have fallen to the bottom of the pedestal and deposits thought to be fuel debris were found in the vicinity of these fallen components.
- The CRD housing supports were found to be in the same condition as was seen during the January~February 2017 investigations and no significant damage was seen.
- Dose and temperature were approximately the same regardless of the height at which measurements were taken. And, dose rates tended to be higher outside the pedestal than inside.
- The investigation was completed while keeping worker exposure doses under planned limits.
- No significant fluctuations were seen in data from monitoring posts or dust monitors neither prior to, nor after, the investigation.

【Plans going forward】

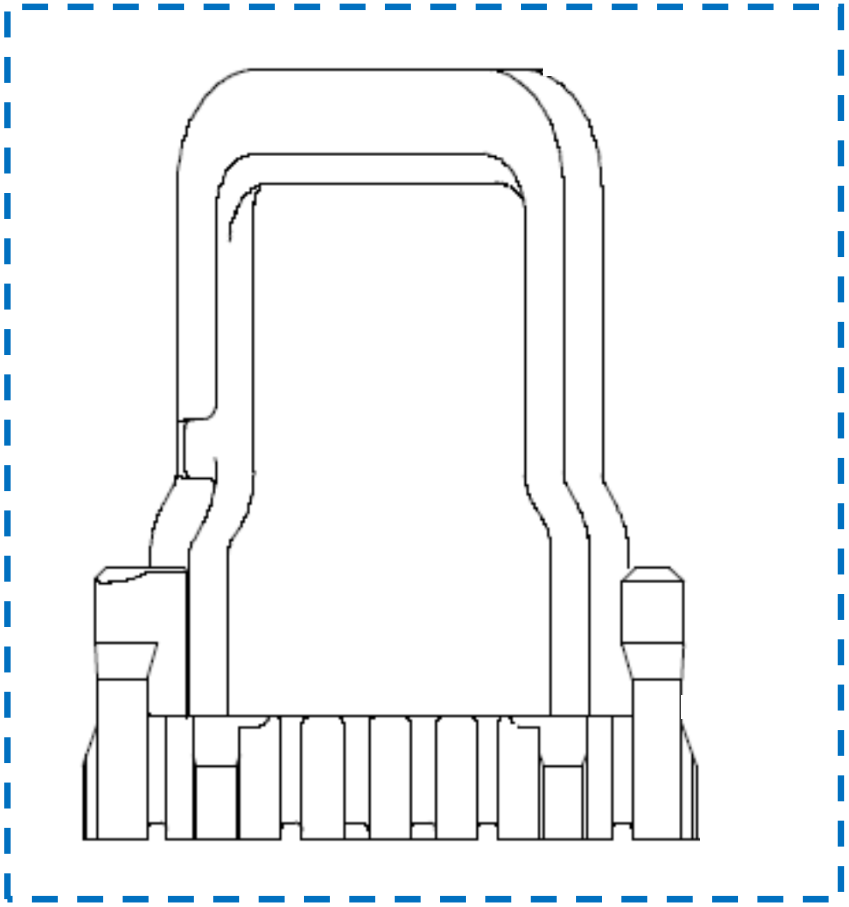
- The images taken during this investigation will be analyzed

Reference: PCV Internal investigation location

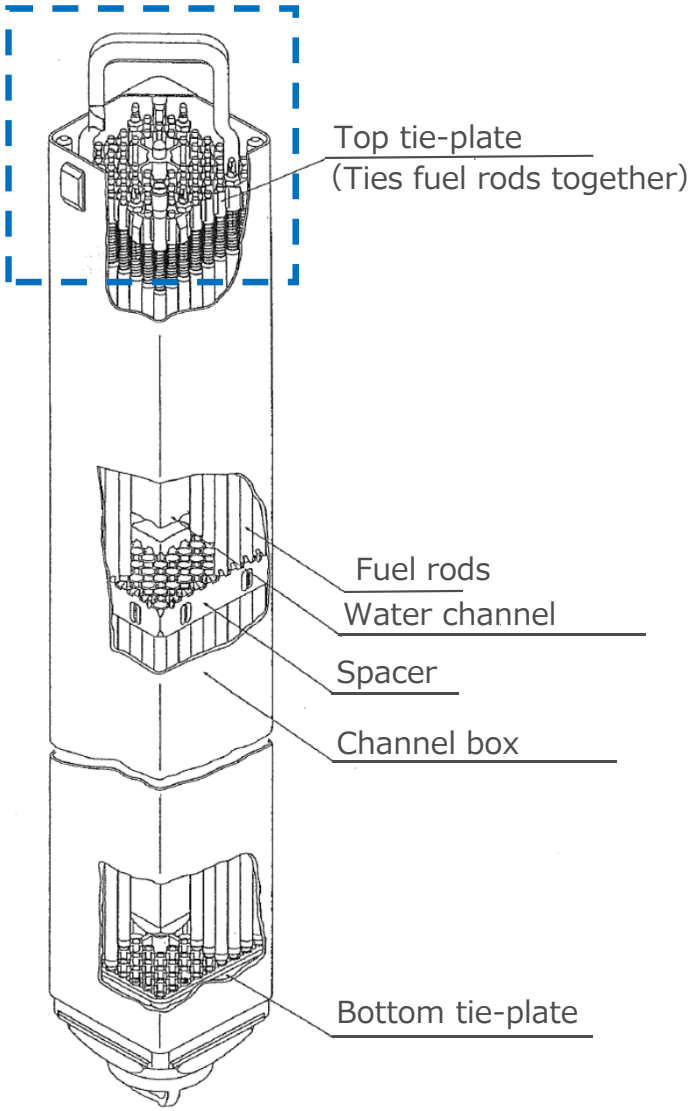


Area that the investigation unit accessed during this investigation (tentative)

Reference: Fuel assembly component (top tie-plate) overview

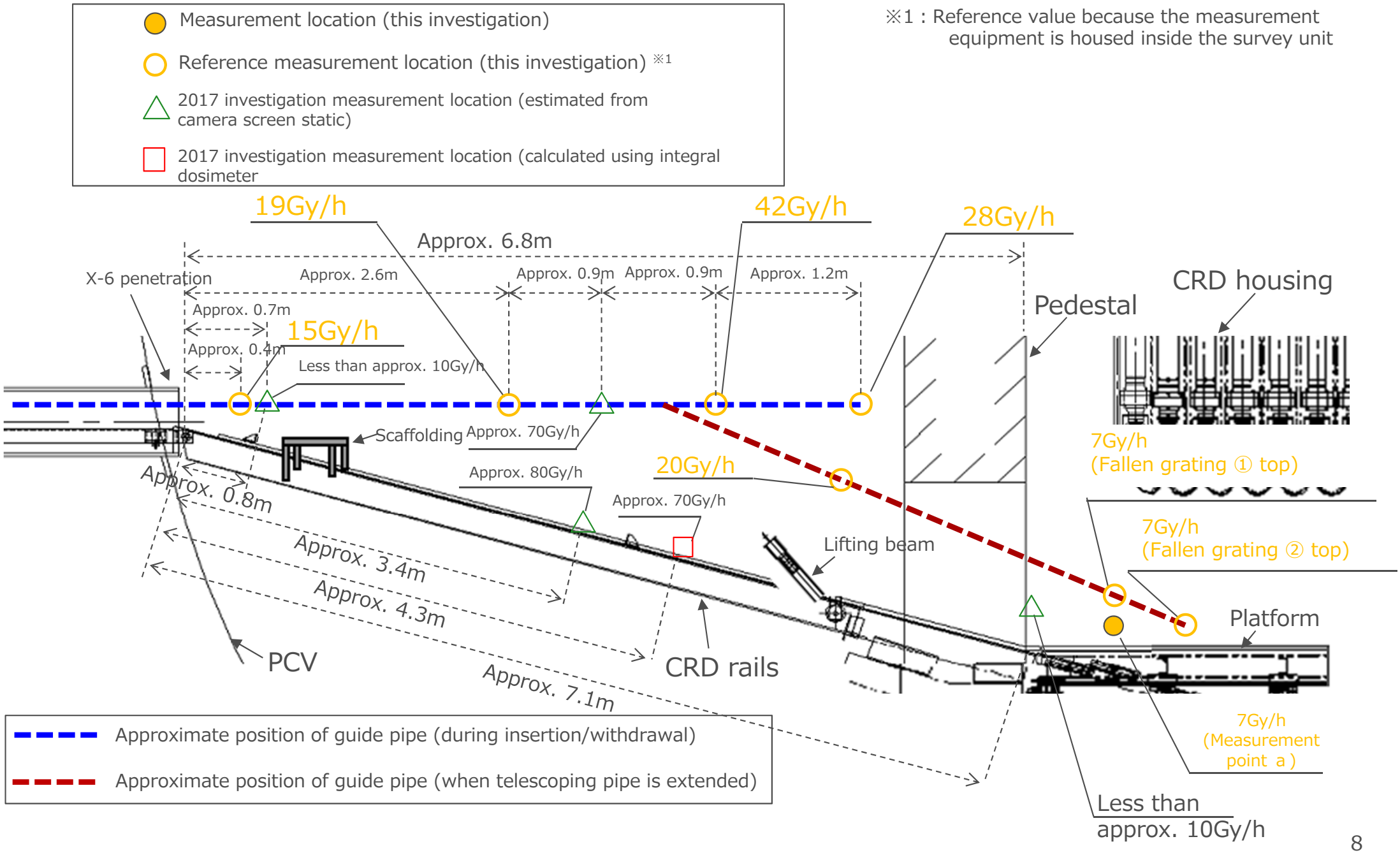


Simple drawing of fuel assembly component (top tie-plate)

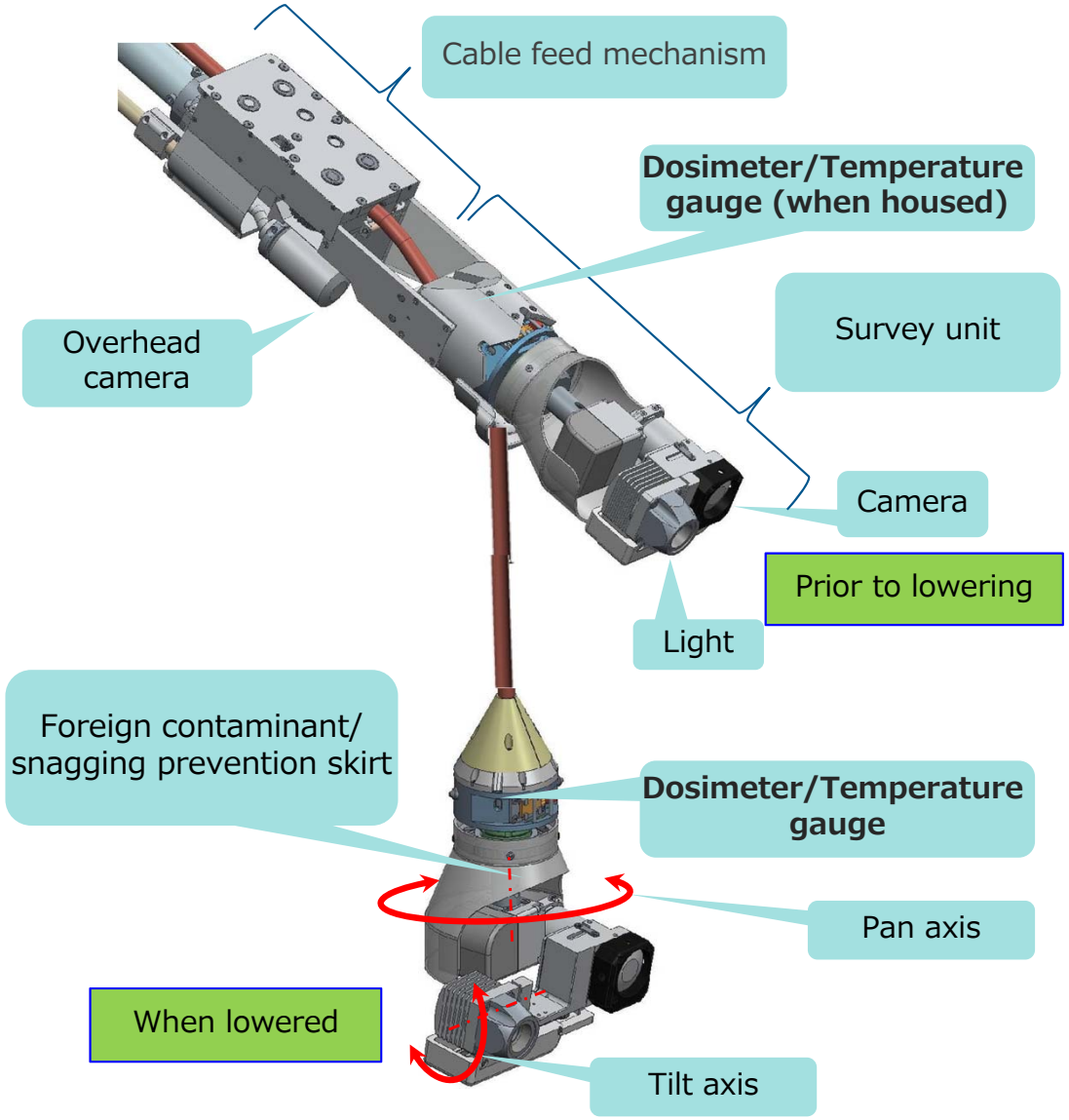


Simple drawing of fuel assembly

Reference: Reference dose rate measurement locations



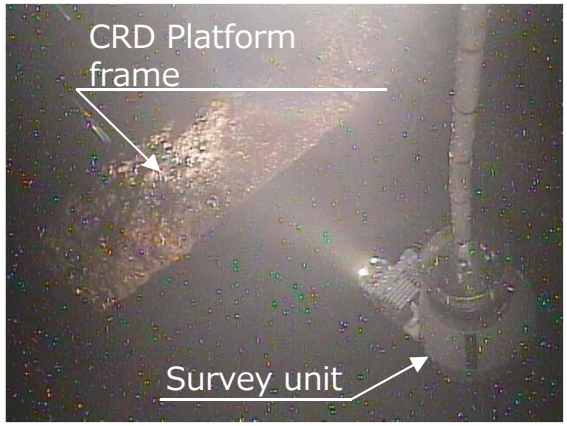
Reference: Dosimeter/Temperature Gauge Mounting Location



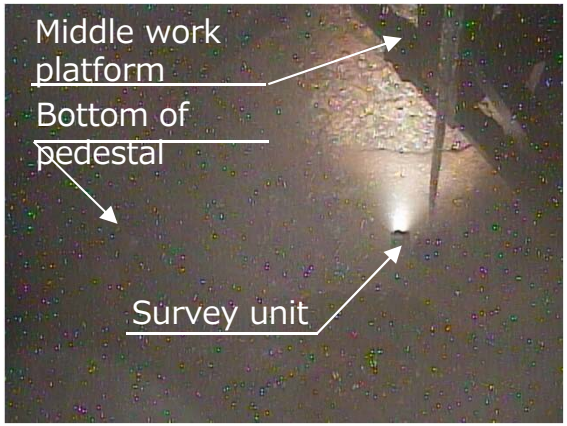
Overview of end of investigation device

Photos provided by: International Research Institute for Nuclear Decommissioning (IRID)

Reference: Work conditions（1/2）



Feed from overhead camera 1
(Lowering the investigation unit)



Feed from overhead camera 2
(Lowering the survey unit)

Work outside the PCV (In front of X-6 penetration)

Remote operations center (main anti-earthquake building)

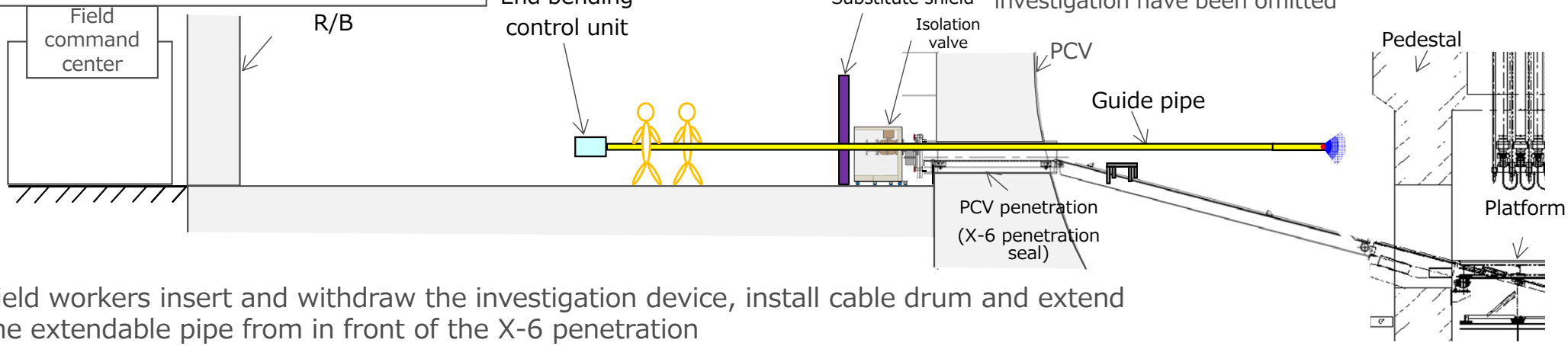
Field command center
(R/B west side yard)

Photos provided by: International Research Institute for Nuclear Decommissioning (IRID)

Reference: Work conditions （2/2）

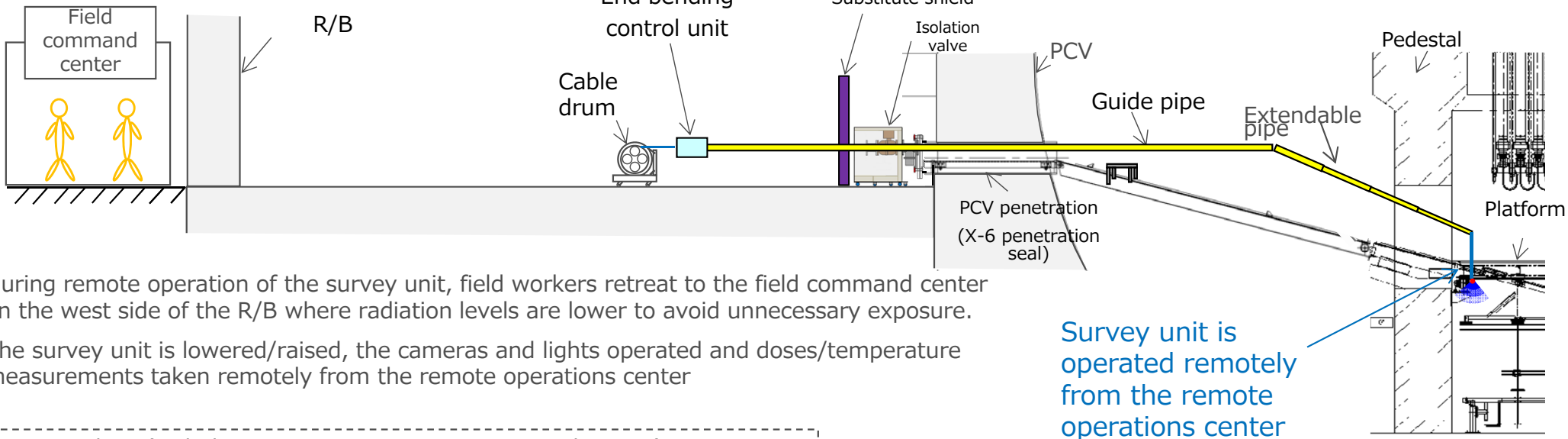
During installation of the investigation device

※Other structures not related to the PCV internal investigation have been omitted



- Field workers insert and withdraw the investigation device, install cable drum and extend the extendable pipe from in front of the X-6 penetration

During the investigation



- During remote operation of the survey unit, field workers retreat to the field command center on the west side of the R/B where radiation levels are lower to avoid unnecessary exposure.
- The survey unit is lowered/raised, the cameras and lights operated and doses/temperature measurements taken remotely from the remote operations center

・Total exposure dose (including preparations~investigation~clean-up)
Planned:0.31[person/Sv]　Actual: 0.22[person/Sv]（as of 1/31）
・Actual individual maximum dose: 1.68[mSv/day]（Planned dose: 3 [mSv/day]）

Reference: Environmental Impact（1/2）

- **There was no impact on the surrounding environment from radiation during internal investigation of the Unit 2 primary containment vessel conducted on January 19.**
- **During the investigation a boundary was constructed to prevent the gases from inside the containment vessel from leaking into the external environment.**
- **No significant fluctuations in data from monitoring posts and dust monitors were seen neither prior to, nor after, the investigation.**
- **Data from monitoring posts and dust monitors near site boundaries can be found on our website.**

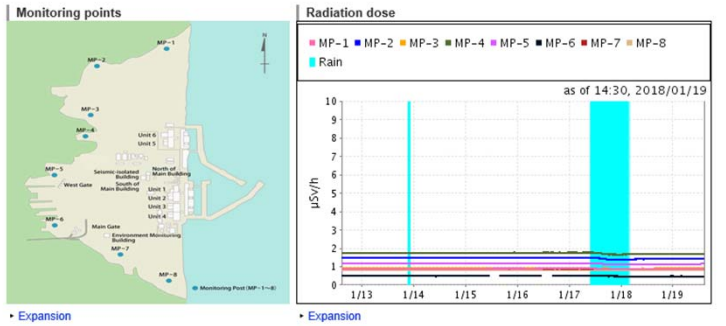
URL : http://www.tepco.co.jp/en/nu/fukushima-np/f1/index-e.html
http://www.tepco.co.jp/en/nu/fukushima-np/f1/dustmonitor/index-e.html

(Reference) Website Excerpt

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) and portable monitoring posts on the premises of Fukushima Daiichi Nuclear Power Station.

Monitoring post (MP1 - MP8)



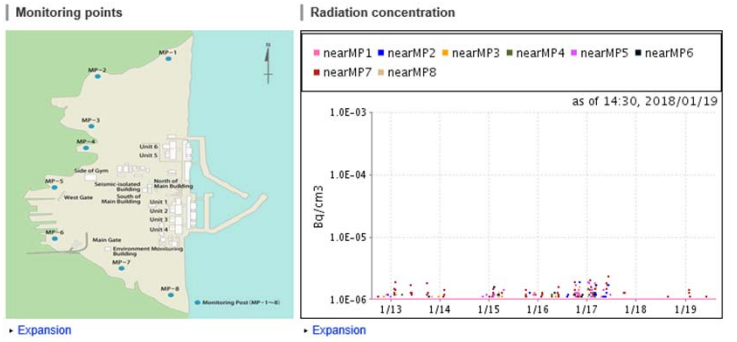
○Measurement value (2018/01/19 14:30)

MP Unit: μSv/h Wind Velocity Unit: m/s

MP-1	MP-2	MP-3	MP-4	MP-5	MP-6	MP-7	MP-8	Wind Direction	Wind Velocity	Rain
0.869	1.440	0.914	1.706	1.155	0.483	0.862	0.831	north-northwest	5.4	No

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.



○Measurement value (2018/01/19 14:30)

Radioactive Particles Monitor Unit: Bq/cm³ Wind Velocity Unit: m/s

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	north-northwest	3.0

*Radiation levels include contributions from radiation sources other than the inside of the primary containment vessel.

Reference: Environmental Impact（2/2）

- **During the investigation, plant parameters were continuously monitored and no significant fluctuations were seen in the temperature of the primary containment vessel neither prior to, nor after, the investigation. There were also no changes in the cold shut down status of the reactor.**
- **Primary containment vessel internal temperature data can be viewed on our website.**

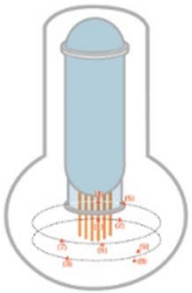
URL : http://www.tepco.co.jp/en/nu/fukushima-np/f1/plantdata/unit2/pcv_index-e.html

(Reference) Website Excerpt

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

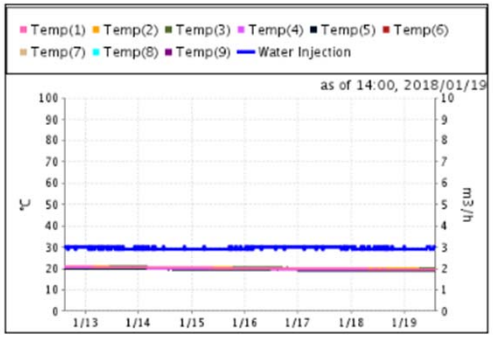
Here are the measurement results of temperatures inside the Unit 2 Primary Containment Vessel at Fukushima Daiichi Nuclear Power Station.

Monitoring points



Expansion

Temperature



Expansion

○Measurement value (2018/01/19 14:00)

Temperature Unit:℃、Water Injection Unit:m³/h

Temp(1)	Temp(2)	Temp(3)	Temp(4)	Temp(5)	Temp(6)	Temp(7)	Temp(8)	Temp(9)	Water Injection
19.7	19.7	19.9	19.4	19.0	19.3	19.2	19.7	19.7	3.0