Drops in Water Levels in the Fukushima Daiichi Unit 1 and Unit 3 Primary Containment Vessels

February 25, 2021

Tokyo Electric Power Company Holdings, Inc.

Overview

- On February 18, 2021, as parameters, such as primary containment vessel water levels and temperature, etc., were being monitored, the Unit 1 primary containment vessel water level gauge indicated a drop in water level.

- Other parameters were checked and it was found that some of the temperature gauges in the primary containment vessels for Unit 1 and Unit 3 have been showing decreasing trends since February 15 and February 17, respectively. This data taken with other parameter assessments led us to determine on February 19 that water levels in the Unit 1 and Unit 3 primary containment vessels are decreasing.

- Thereafter on February 21, we confirmed a decrease in pressure in the Unit 1 primary containment vessel which we assume was caused by gas phase exposure of the vacuum rupture line bellows (we have seen similar pressure decreases during reactor cooling water injection suspension tests performed to date)

- Furthermore, since no significant fluctuations have been seen with temperatures at the bottom of the primary containment vessels, containment vessel gas management system noble gas monitors and dust monitors, site boundary monitoring posts and dust monitors, on-site dust monitors, or reactor building water levels, we have determined that there is no off-site impact.

- During inspections on February 13 following the earthquake, no abnormalities were found with reactor cooling water injection equipment parameters or during visual inspections, and we confirmed that cooling water is being injected into reactors in a suitable manner.

- It is possible that the cause of the drops in primary containment vessel water levels may be the result of changes to damaged portions of the primary containment vessel caused by the earthquake that occurred at 11:08PM on February 13, so we will continue to watch and monitor parameters.

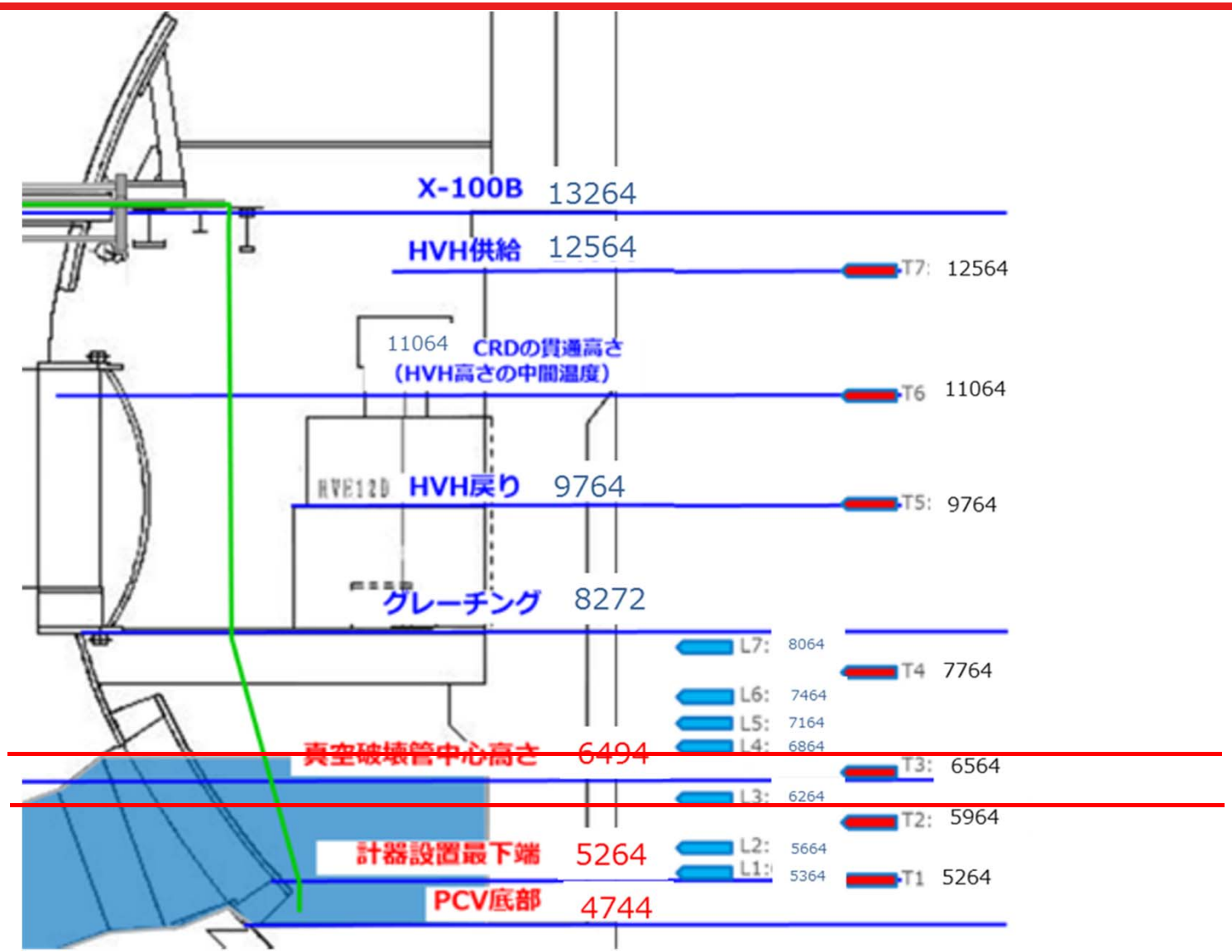
- In response to the decrease in water level in the primary containment vessels, we will increase the amount of cooling water being injected when the water level gauge falls below L2 (current injection rate is approximately 3.0m³/hour. This will be increased to approximately 4.0m³/hour. And the same measures will be implemented at Units 1 and 3), and we shall assess the impact on short-term/long-term water treatment plans from the need to treat more water in conjunction with the increase in cooling water injection rate.

Chronological order of events that led to the determination that primary containment vessel water levels were dropping

TEPCO

- Around 11 PM, February 18
- During regular data sampling of operation logs, shift personnel discovers that water level in the Unit 1 primary containment vessel had dropped from L3 to L2.
- Parameters related to Unit 1 primary containment vessel water level fluctuations are checked.
- February 19
- News that the Unit 1 primary containment vessel water level has dropped from L3 to L2 is shared amongst departments on site.
- Relevant departments on site discuss and assess the possible causes of the drop in water level in the Unit 1 primary containment vessel.
- The following is discovered during this process:
  - ✓ It is found that at Unit 1, some temperatures in the primary containment vessel have shown decreasing trends since February 15.
  - ✓ At Unit 3, it is found that some temperatures in the primary containment vessel have shown decreasing trends since February 17, and that water level in the primary containment vessel is showing decreasing trends.
- As a result of a comprehensive assessment of all the aforementioned information the conclusion is drawn at around 5:00PM that water levels in the Unit 1 and Unit 3 primary containment vessels are decreasing.

Unit 1 primary containment vessel temperature gauge/water level gauge installation heights

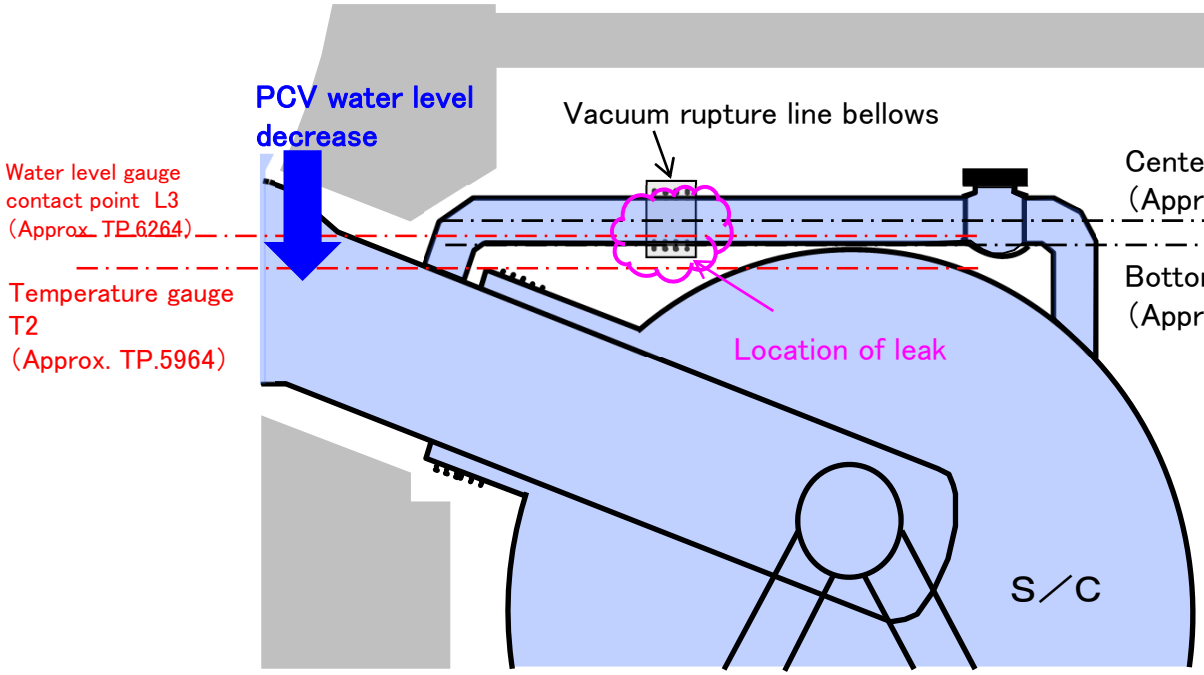


Water level on February 13 prior to the earthquake

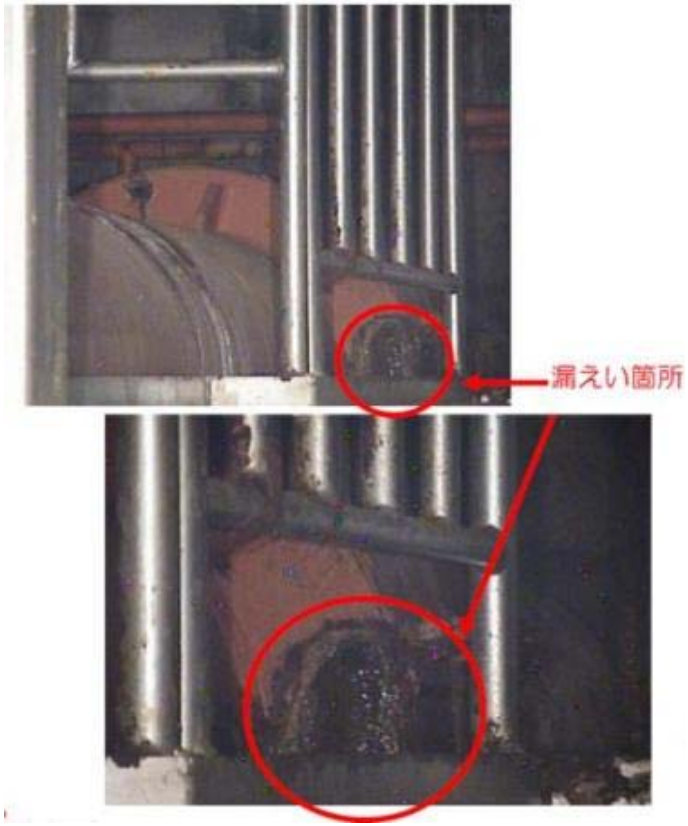
Current water level (February 25) (estimated)

Installation height is indicated using elevation （T.P.）

(Reference) Unit 1 Estimated location of the PCV leaks (1/2)

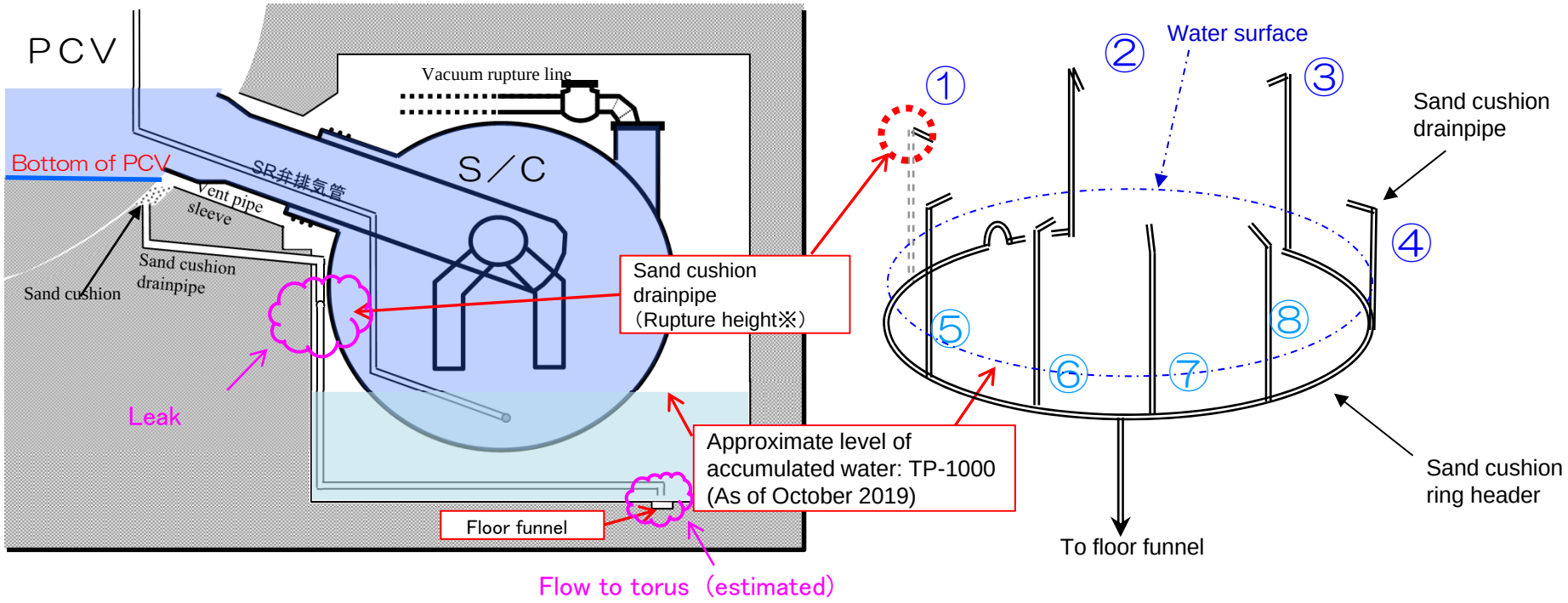


(Vacuum rupture line bellows leak status: From 2014 investigation)



- Investigations performed to date at Unit 1 have found leaks from the vacuum rupture line bellows and damaged parts of the sand cushion drainpipes.
- The installation height of the vacuum rupture line bellows almost matches the height of leaks estimated from the behavior of D/W pressure during reactor cooling water injection suspension tests.

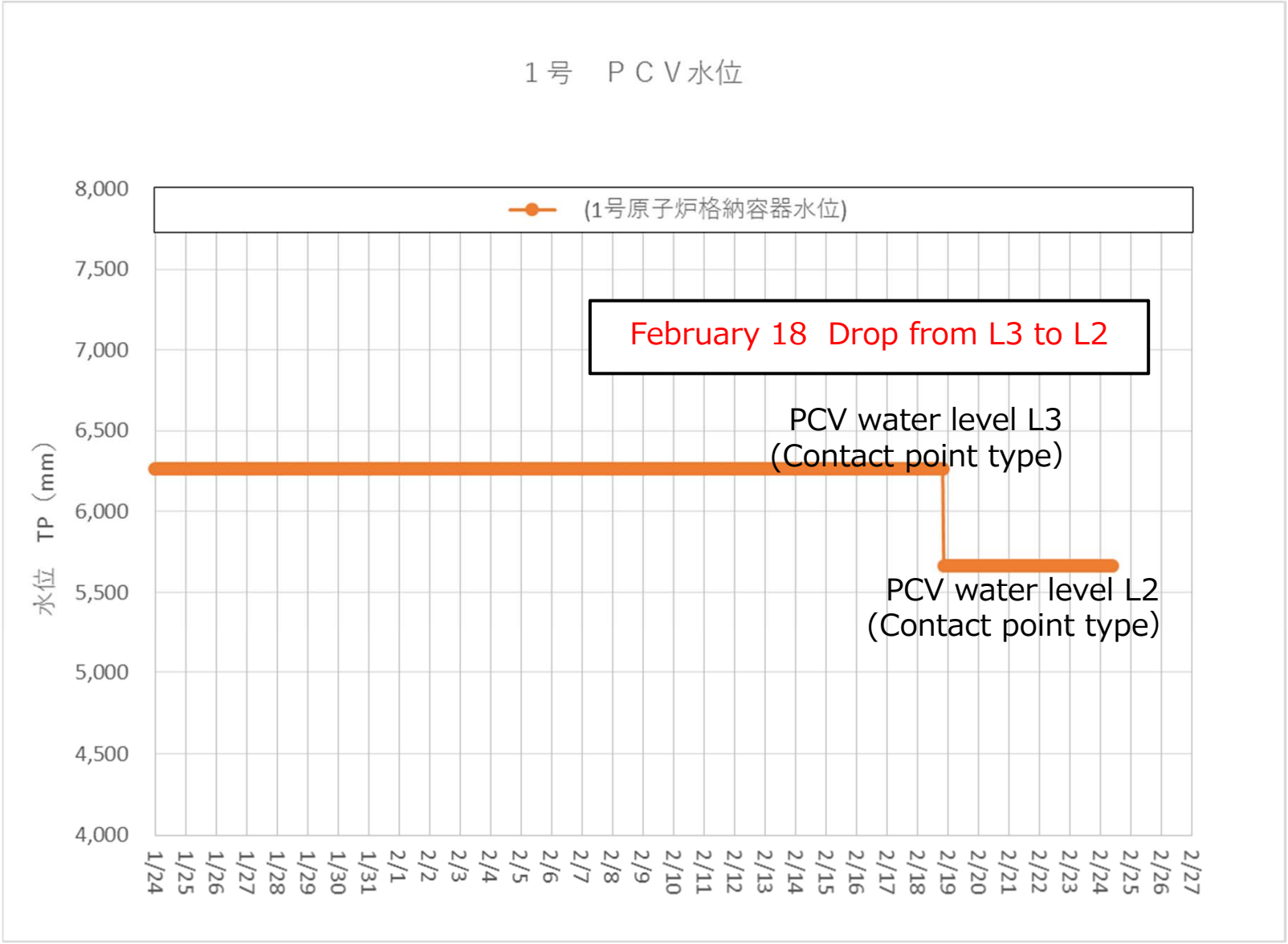
(Reference) Unit 1 Estimated location of the PCV leaks (2/2)



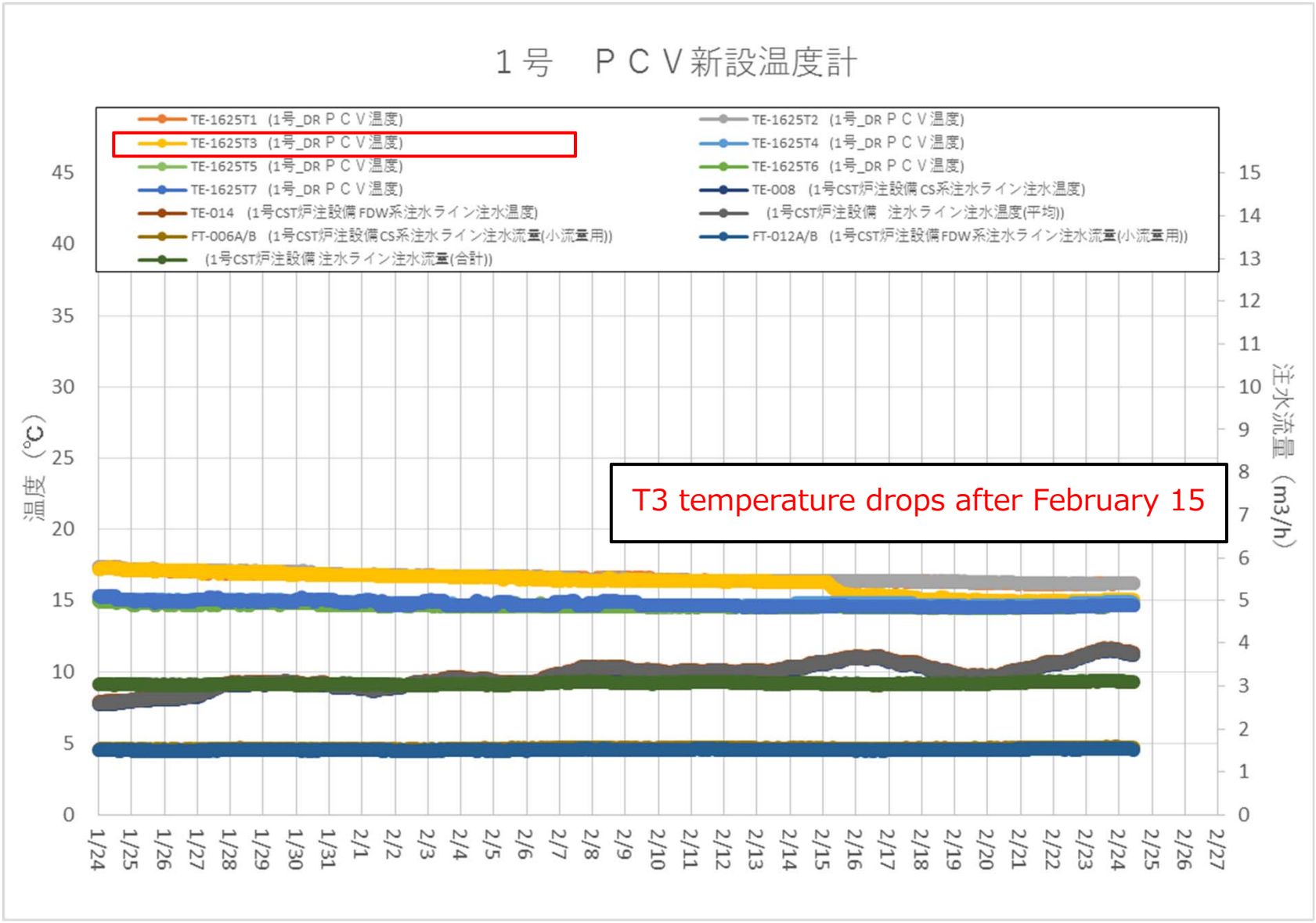
※ There are eight sand cushion drainpipes and one has a rupture that is exposed to the air.

- The only leak found from sand cushion drainpipes is from a pipe that has a rupture that is exposed to the air. However, it is possible that there may be leaks from the PCV from the other seven pipes under the water (near the floor funnel, for example).

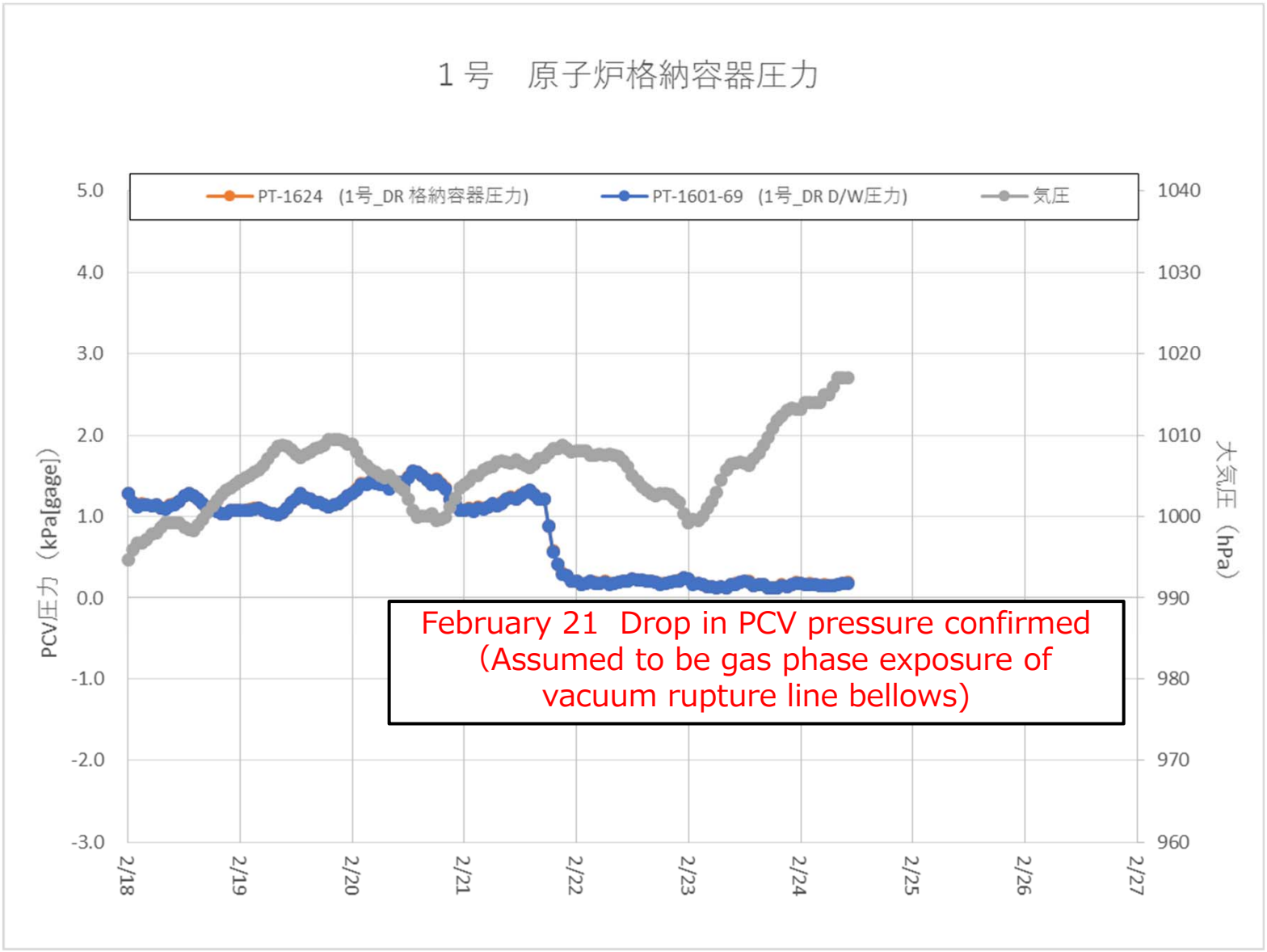
Unit 1 primary containment vessel water level



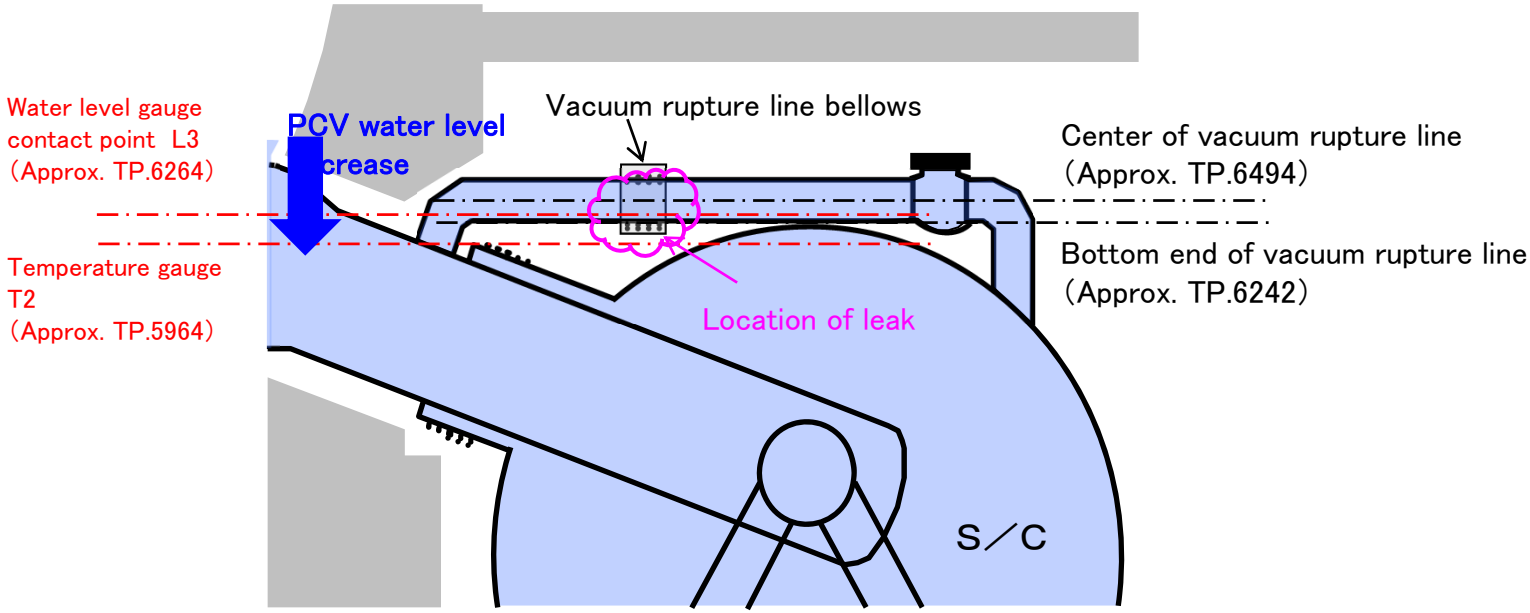
Unit 1 primary containment vessel temperatures



Unit 1 primary containment vessel pressure

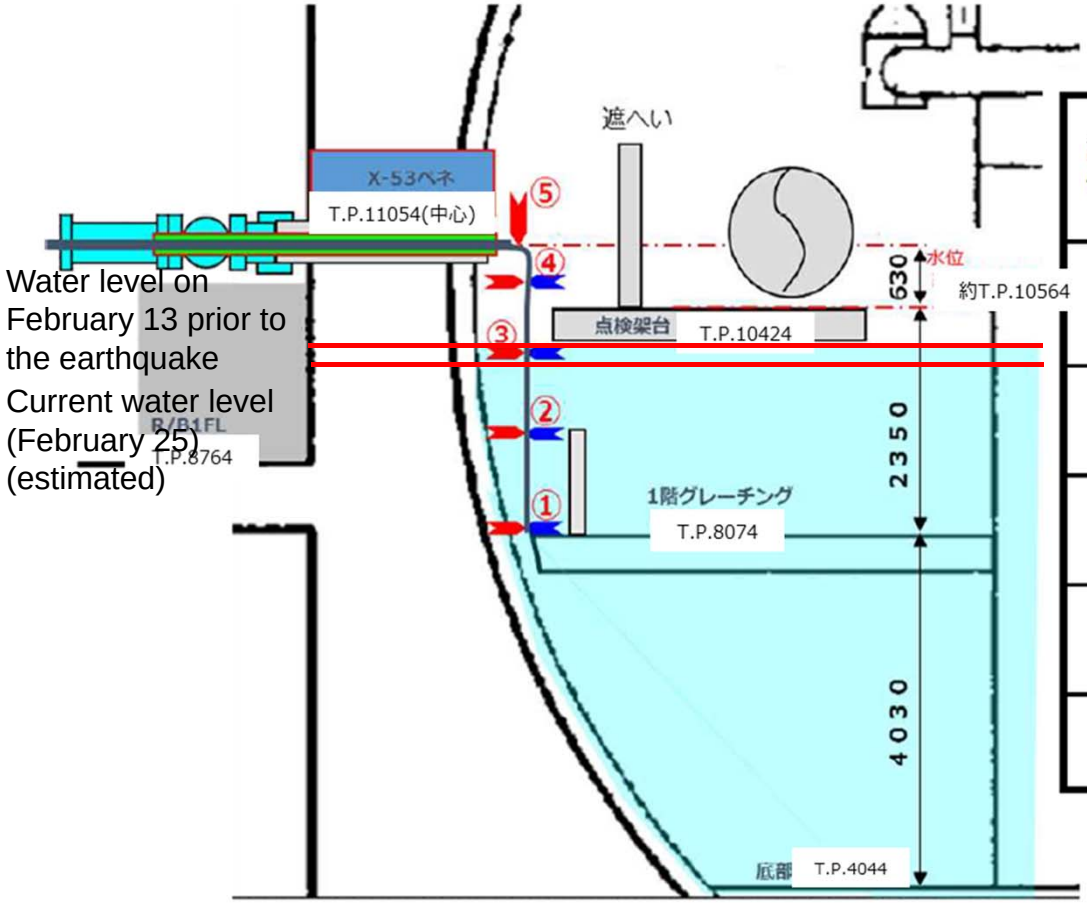


Information about the drop in Unit 1 primary containment vessel pressure



- On February 21, pressure in the Unit 1 primary containment vessel dropped to approximately the same as atmospheric temperature and has remained at slightly positive pressure ever since.
- Normally, primary containment vessel pressure is kept above atmospheric pressure to prevent the influx of oxygen, and nitrogen inclusion flow is kept above the exhaust flow from primary containment vessel gas management system.
- Since it is assumed that the water level in the primary containment vessel at the time of the drop in pressure was between water level gauge contact point L3 and the temperature gauge T2, it is assumed that pressure in the primary containment vessel dropped as a result of the water level dropping to the point of the vacuum rupture line bellows. (The same phenomenon has been observed during reactor cooling water injection suspension tests)
- No significant fluctuations have been seen in readings from monitoring posts and dust monitors at site boundaries, or on-site dust monitors, so it has been determined that there is no off-site impact.

Unit 3 primary containment vessel temperature gauge/water level gauge installation heights



Water level on February 13 prior to the earthquake

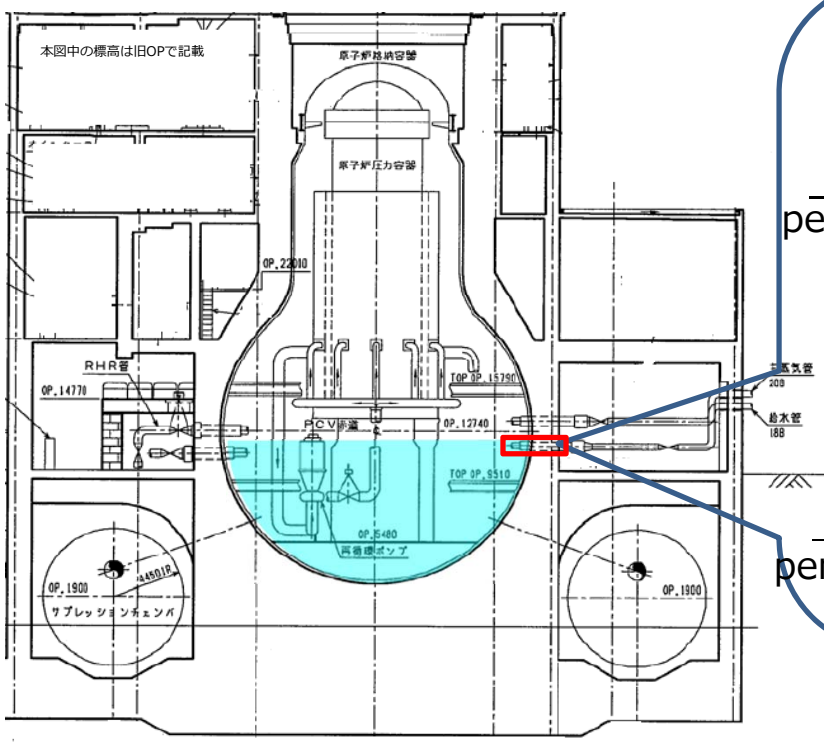
Current water level (February 25) (estimated)

計器位置	設置計器		設置位置 (T.P)
	温度計	水位計	
⑤	TE-16-005	—	約10964
④	TE-16-004	LS-16-004	約10714
③	TE-16-003	LS-16-003	約10064
②	TE-16-002	LS-16-002	約9264
①	TE-16-001	LS-16-001	約8264

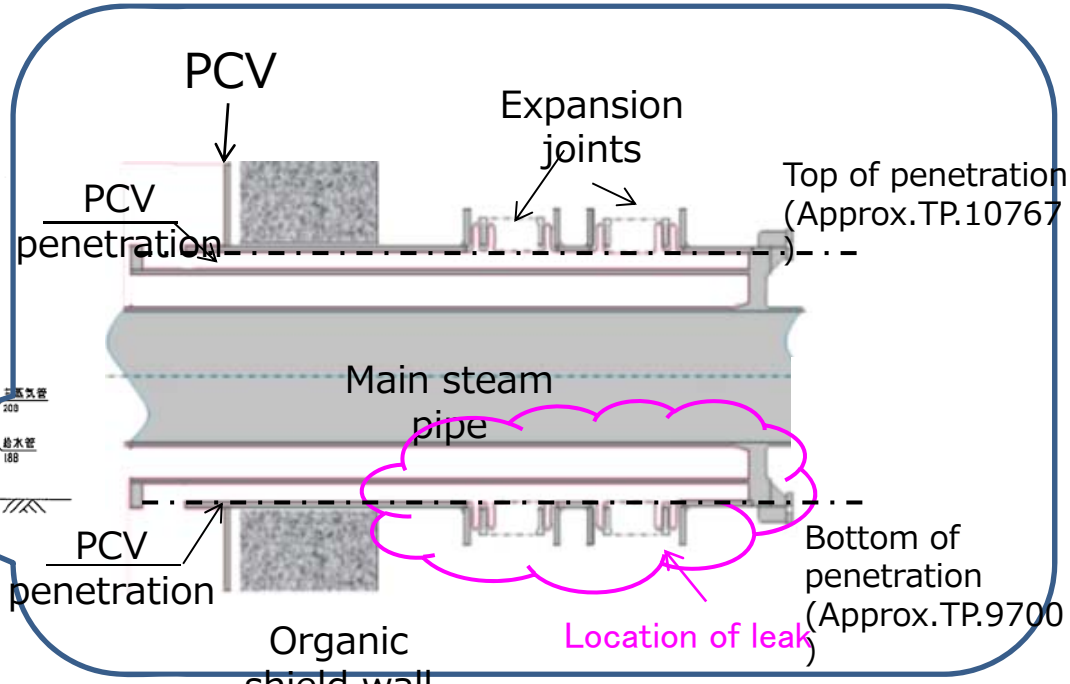
高さはT.Pで記載

(Reference) Unit 3 Estimated location of the PCV leaks

- Investigations at Unit 3 to date have found leaks from the expansion joints of main steam pipes.

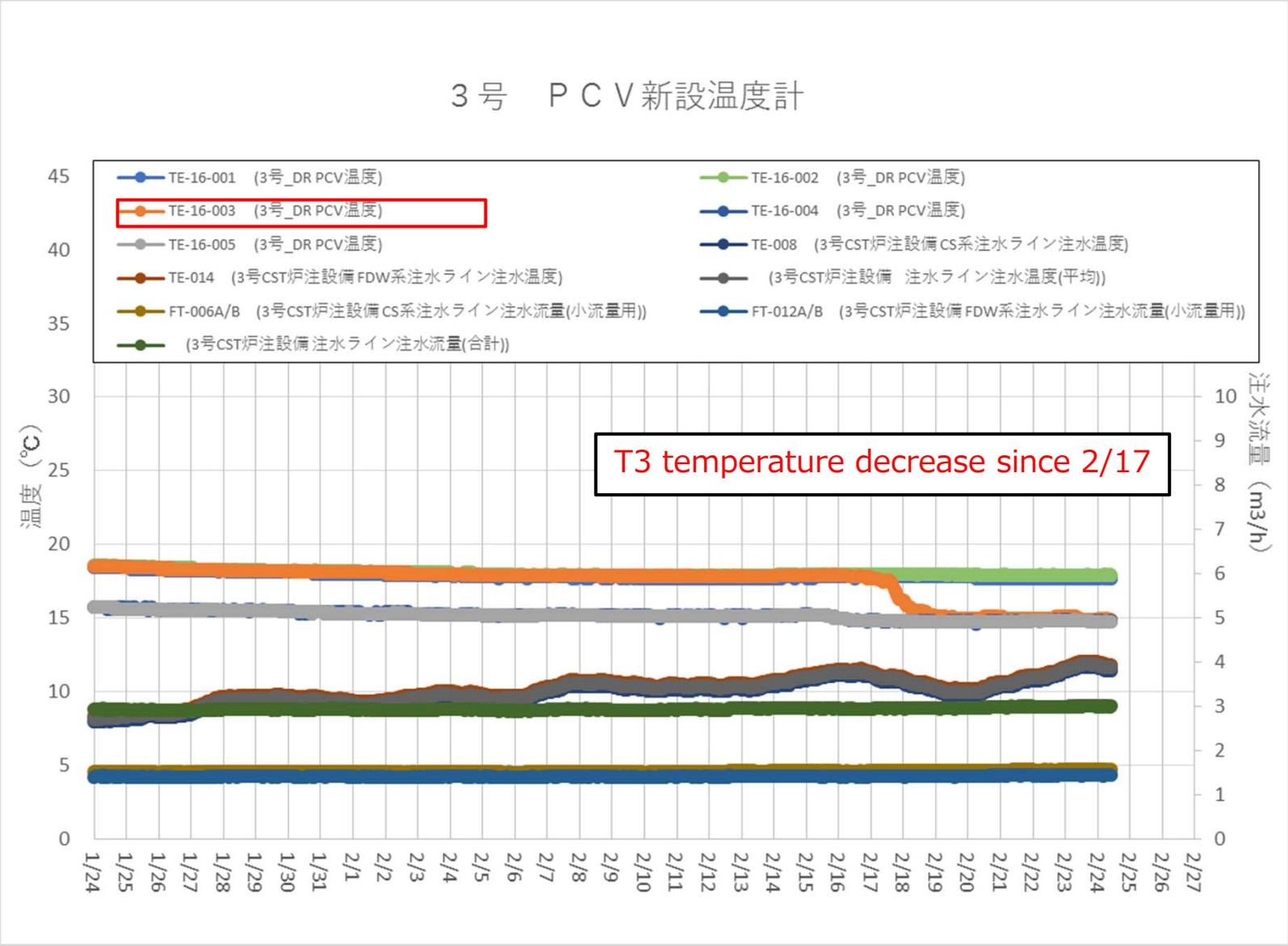


Unit 3 Reactor building cross-section



Close-up of main steam pipe penetration

Unit 3 primary containment vessel temperatures, etc.



Unit 3 primary containment vessel water level