

Unit 1 Primary Containment Vessel Internal Investigation

IRID

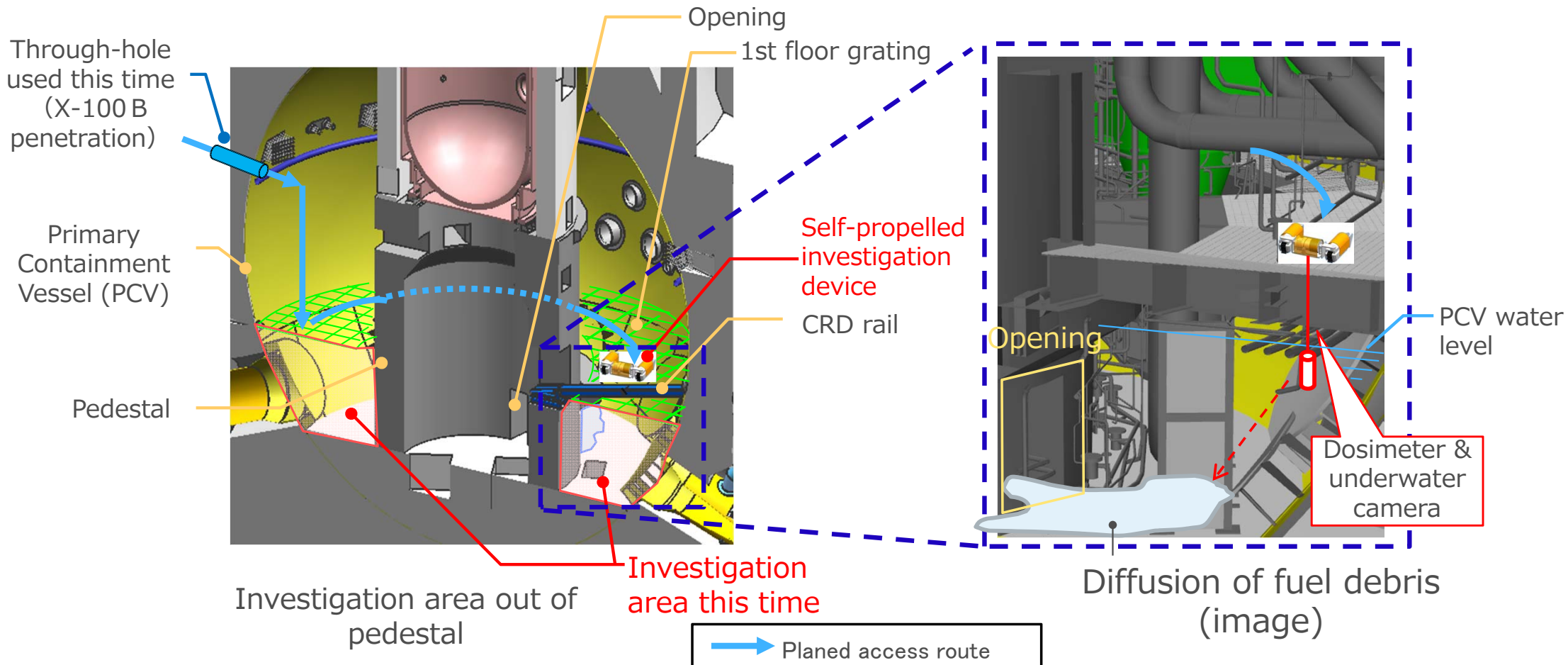
TEPCO

1. Overview of the Primary Containment Vessel (PCV) internal investigation

【Investigation plan】

Diffusion condition of fuel debris in the underground level out of pedestal and whether or not the fuel debris reached the PCV shell are to be checked.

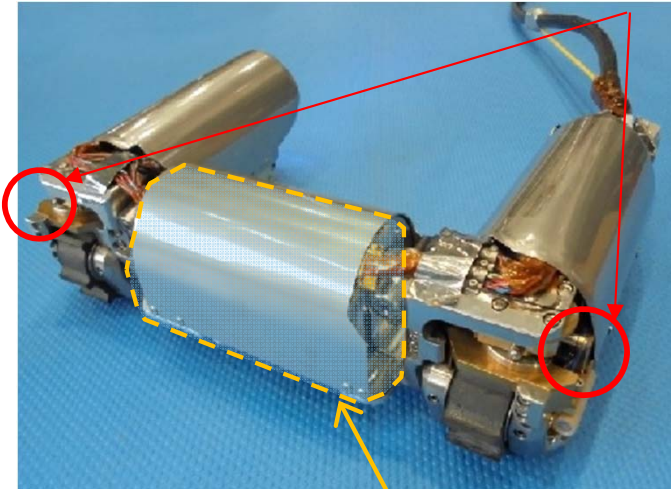
Self-propelled investigation device drops camera and dosimeter from 1st floor grating out of pedestal and checked conditions of the underground level out of pedestal and near opening.



2. Overview of the self-propelled investigation device

Appearance

Laser guide

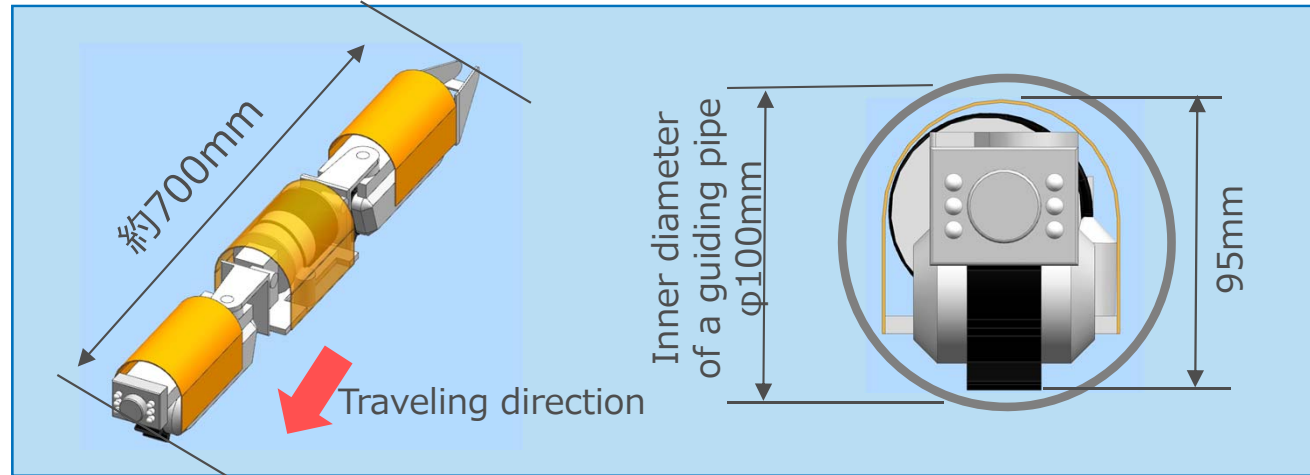


Storage space for a camera and dosimeter
When capturing digital images and measuring radiation doses

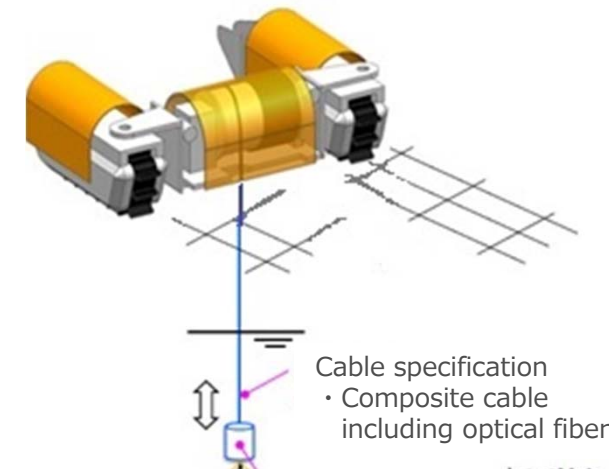
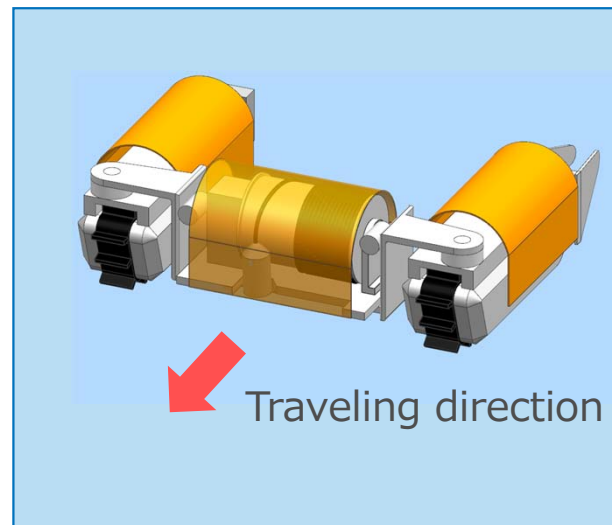


Sensor unit integrating a camera and dosimeter

When inserted into a guiding pipe



When traveling on grating

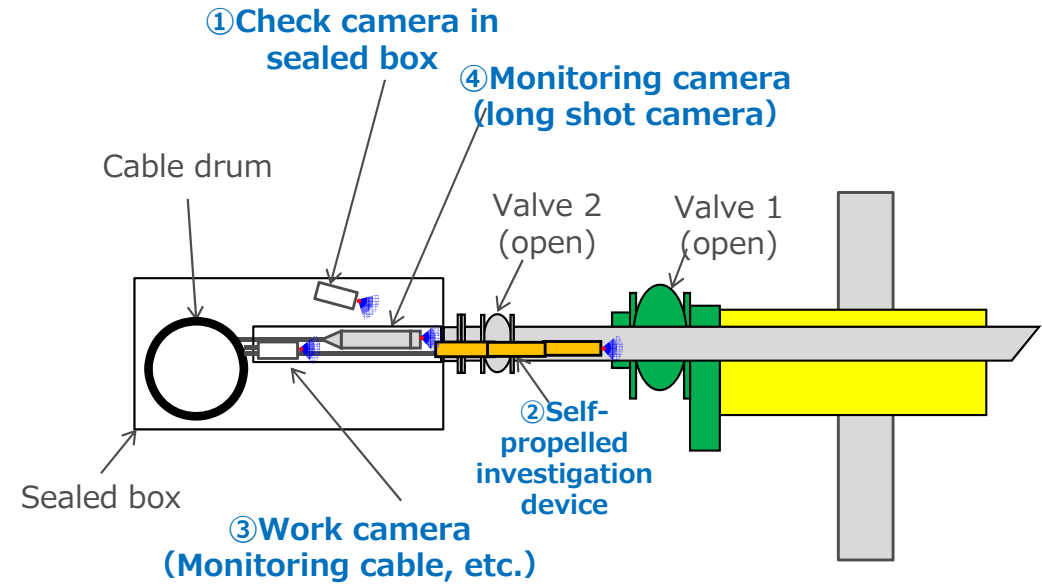


Measurement unit (dosimeter & underwater camera) · About $\phi 20\text{mm}$ × about 40mm

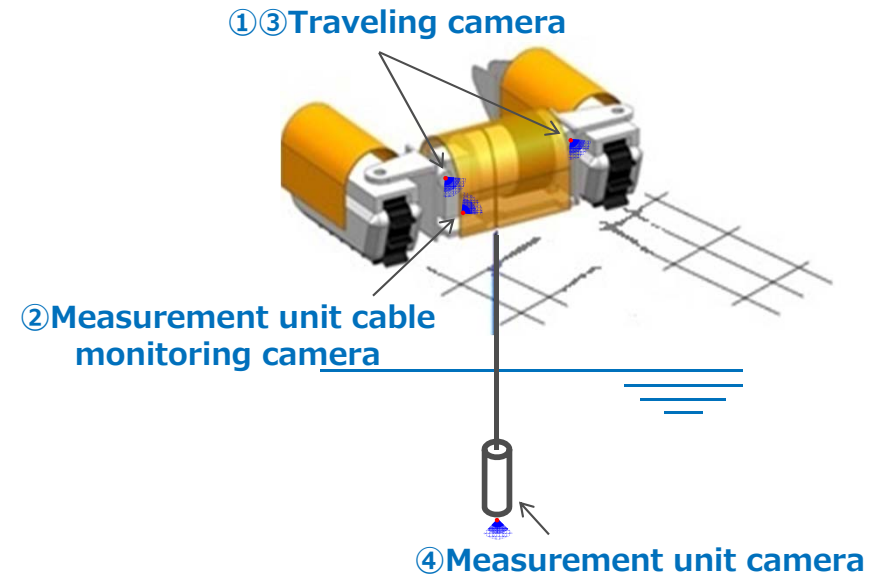
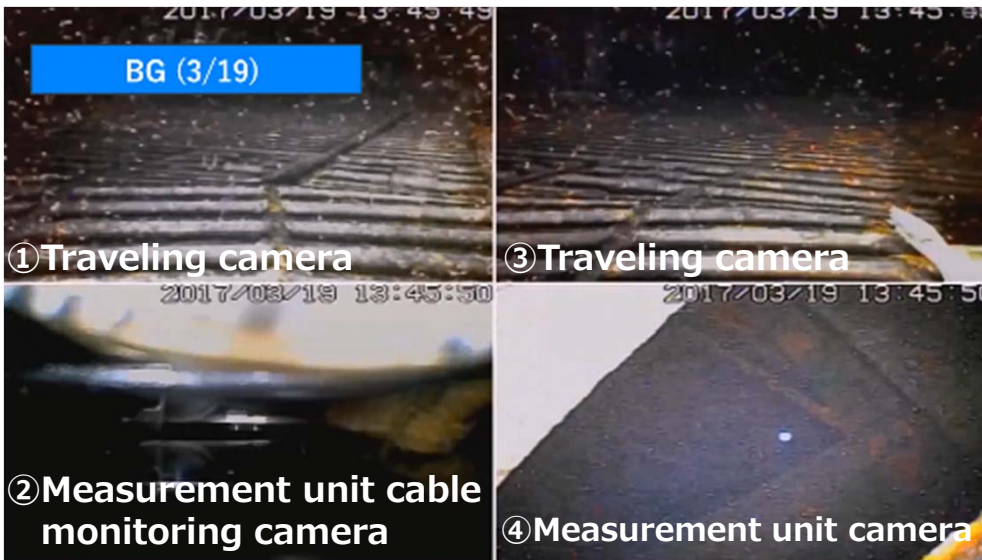
Dosimeter measurement range: $1 \times 10^{-1} \sim 1 \times 10^4 \text{Gy/h}$
Underwater camera: 350,000 pixel
Radiation resistance: 1000Gy

Supplement | Directions of shot image

■ Images when investigation device was installed



■ Images of investigation

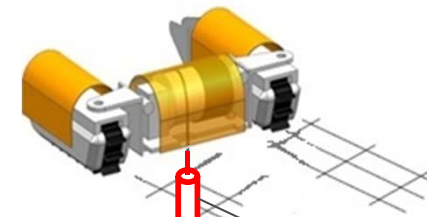


3. Measurement points by self-propelled investigation equipment

- Measurement points of the investigation are as follows.

Measurement point	Contents of estimation, etc.
D0	Estimation of diffusion of fuel debris from the drain sump
BG	Background levels against D0-D3 measurement
D1, D2	Estimation diffusion of fuel debris from opening
D3	Estimation possibility of fuel debris reaching to the PCV shell

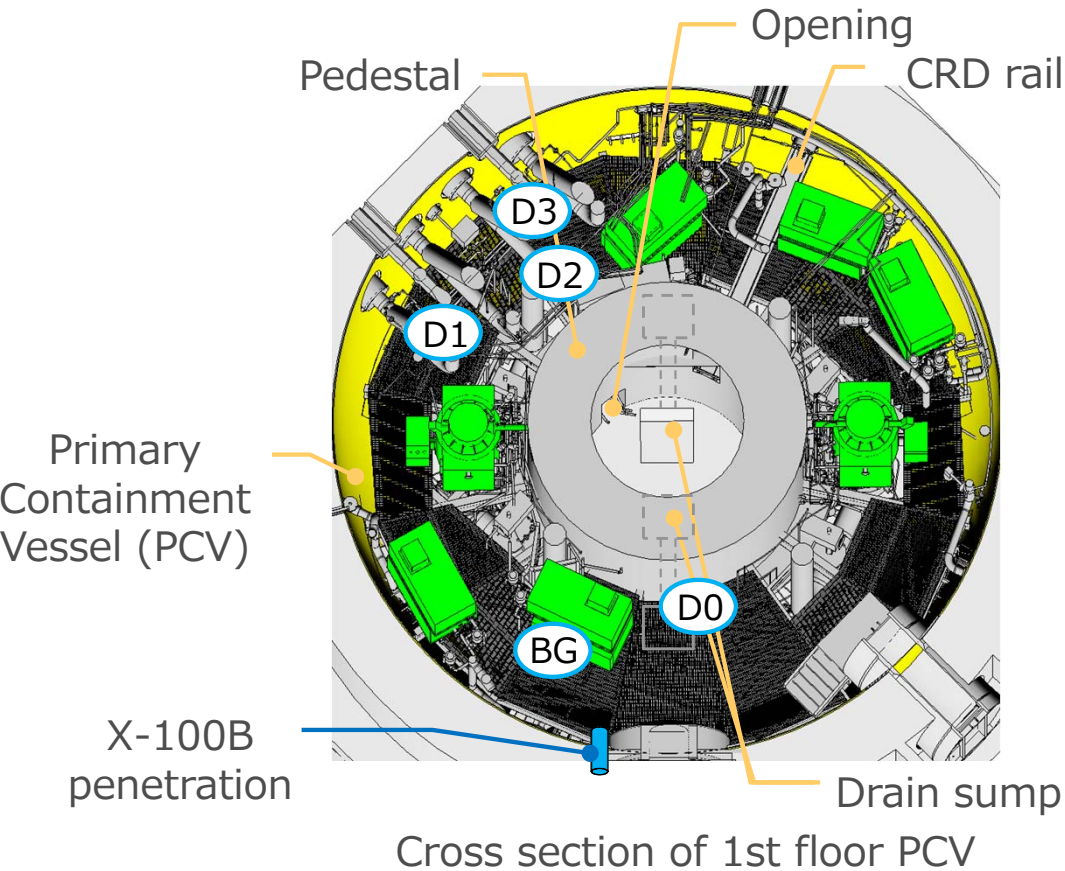
- Measurement started from the lowest point and radiation was measured at every 5 cm upper point.



On metal grating

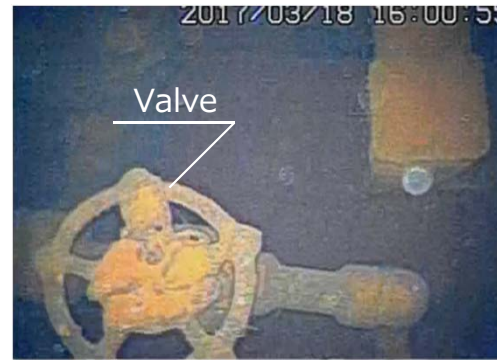
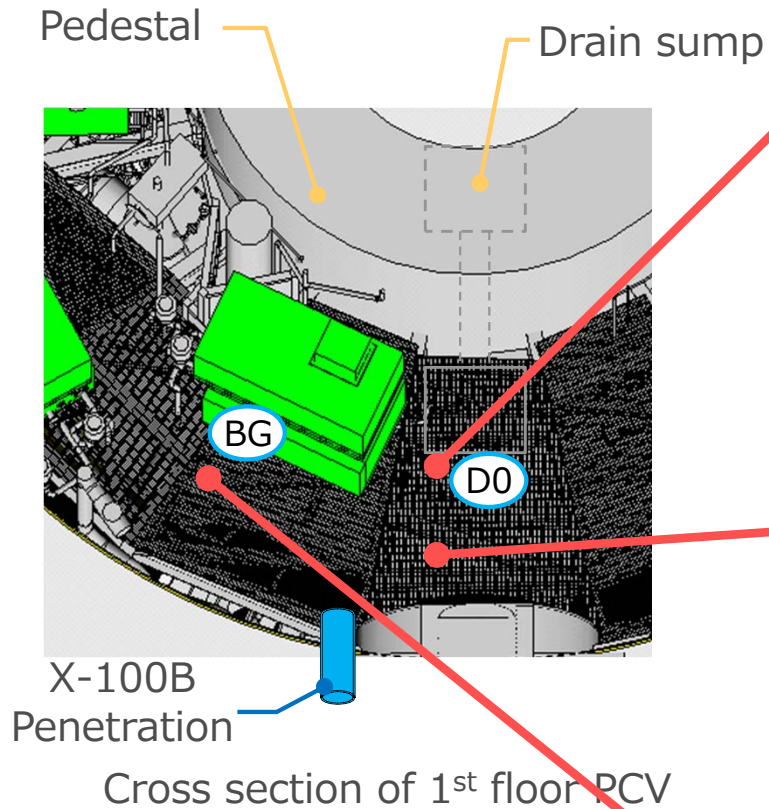
The lowest point
The exact height from basement floor is different according to objects

Measurement image



4. Image measurement results

■ Typical shot images are as follows.



3/18 D0① Image near the lowest point



3/22 D0② Image near the lowest point



3/22 D0③ Image near the lowest point

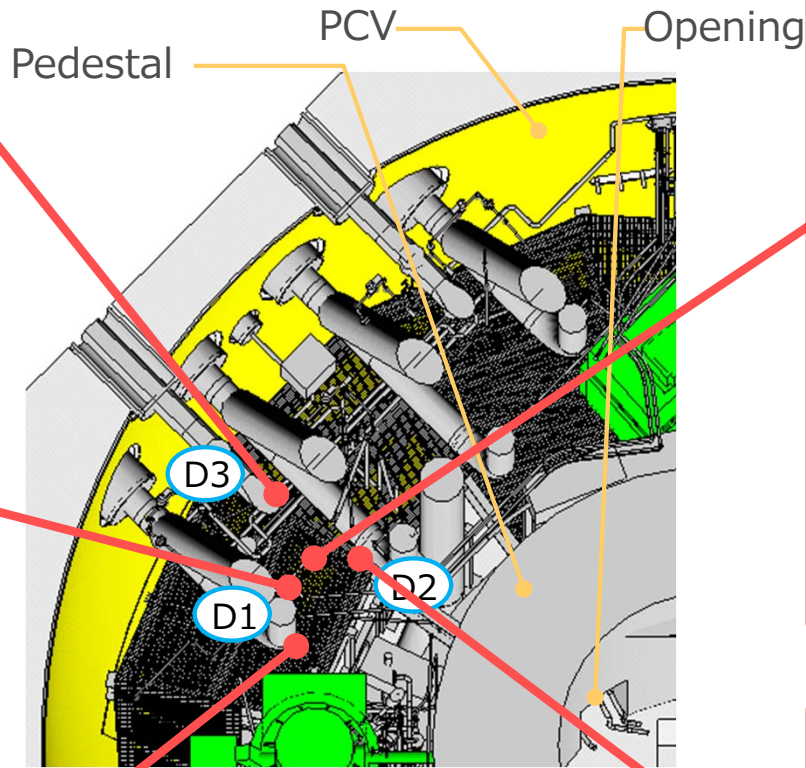


3/19 BG Image near the lowest point

• Details of measurement point is now evaluated.

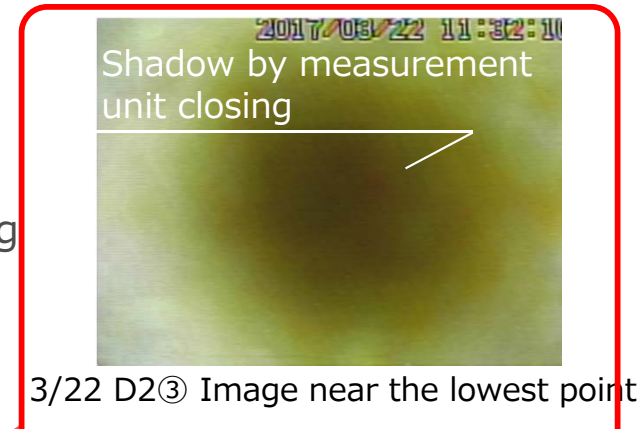
4. Image measurement results

Typical shot images are as follows.



Cross section of 1st floor PCV

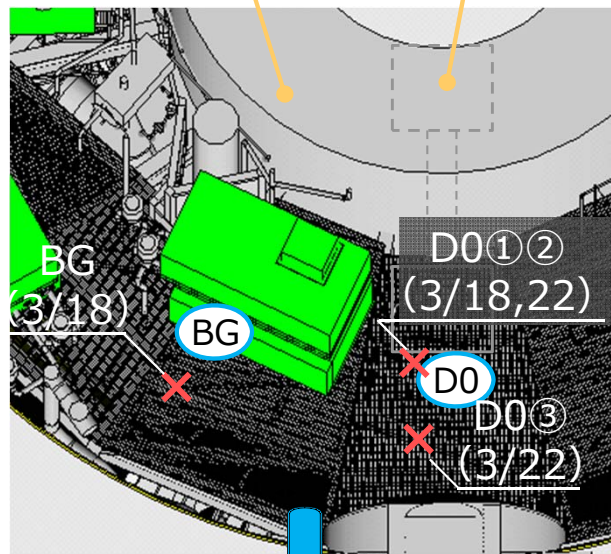
• Details of measurement point is now evaluated.



5. Dose measurement results

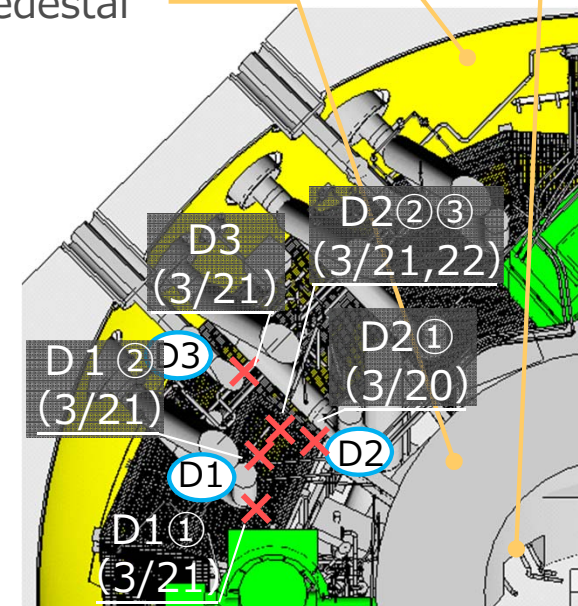
Measurement Point (Measurement date)	BG (3/19)	D0			D1		D2			D3 (3/21)
		① (3/18)	② (3/22)	③ (3/22)	① (3/21)	② (3/21)	① (3/20)	② (3/21)	③ (3/22)	
Dose levels above the grating [Sv/h]	3.8	7.8	6.7	3.6	8.4	8.2	12	9.2	9.3	10
Dose levels at lowermost point [Sv/h] (Height from the floor)	11 (Approx. 0.3m)	1.5 (Approx. 1m)	1.6 (Approx. 0.6m)	5.4 (Approx. 0.3m)	6.3 (Approx. 0.9m)	5.9 (Approx. 0.9m)	6.3 (Approx. 1m)	7.4 (Approx. 0.9m)	9.4 (Approx. 0.9m)	3.0 (Approx. 1.6m)

Pedestal Drain sump



X-100B penetration seal

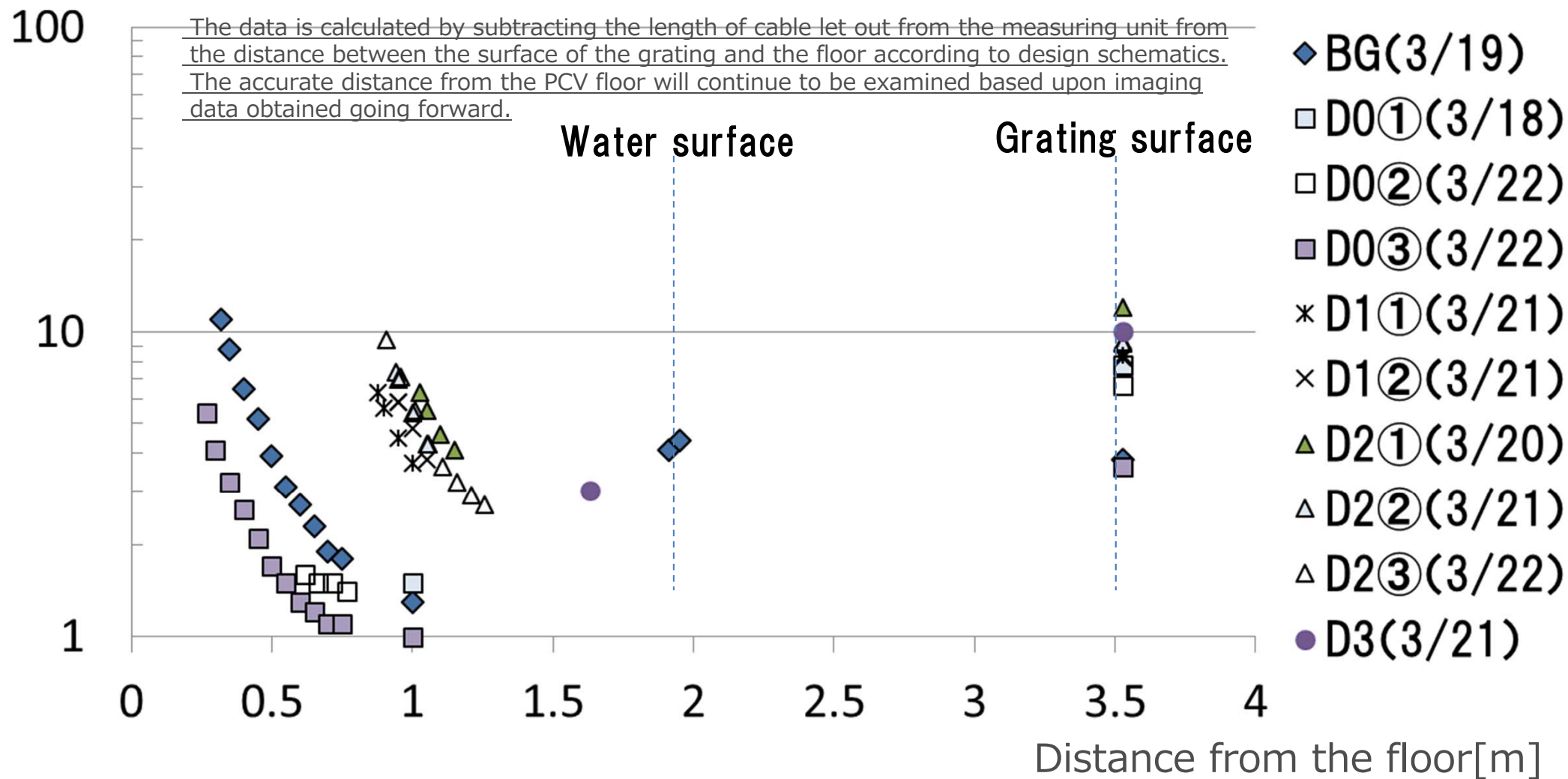
Pedestal PCV Opening



• Detailed measurement points are currently ⁷ being evaluated

6. Dose measurement results

Dose rate[Sv/h]



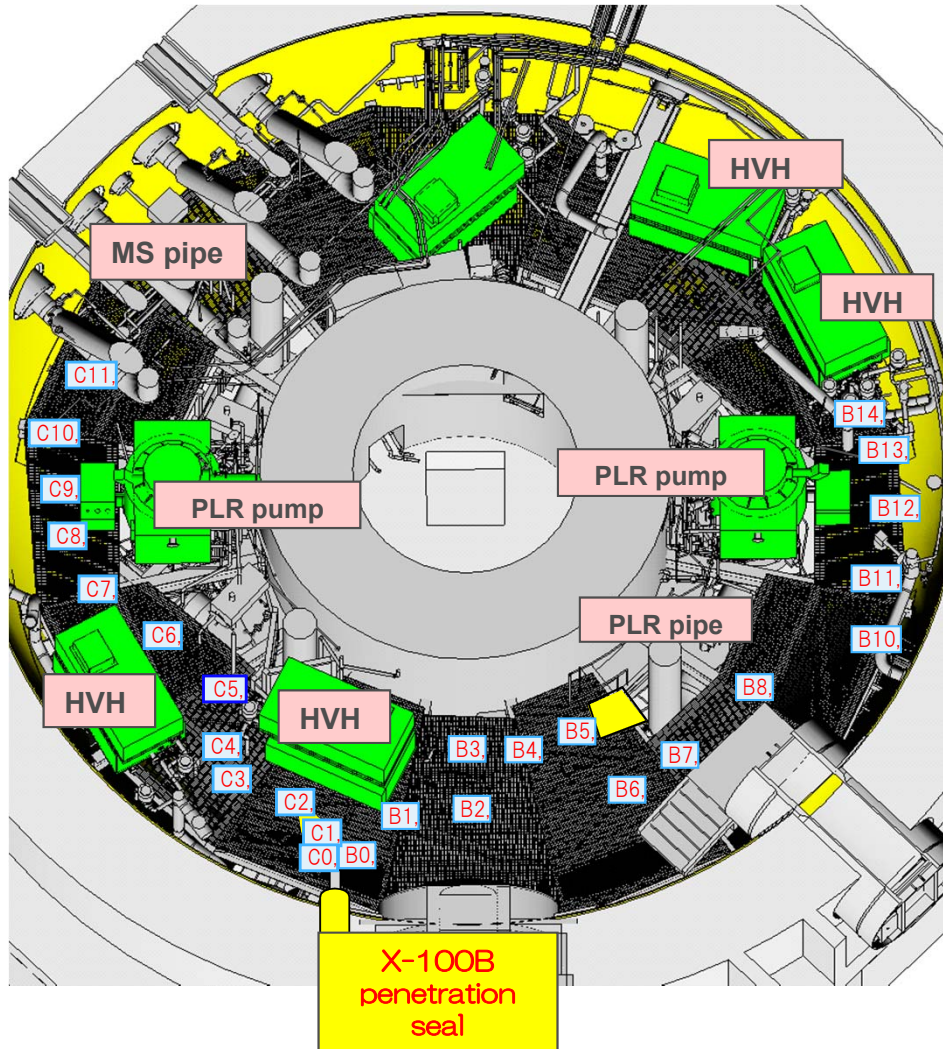
7. Conclusion

This is the first time we can shoot the PCV floor condition near pedestal opening. And we checked that dose is likely to get higher as closing to the PCV floor.

- Deposits were found at the bottom of the PCV and on piping. (The nature of the deposits will be analyzed by examining the images and taking samples of the deposits.)
- Images were taken near the D2 area deposits, and the deposit material was not churned up in the process so it is assumed that the deposit material has a certain amount of mass.
- Dose levels decrease upon submerging into the water, but then rise again as the floor is approached.
- The height from the PCV floor at which dose levels begin to rise differs depending on the measurement point.(There are many possible causes for this. The deposits could be radiation sources, radiation sources under the deposits that have adhered to the underlying structures may be having an impact, or there may be melted fuel near the PCV floor, etc.)
- There has been little change in dose levels above the grating compared to the last time the area was surveyed (April 2015) and no significant damage was found to existing structures.



The conditions on the PCV floor will continue to be examined based on image data and dose level data obtained going forward.



	Dose rate (Sv/h)
B3	7.4
B4	7.5
B5	8.7
B7	7.4
B11	9.7
B14	7.0
C2	6.7
C5	8.3
C6	7.7
C9	4.7
C10	5.3
C11	6.2

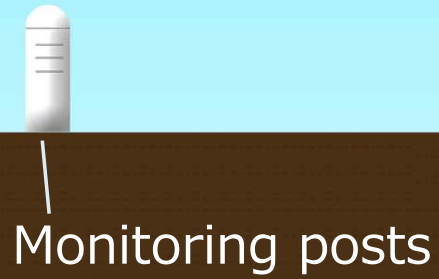
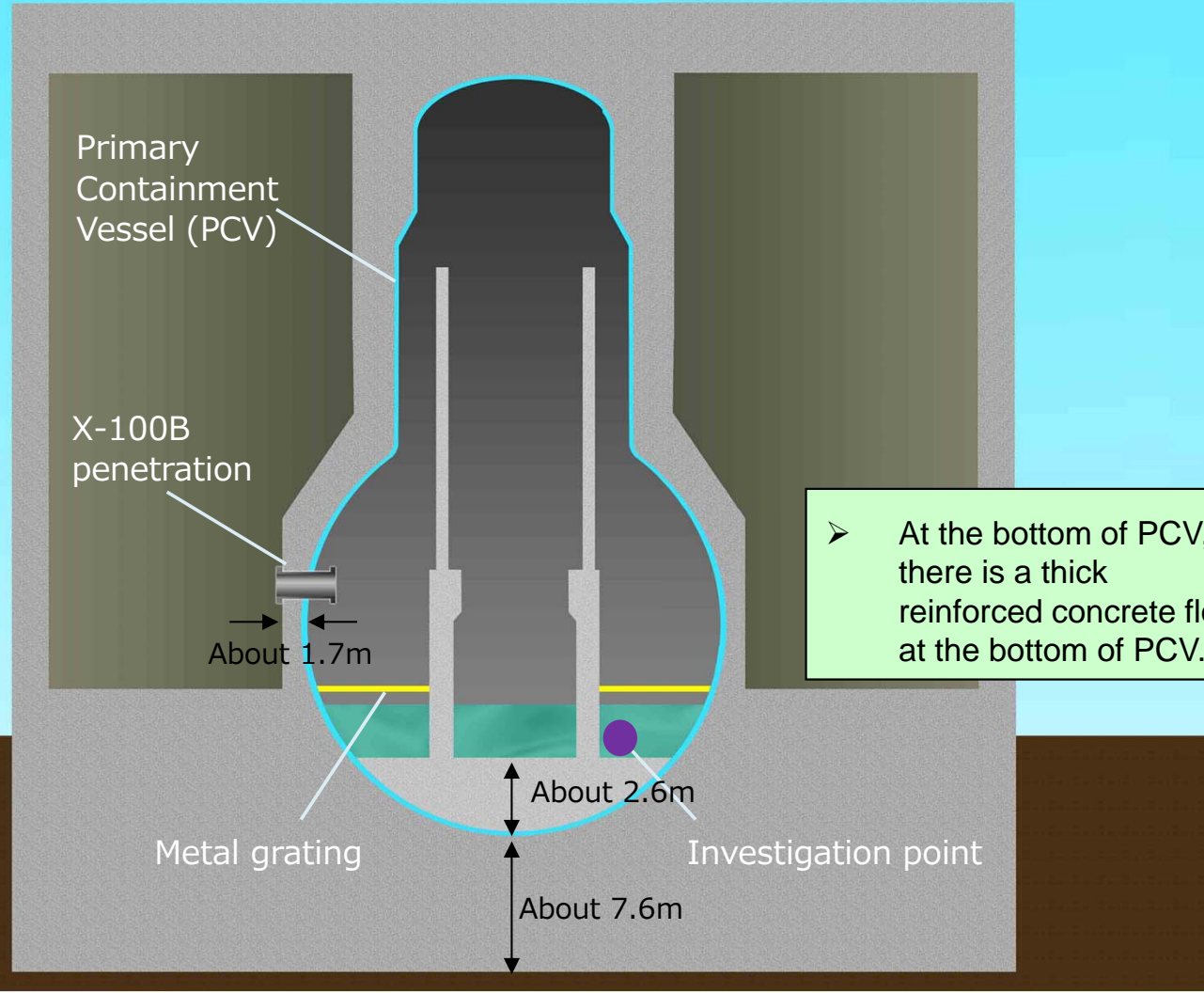
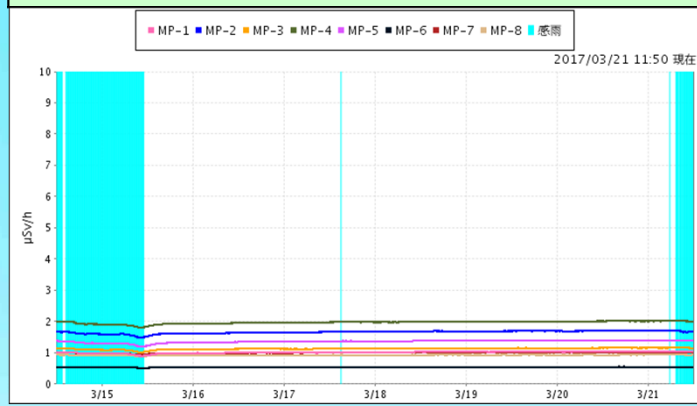
B3~B14 (Measurement date: April 10, 2015)

C2~C6 (Measurement date: April 15, 2015)

C9~C11 (Measurement date: April 16, 2015)

➤ **No radiation impact has occurred to the surrounding environment because the radiation has been reduced by the shielding of PCV concrete walls and steels.**

There are no changes in measurement values at the monitoring posts before and after the investigation.



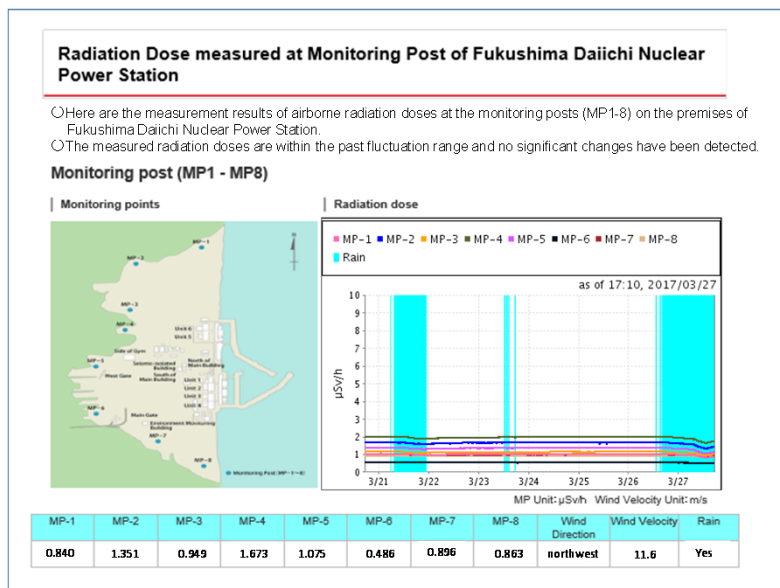
- The radiation level of 12 Sv/h* was measured by a dosimeter during the March 20 investigation, but **the radiation impact has been reduced by the shielding** of PCV concrete walls and steel. **No radiation impact has been observed in the surrounding environment.**

*The radiation rates measured on the metal grating in April 2016 were 4.7-9.7 Sv/h, almost the same levels as the measurement result this time.

- The investigation is conducted **while creating a boundary around the guiding pipe to prevent the air inside the PCV from leaking to the outside.**
- **No significant changes have been observed at the monitoring posts and dust monitors after the investigation, compared to the before.**
- **Real-time data of the monitoring posts and dust monitors along the site boundary are available on the website.**

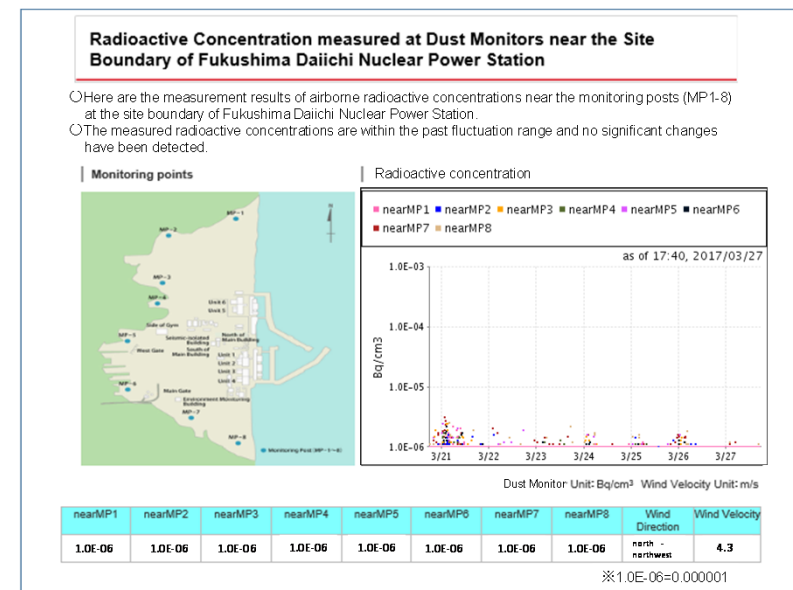
Reference URL: <http://www.tepco.co.jp/en/nu/fukushima-np/f1/index-e.html>

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



As of 0:30 p.m. on March 27, 2017: about 0.5-1.7 $\mu\text{Sv/h}$

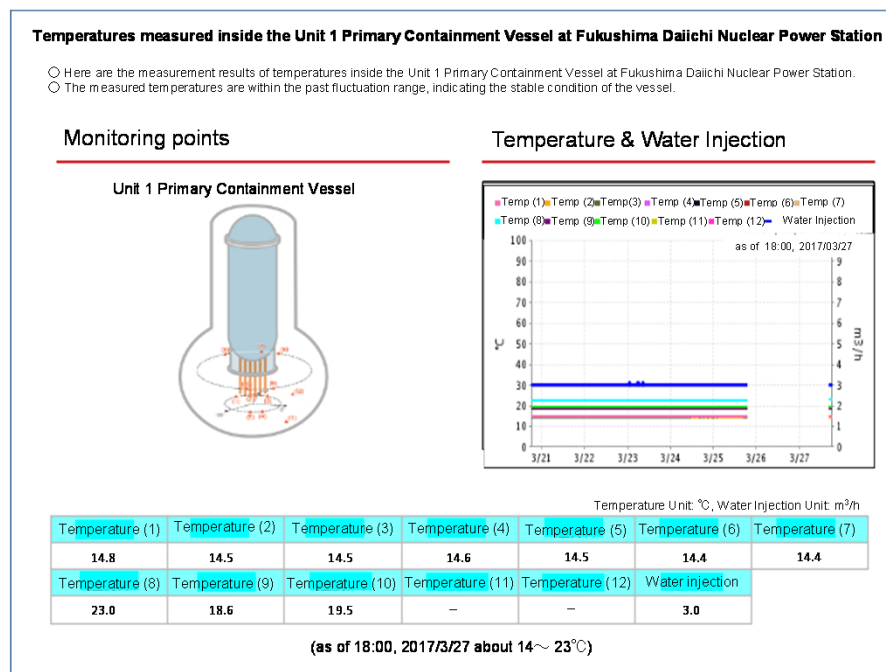
*Radiation dose including the other influence than the PCV interior



As of 0:30 a.m. on March 27, 2017: 1.0E-06Bq/cm³

- **The measurement result during the investigation does not mean that a new phenomenon has occurred in the PCV, but rather the area that has not been investigated since the March 2011 accident was investigated for the first time.**
 *The radiation rates measured on the metal grating in April 2016 were 4.7-9.7 Sv/h, almost the same levels as the measurement result this time.
- **Plant parameters are monitored all the time during the investigation, and no significant changes have been observed in the PCV internal temperatures after the investigation, compared to the before. The condition of cold shutdown has not been changed.**
- **Temperature data inside the PCV are available on the website.**

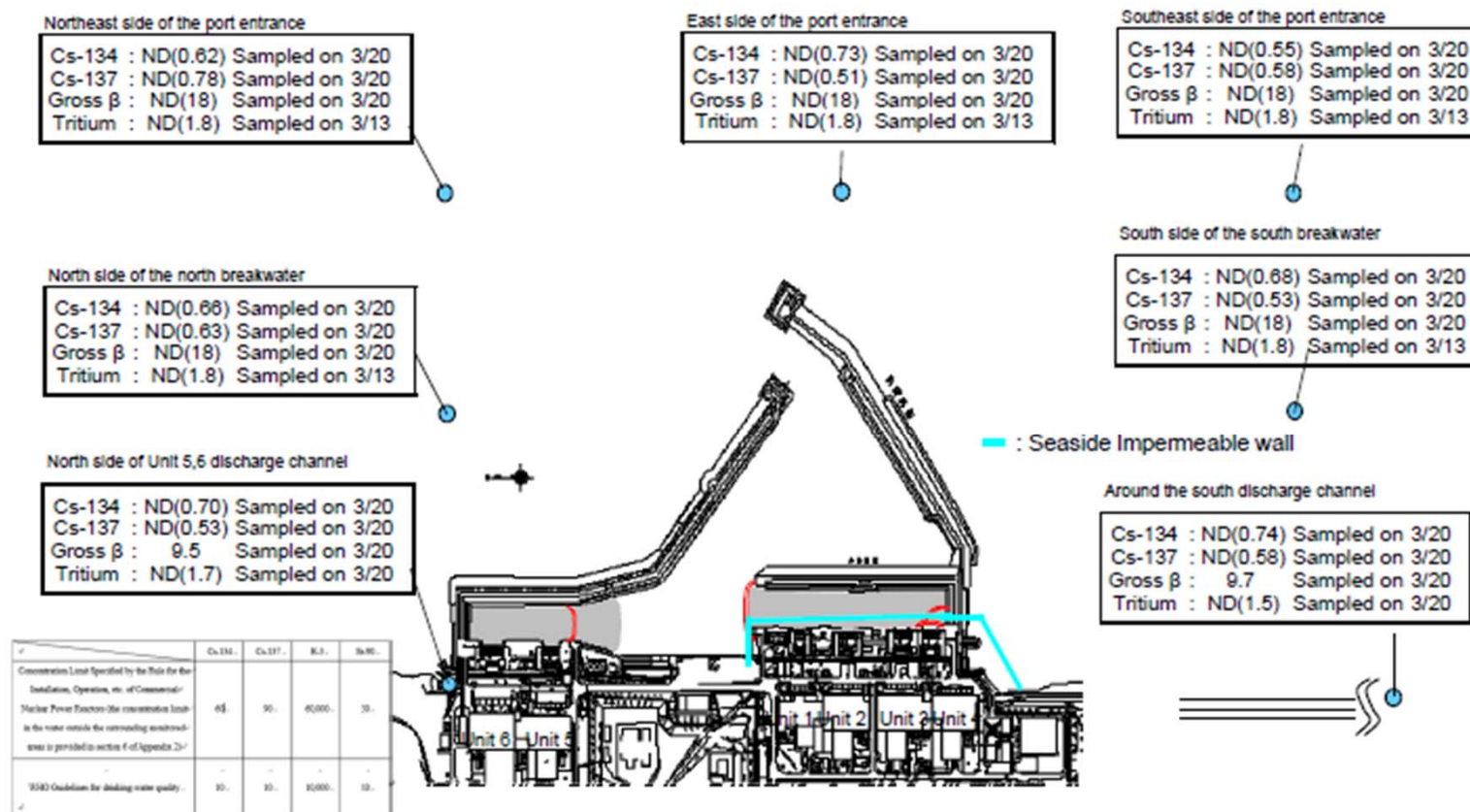
Reference URL: <http://www.tepco.co.jp/en/nu/fukushima-np/f1/pla/index-e.html>



As of 6:00 p.m. on March 27, 2017: about 14-23 °C

- Analysis results of radioactive materials in seawater are monitored, and **no significant changes have been observed after the investigation, compared to the before.**
- Analysis results of radioactive materials in seawater around the Fukushima Daiichi Nuclear Power Station are available on the website.

Reference URL: <http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/index-e.html>



	Cs-134	Cs-137	B-1	B-2
Concentration Limit Specified by the Rule for the Installation, Operation, etc. of Commercial Nuclear Power Reactors (the concentration limit in the water outside the surrounding monitored areas is provided in section 6 of Appendix 2)	40	90	40,000	10
1000 Bq/Limit for drinking water quality	10	10	10,000	10

Concentration Limit Specified by the Rule: Concentration Limit Specified by the Rule for the Installation, Operation, etc. of Commercial Nuclear Power Reactors (the concentration limit in the water outside the surrounding monitored areas is provided in section 6 of Appendix 2)

As of 12:00 a.m. on March 27, 2017: ND for Cesium134 and Cesium137, ND-9.7 Bq/L for Grossβ