Progress of Landside Impermeable Wall freezing: the Second Stage

January 26, 2016

TEPCO

Tokyo Electric Power Company Holdings, Inc.

Contents

Landside impermeable wall

- The purpose of the Landside Impermeable Wall construction lies not in freezing soil to form an underground wall but in keeping groundwater from flowing into the reactor/turbine buildings and preventing new contaminated water from being generated.

- By closing less than 95 percent of the mountain side of the Landside Impermeable Wall in Phase 2 of the first stage, it is expected that the amount of groundwater flowing into the areas around the reactor/turbine buildings will be reduced. This will help keep groundwater from being contaminated during the first stage.

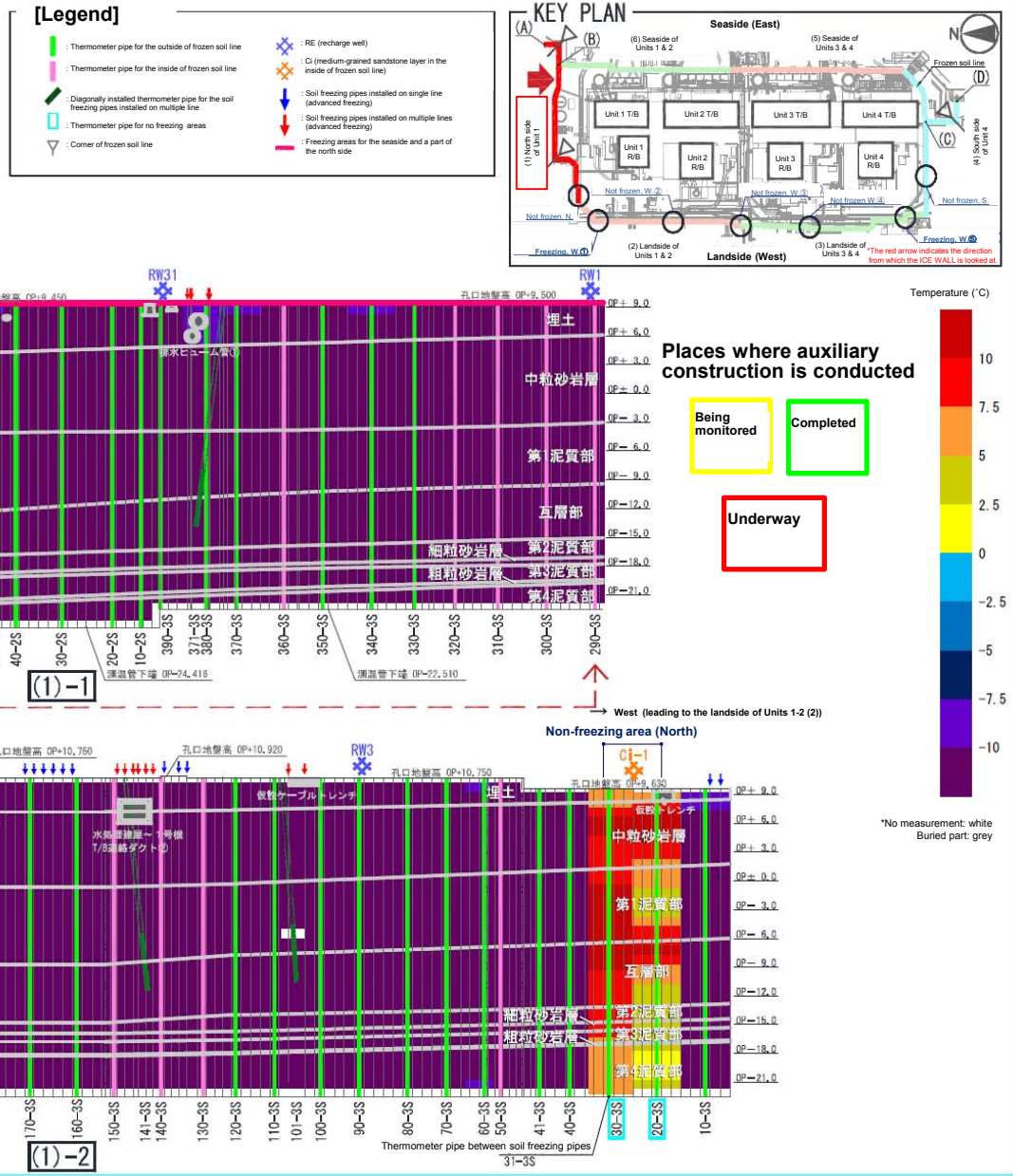
- Throughout the first stage, how freezing of the Landside Impermeable Wall has progressed will be checked by monitoring the difference in groundwater levels inside and outside of the wall and the amount of groundwater pumped up by the subdrain and groundwater drain systems and the well point system.

2-1 Distribution map of soil temperatures (north side of Unit 1)

■ Distribution map of soil temperatures

(1) North side of Unit 1 (a view from the north side)

(The temperature data as of 7 a.m. on January 24)

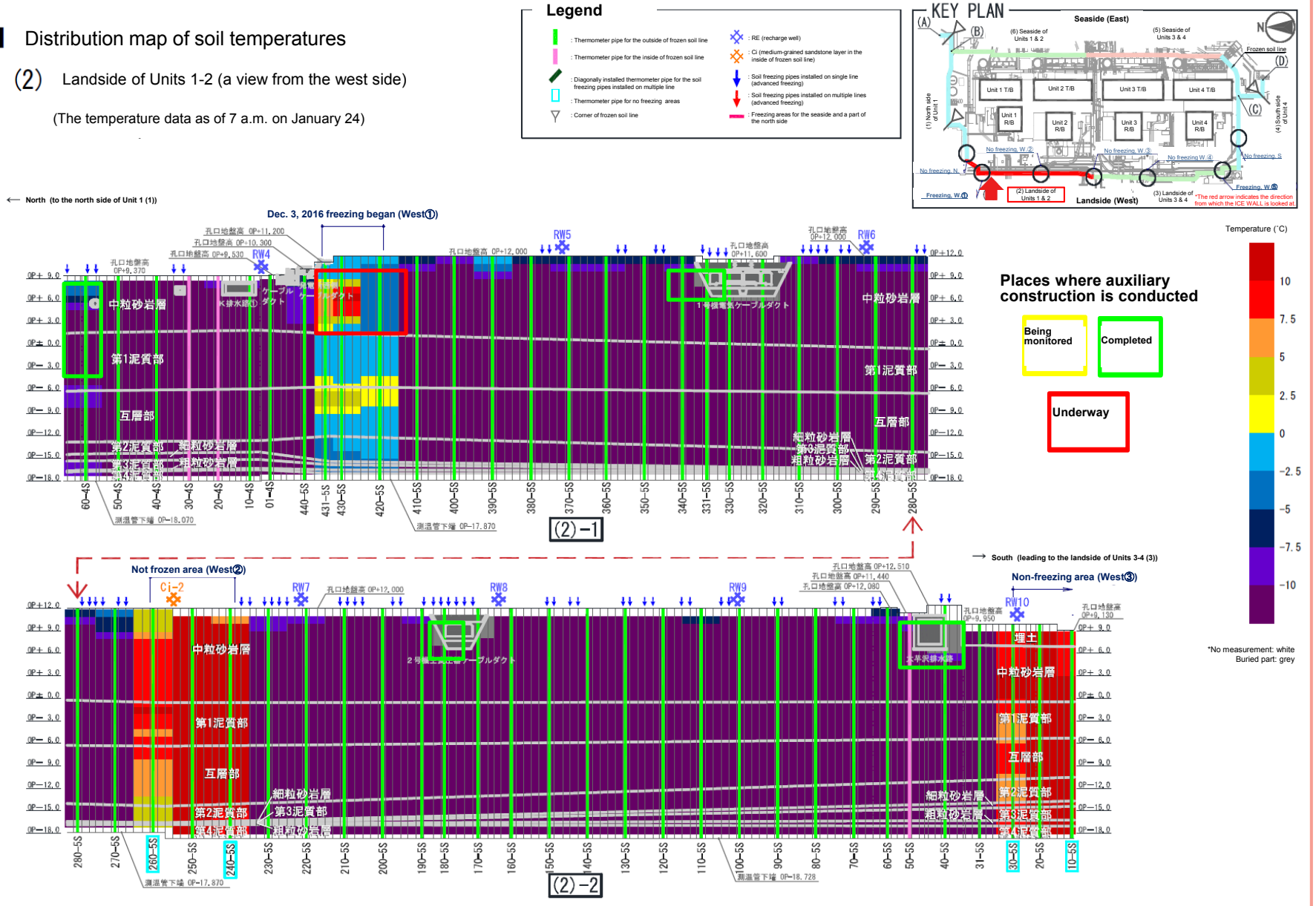


2-2 Distribution map of soil temperatures (west side of Units 1-2)

■ Distribution map of soil temperatures

(2) Landside of Units 1-2 (a view from the west side)

(The temperature data as of 7 a.m. on January 24)

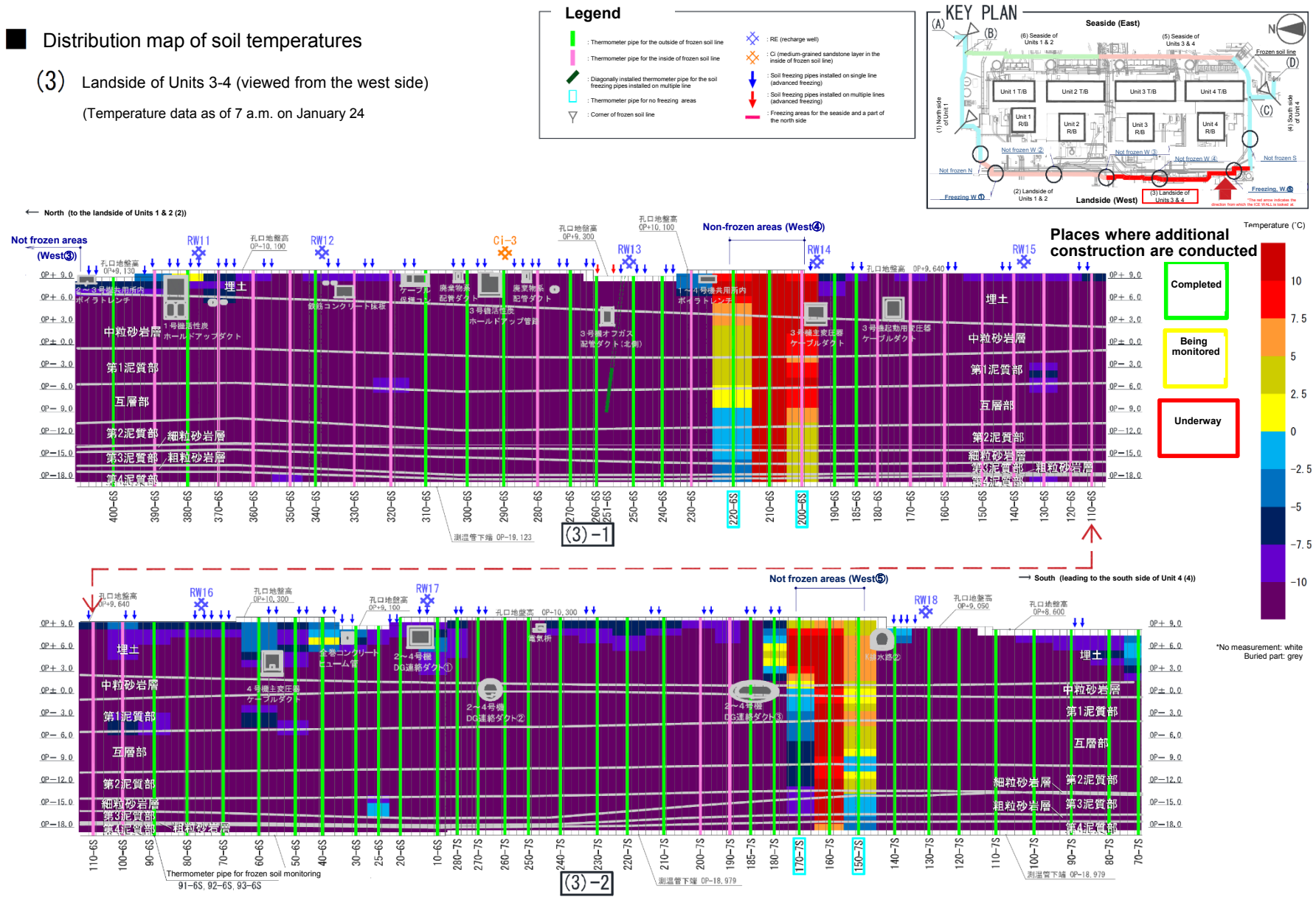


2-3 Distribution map of soil temperatures (west side of Units 3-4)

■ Distribution map of soil temperatures

(3) Landside of Units 3-4 (viewed from the west side)

(Temperature data as of 7 a.m. on January 24

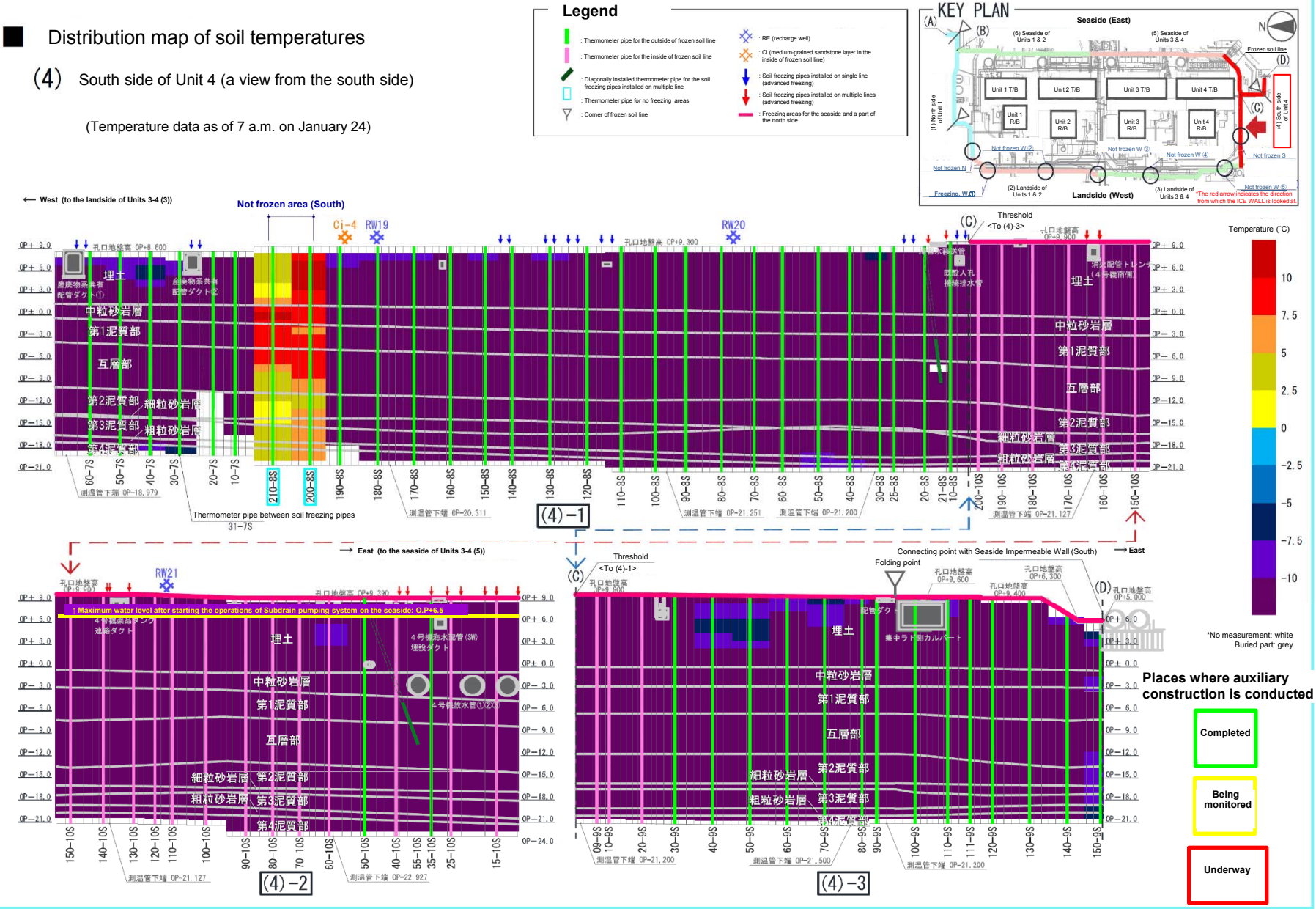


2-4 Distribution map of soil temperatures (south side of Unit 4)

■ Distribution map of soil temperatures

(4) South side of Unit 4 (a view from the south side)

(Temperature data as of 7 a.m. on January 24)

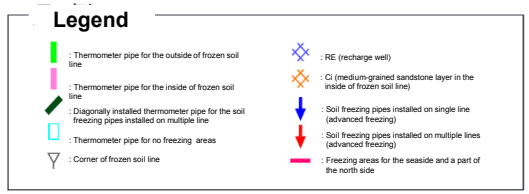


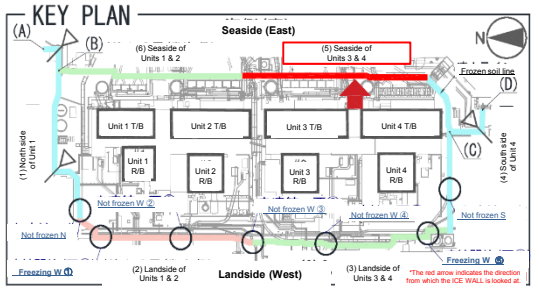
2-5 Distribution map of soil temperatures (east side of Units 3-4)

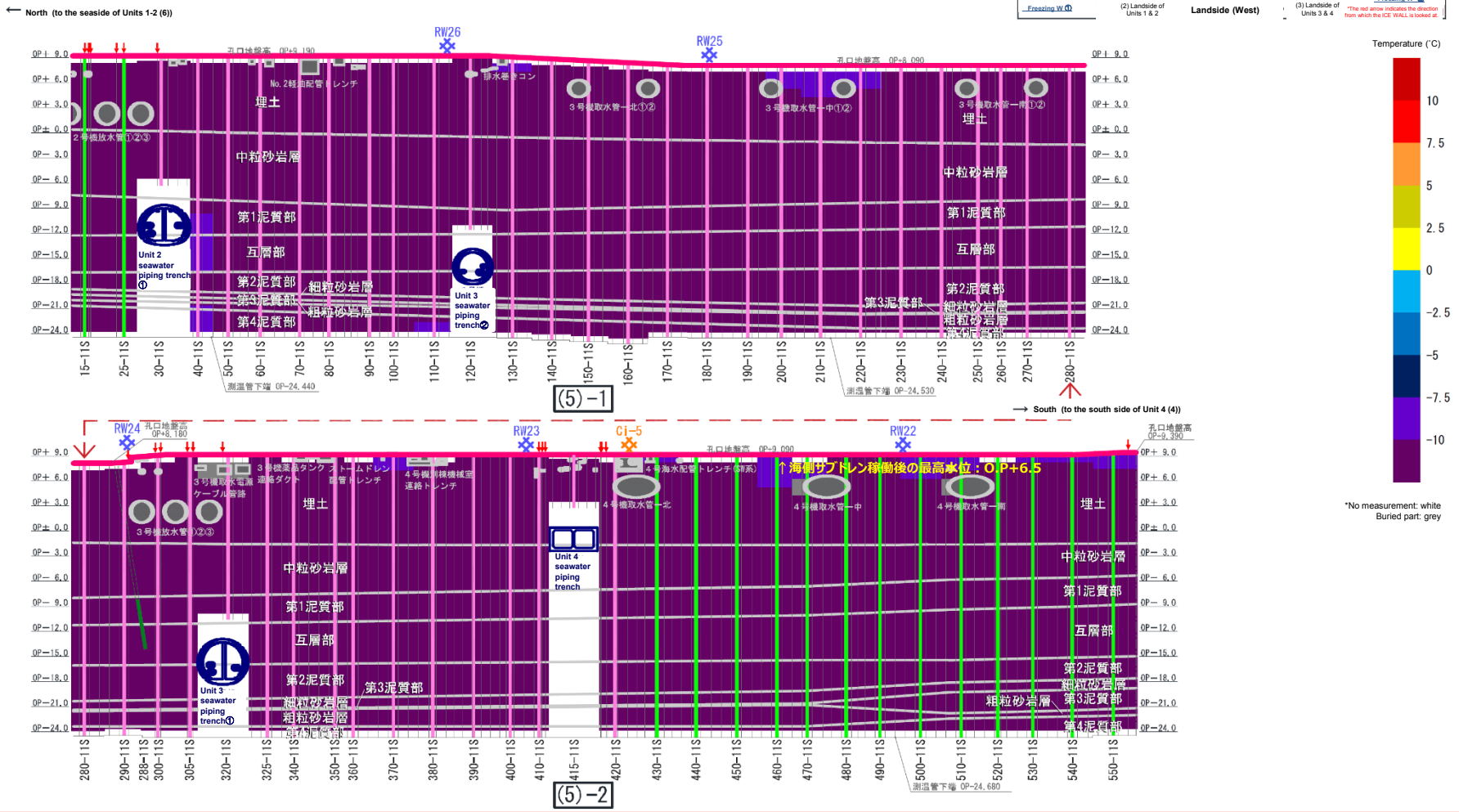
■ Distribution map of soil temperatures

Seaside of Units 3-4
(west side: a view from the inside of frozen soil)

(Temperature data as of 7 a.m. on January 24)





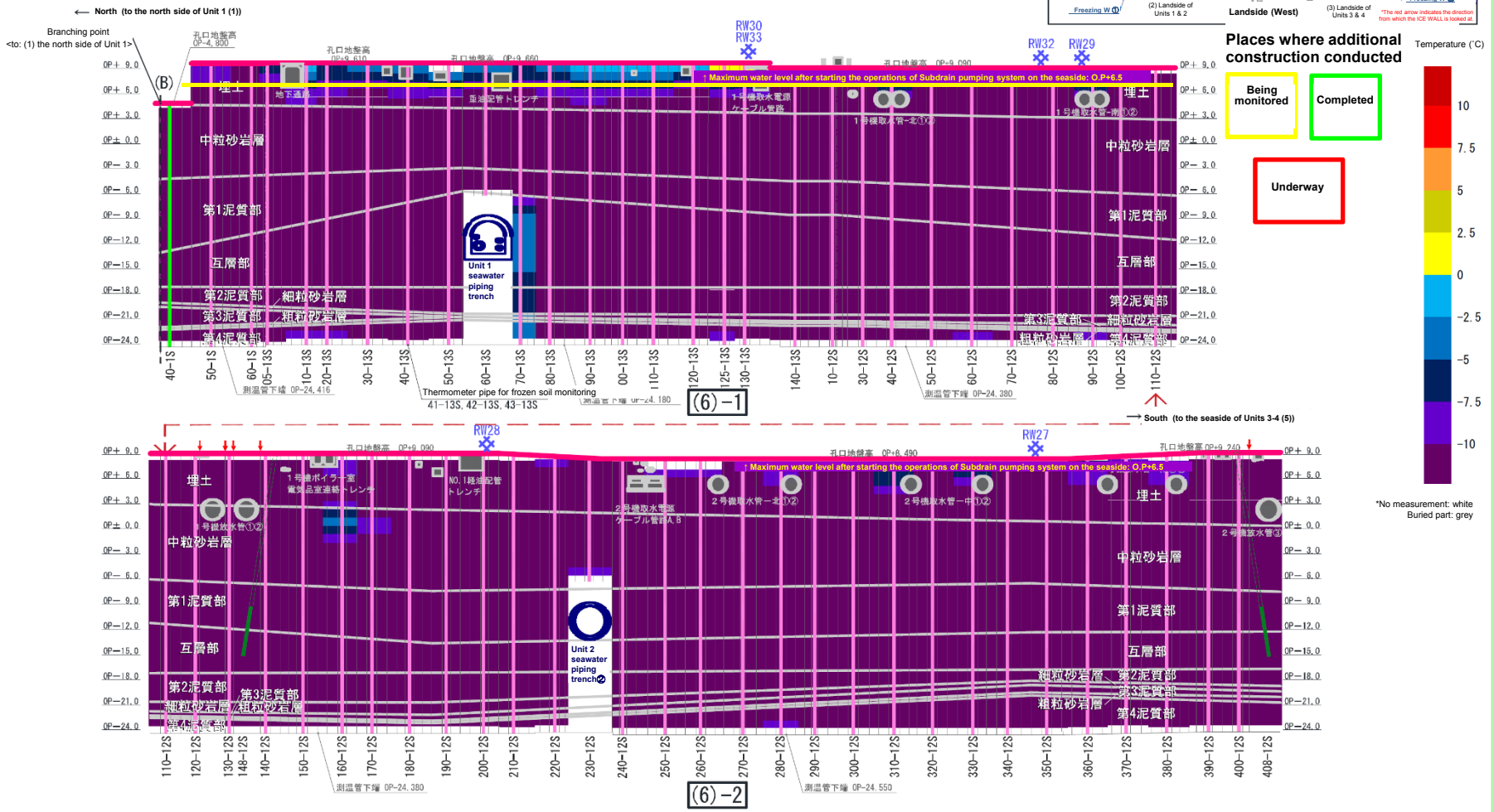


2-6 Distribution map of soil temperature (east side of Units 1-2)

Distribution map of soil temperatures

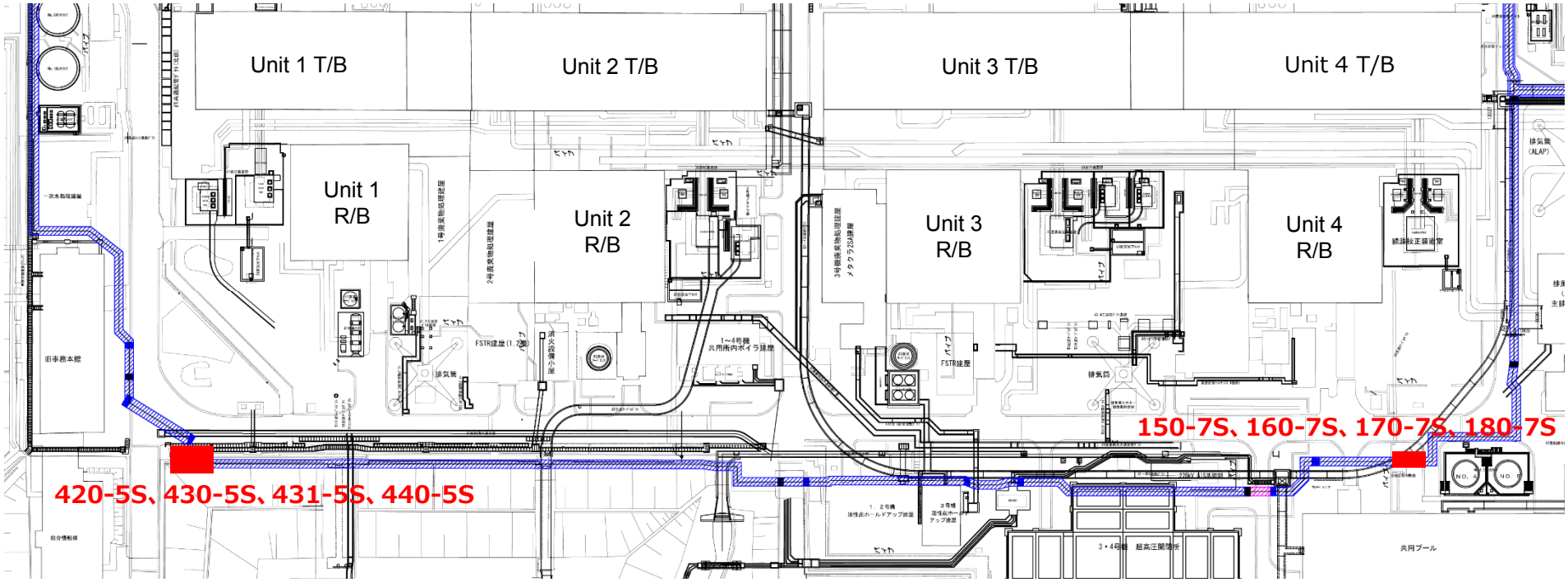
Seaside of Units 1-2
(west side: a view from the inside of frozen soil)

(Temperature data as of 7 a.m. on January 24)



3-1 Additional construction to further freeze the areas where soil freezing began on December 3 (as of Tuesday, January 24)

To further freeze the areas where soil freezing began on Dec. 3, 2016, additional construction (chemical injection) will be applied to the points where soil temperatures are expected not to go below 0℃ a month later.

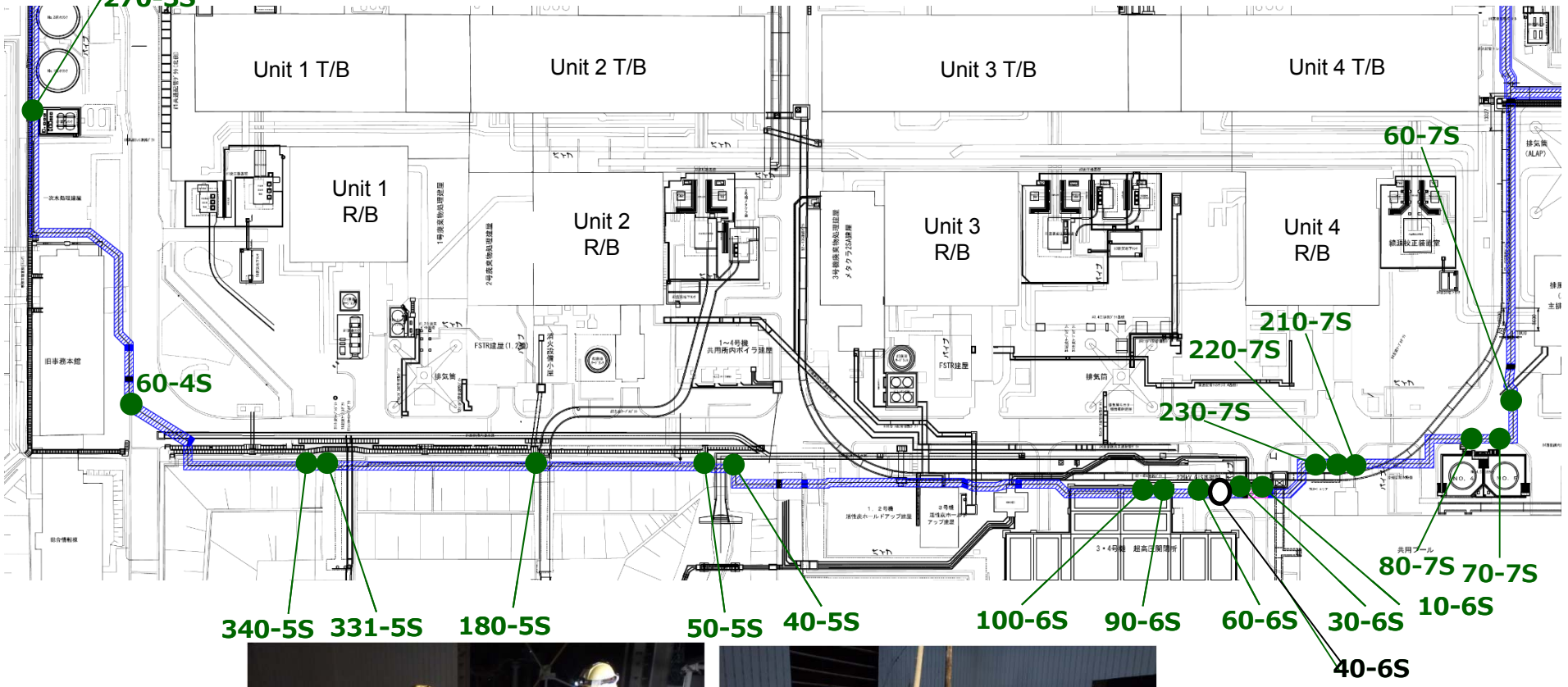


Legend
- : Completed
- : Being monitored
- : In progress
- : Yet to take place

3-2 Additional construction on the landside except for the areas where soil freezing began on December 3 (as of Tuesday, January 24)

TEPCO

Result of Additional construction – went below 0℃



Legend
- : Completed
- : Being monitored
- : In progress
- : Yet to take place

3-3 Schedule for auxiliary construction to further freezing the landside (based on the changes of soil temperatures from January 16 to January 23) and its progress (as of Tuesday, January 24)

TEPCO

(Areas where soil freezing began on December 3)

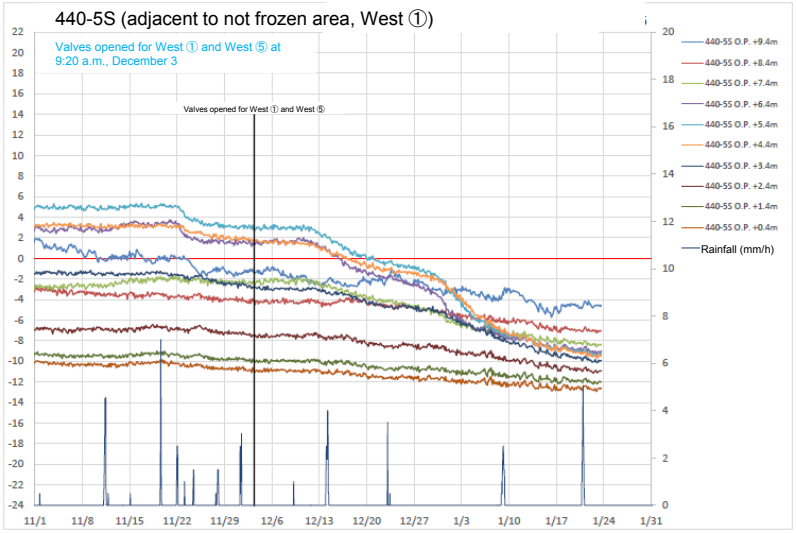
Areas where freezing began	Thermometer pipe	Progress status	December 2016	January 2017	February 2017	March 2017
West ① Began on Dec. 3	420-5S 430-5S 431-5S	In progress				
West ⑤ Began on Dec. 3	150-7S 160-7S 170-7S 180-7S	In progress				

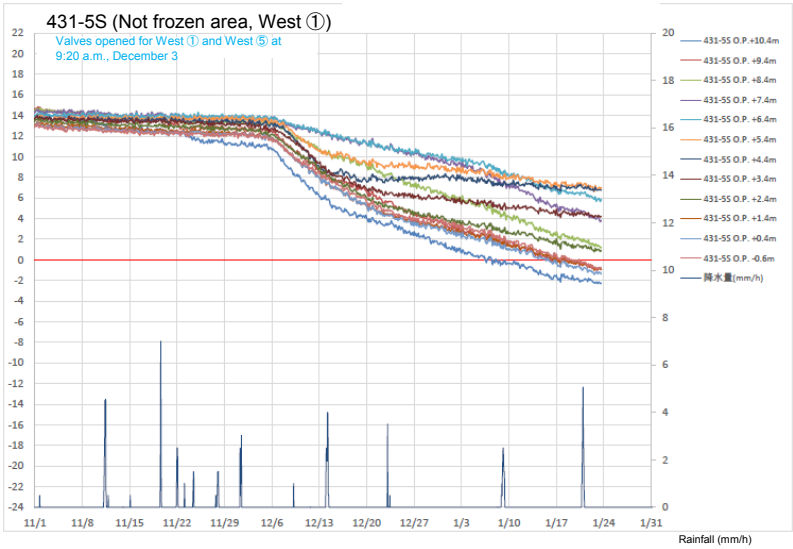
(Other areas)

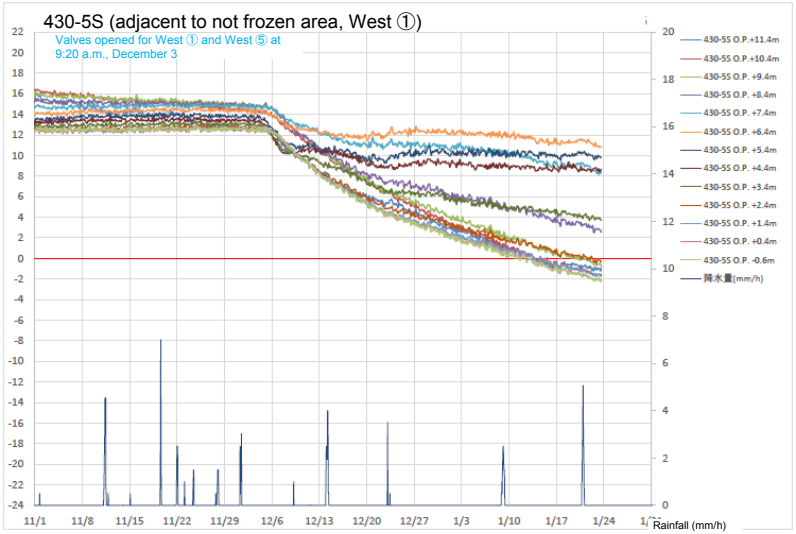
BLK	Thermometer pipe	Progress status	December 2016	January 2017	February 2017	March 2017
5BLK	331-5S	Completed				
	340-5S	Completed				
	180-5S	Completed				
	50-5S	Completed				
	40-5S	Completed				
6 BLK	30-6S	Completed				
	10-6S	Completed				
	40-6S	Completed				
7 BLK	80-7S	Completed				
	70-7S	Completed				
3 BLK	270-3S	Completed				

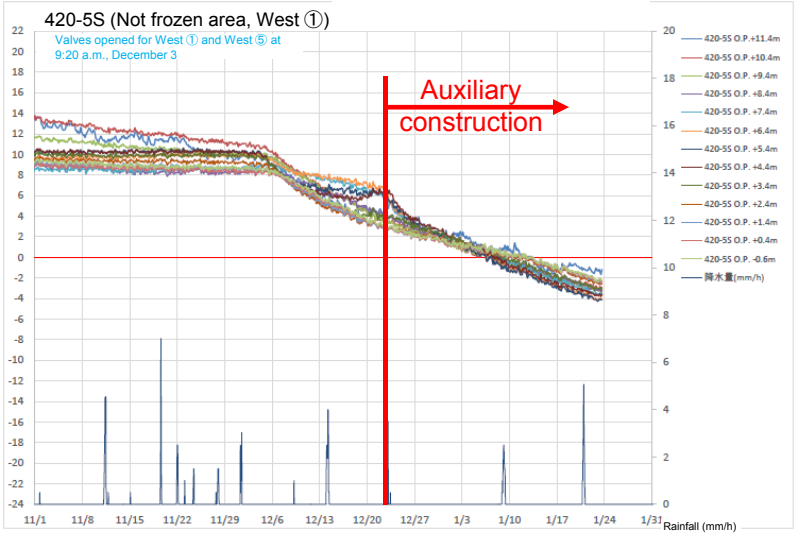
3-4 Auxiliary construction to further freezing the mountainside, soil temperature decrease (Freezing began on December 3 West①)

【440-5S】: Below 0℃
【431-5S】: Auxiliary construction scheduled to be under way. Soil temperatures are decreasing relatively steadily.
【430-5S】: Auxiliary construction scheduled to be under way.
【420-5S】: Below 0℃

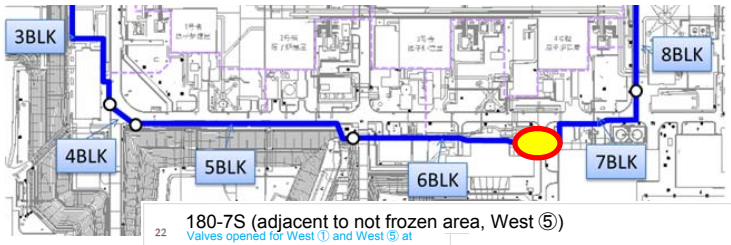




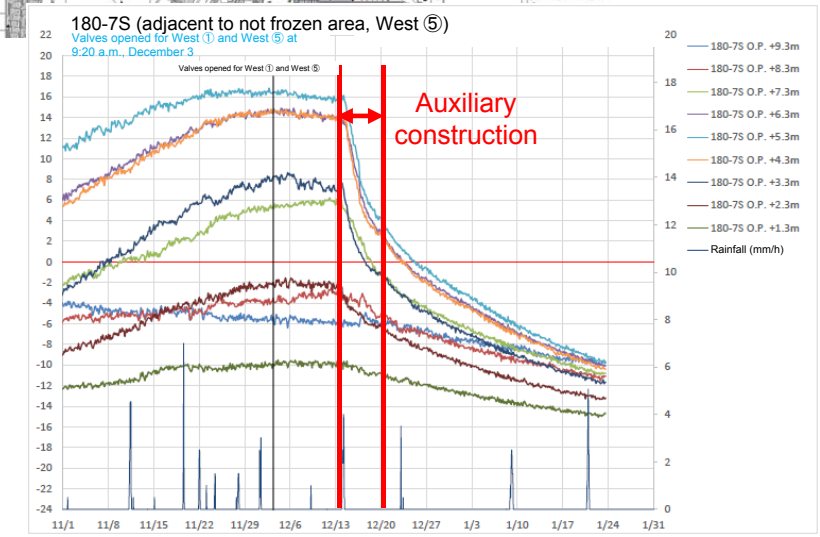


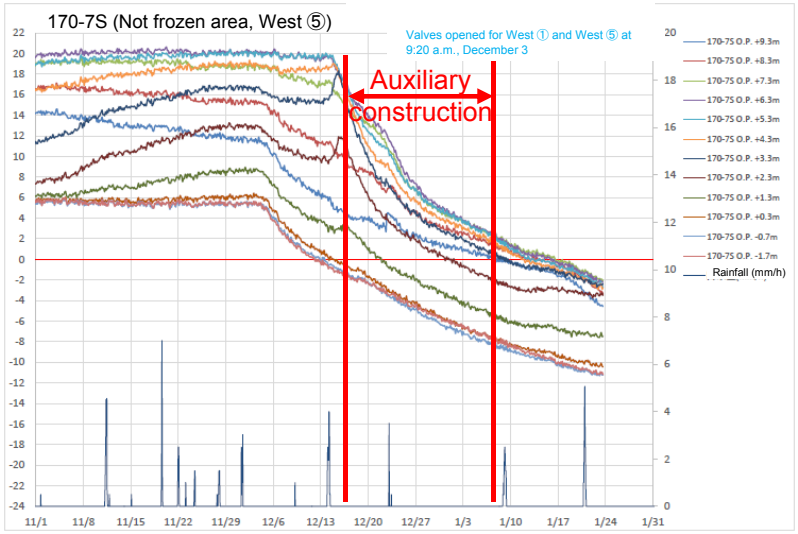


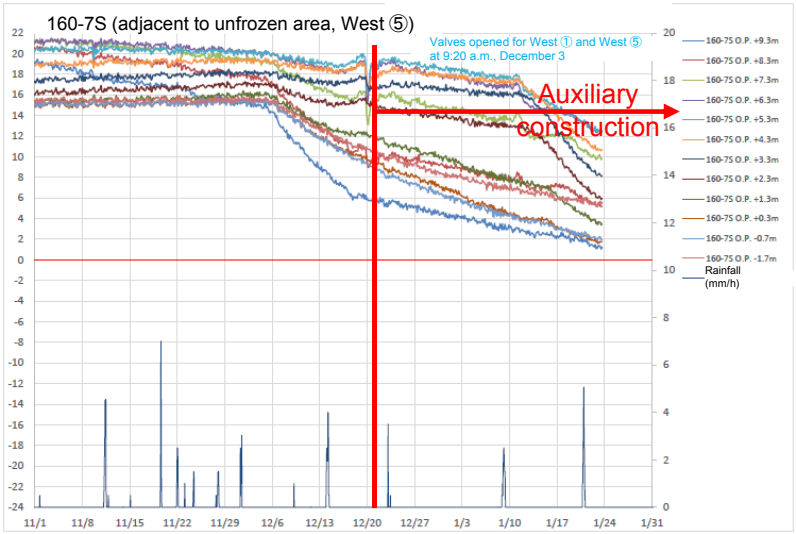
3-5 Auxiliary construction to further freezing the mountainside, soil temperature decrease (Freezing began on December 3 West⑤)

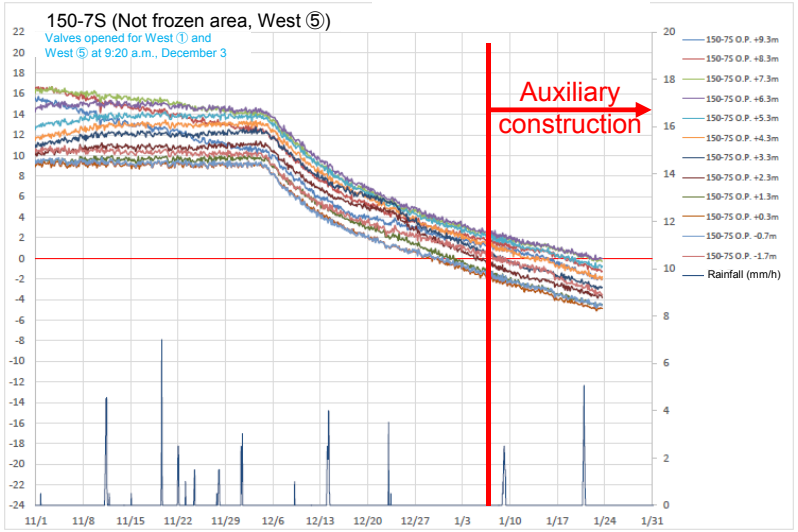


【180-7S】: Below 0℃
【170-7S】: Below 0℃
【160-7S】: Auxiliary construction is under way. Soil temperature tending to decrease.
【150-7S】: Below 0℃

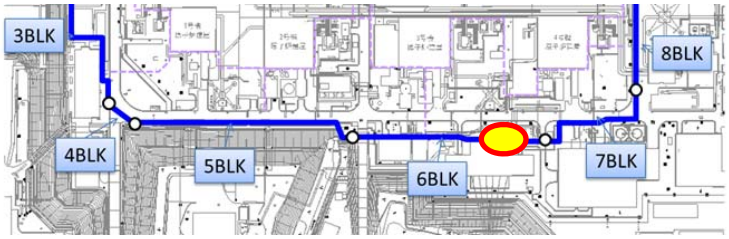






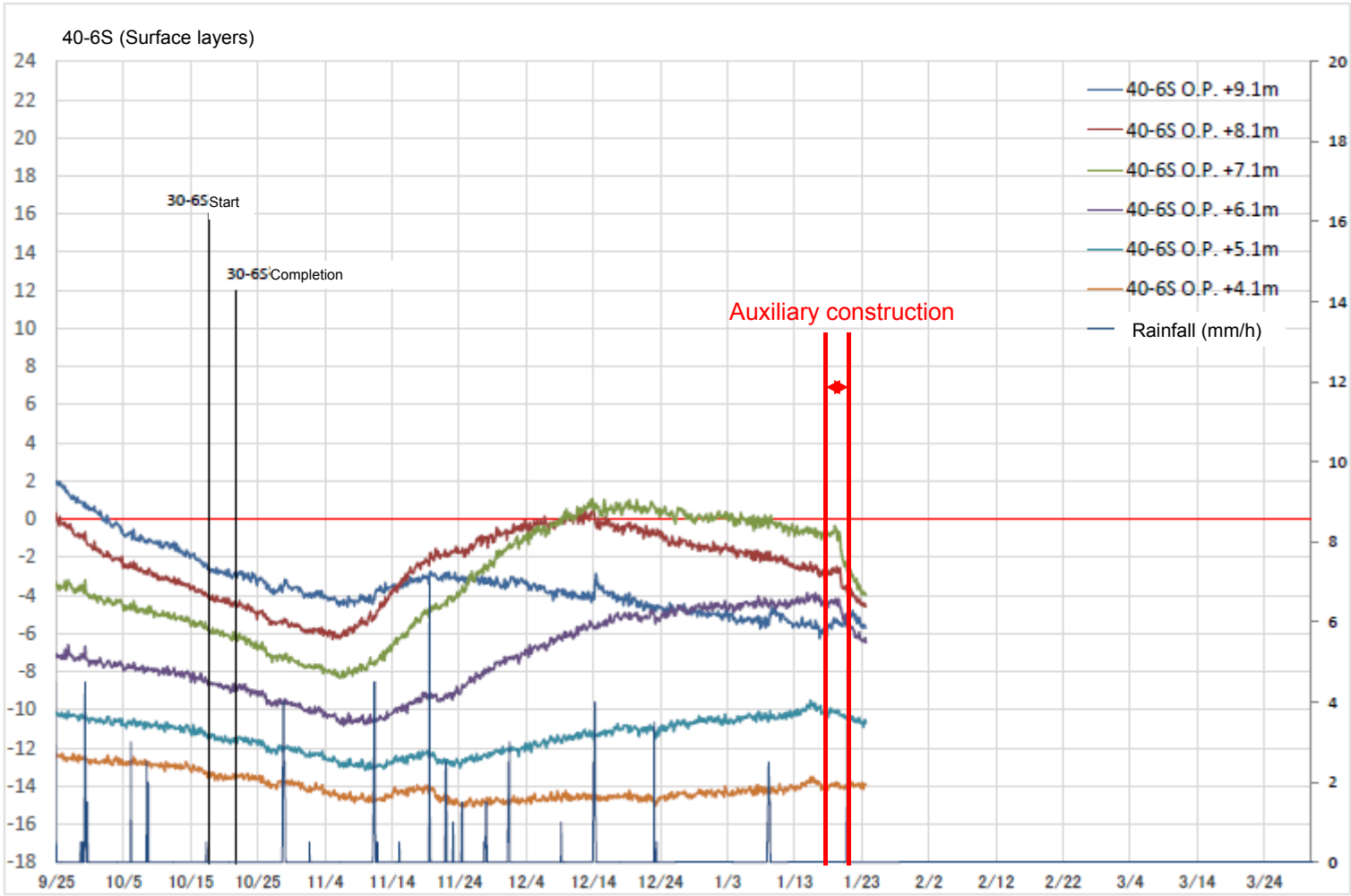


3-5 Auxiliary construction to further freezing the mountainside, soil temperature decrease (6BLK)



【40-6S】：０℃付近から低下

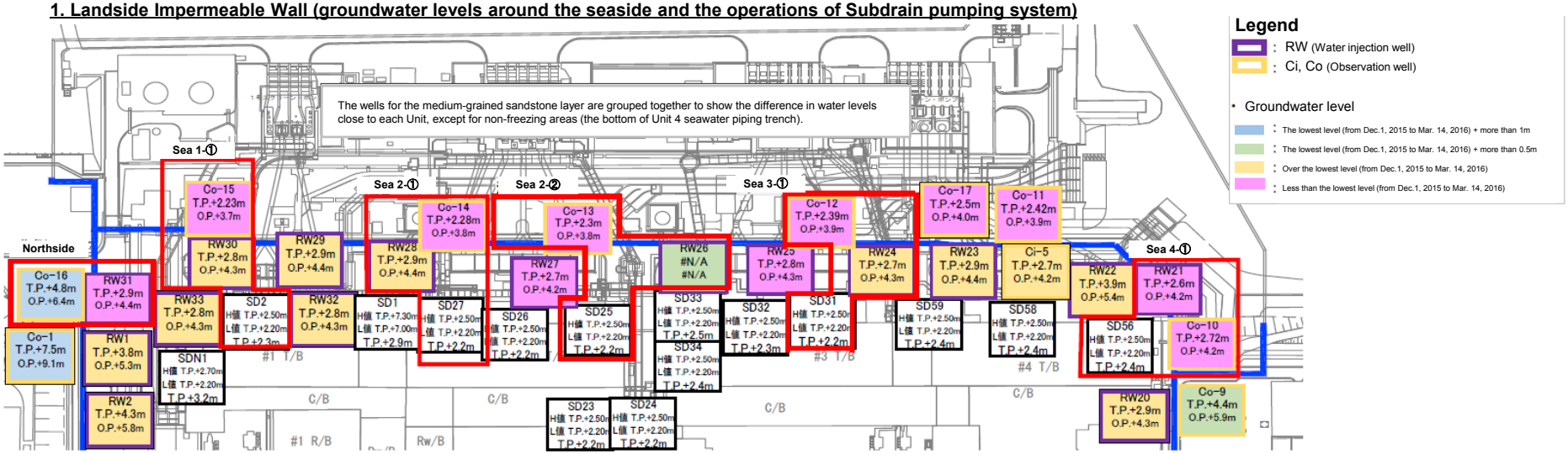
【40-6S】：Lower than around 0℃



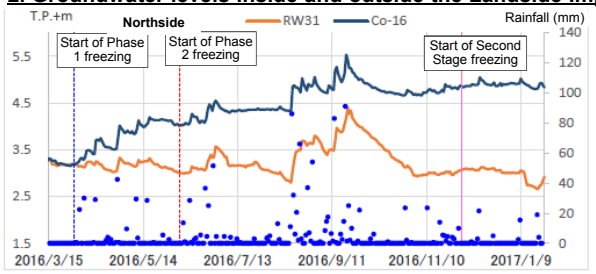
4-1 Groundwater levels and hydraulic heads
(in the medium-grained sandstone layer 1 on the seaside)

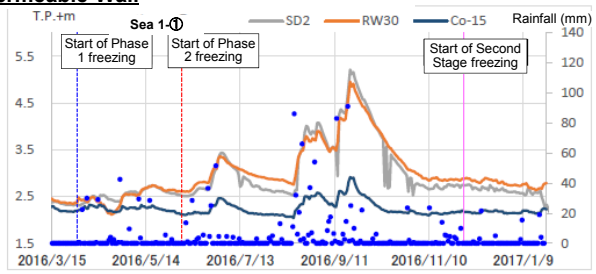
Monitoring items in an early stage of the ice wall freezing (Second Stage, seaside, water levels in the medium-grained sandstone layer)

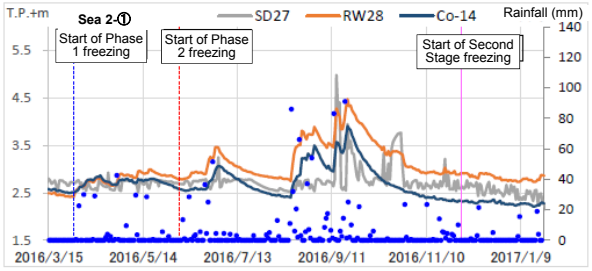
1. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

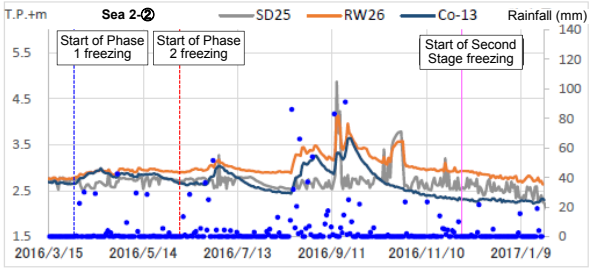


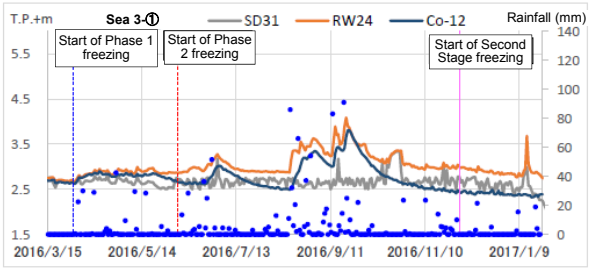
2. Groundwater levels inside and outside the Landside Impermeable Wall

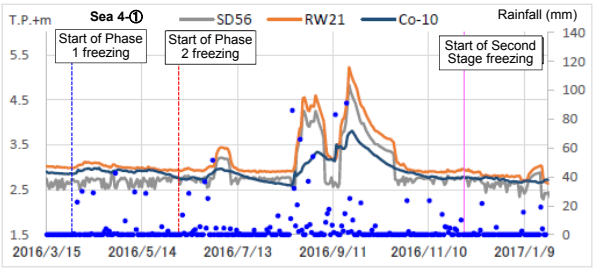










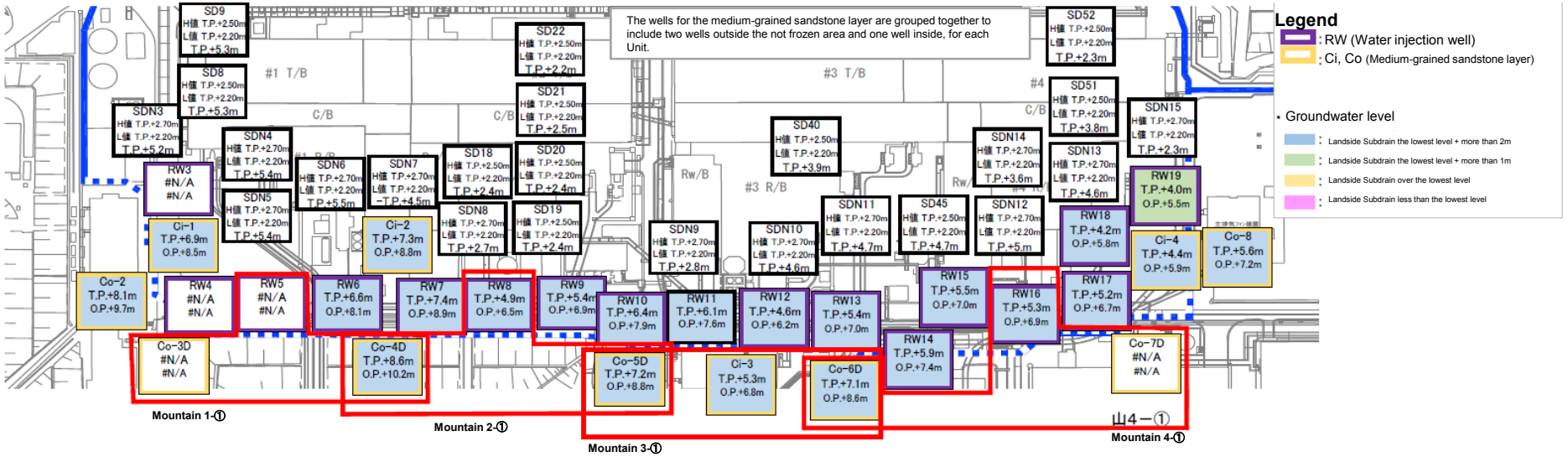


Data of groundwater levels as of 12 p.m. on January 24

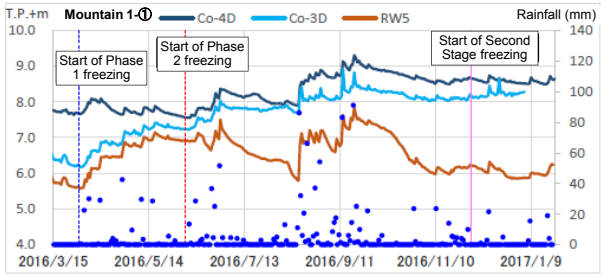
4-2 Groundwater levels and hydraulic heads
(in the medium-grained sandstone layer 2 on the landside)

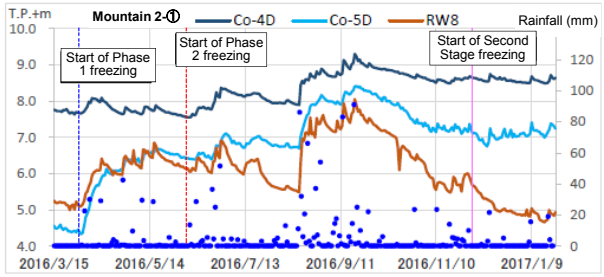
Monitoring items in an early stage of the ice wall freezing (Second Stage, landside, water levels in the medium-grained sandstone layer)

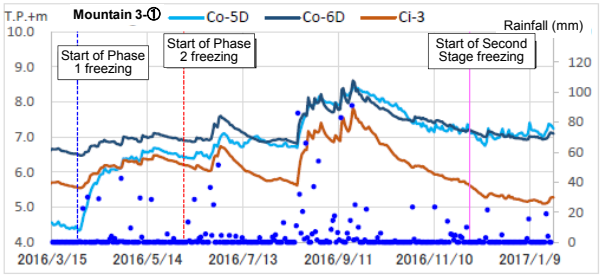
3. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

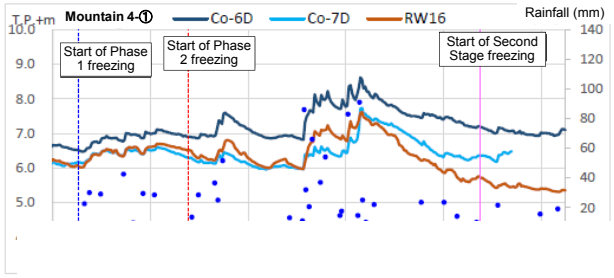


4. Groundwater levels inside and outside the Landside Impermeable Wall







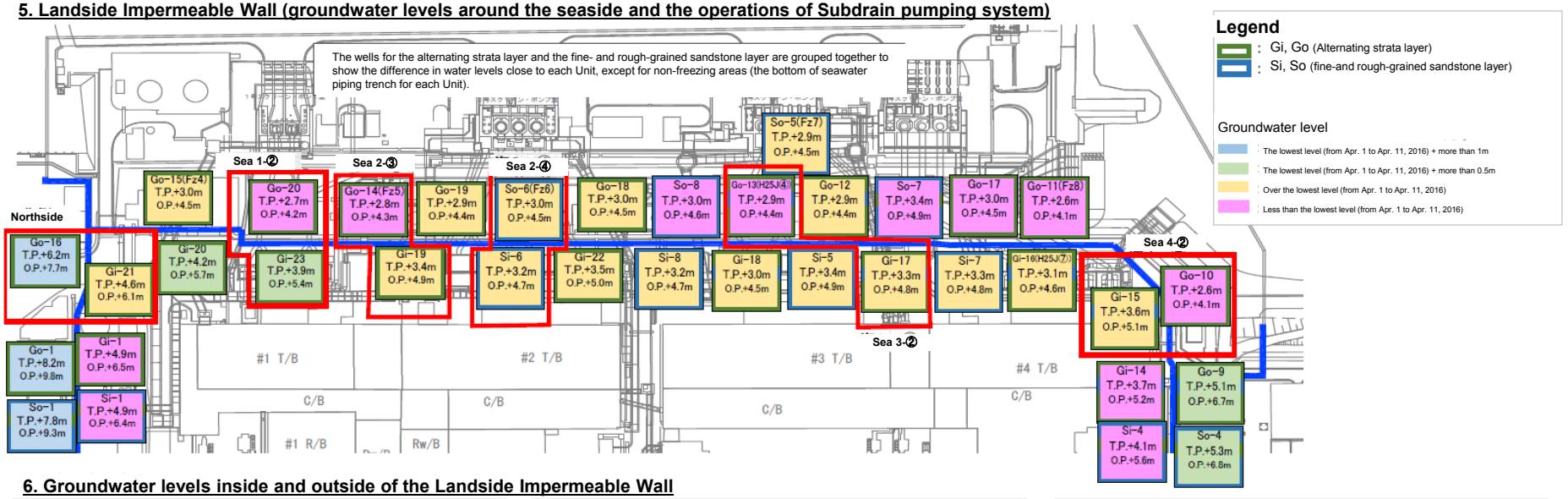


Data of groundwater levels as of 12 p.m. on January 24

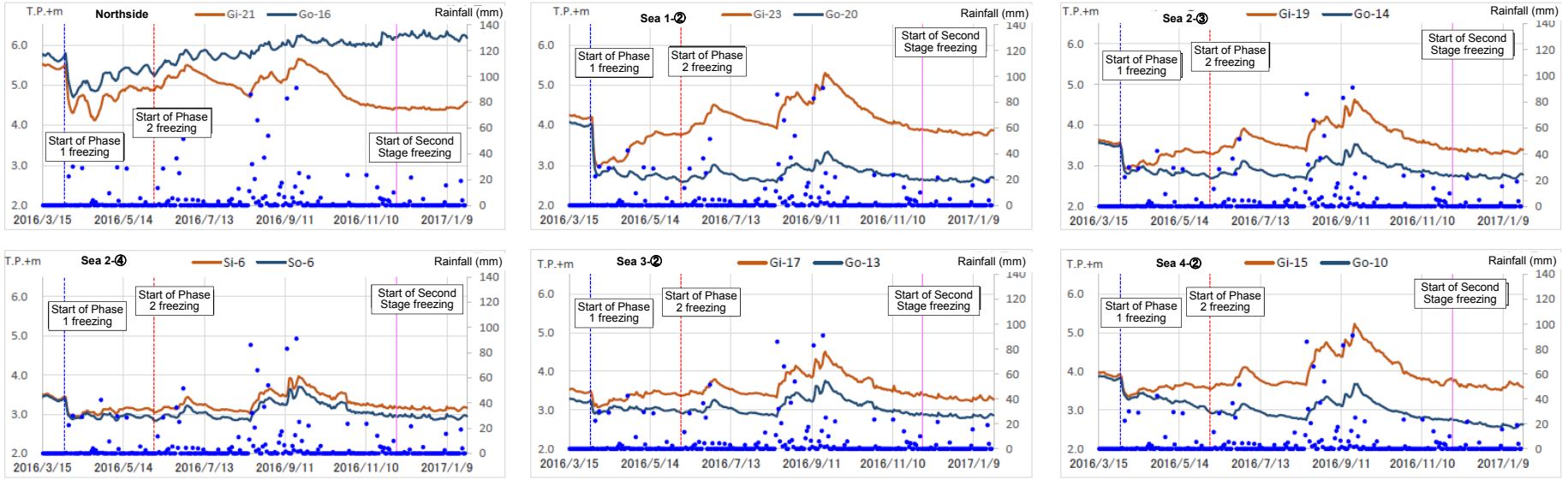
4-3 Groundwater levels and hydraulic heads
(in the alternating strata layer and the fine- and rough-grained sandstone layer 1 on the seaside)

Monitoring items in an early stage of the ice wall freezing (Phase 1 Stage 1, seaside, water levels in the middle-grained sandstone layer)

5. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)



6. Groundwater levels inside and outside of the Landside Impermeable Wall

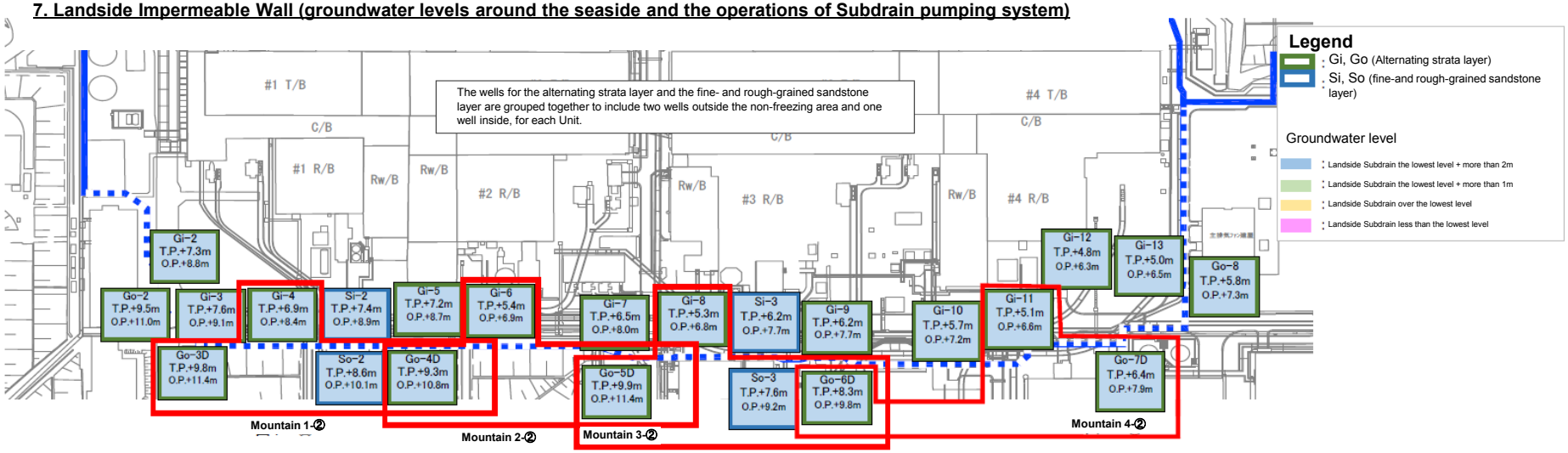


Data of groundwater levels as of 12 p.m. on January 24

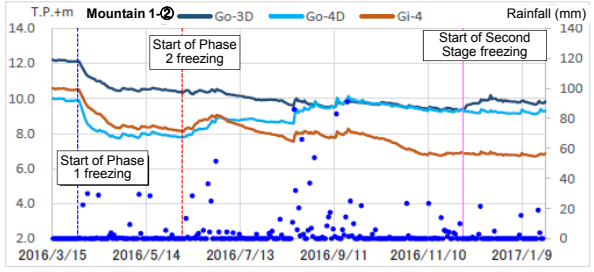
4-4 Groundwater levels and hydraulic heads
(in the alternating strata layer and the fine- and rough-grained sandstone layer 2 on the landside)

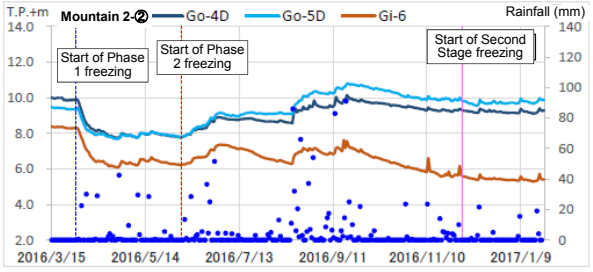
Monitoring items in an early stage of the ice wall freezing (Phase 1 Stage 1, seaside, water levels in the middle-grained sandstone layer)

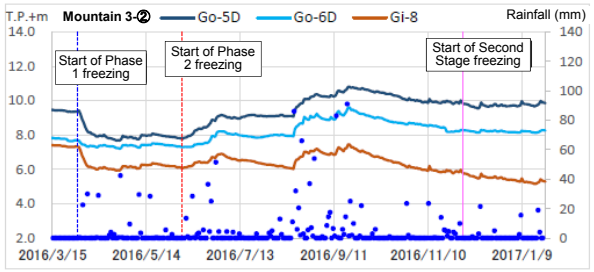
7. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

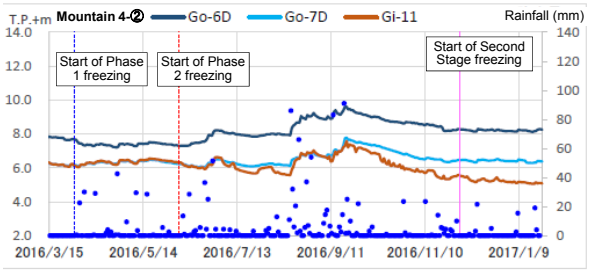


8. Groundwater levels inside and outside of the Landside Impermeable Wall









Data of groundwater levels as of 12 p.m. on January 24

5-1 Water injection testing for RW23 and 24

Testing Objectives

Confirm the start time and amount of water when the test subdrains' water levels rise from water injection

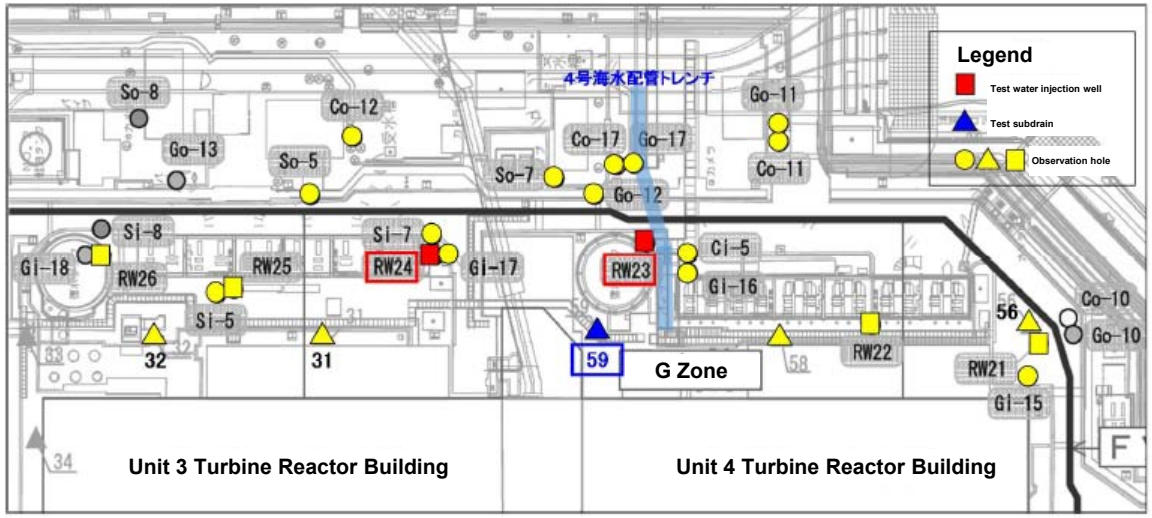
Test Times

January 11	09:34	Subdrain interrupted Tank series No. 5 stopped
	13:02	Subdrain No. 31 stopped
January 13	15:13	Water injection starts (RW23, 24: Amount of water 10L/min)
January 15	05:08	water injection stops

Test Results (details in next slide)

- Test Time : approx. 38 hours
- injected water(total amount) : approx. 46m3 (cubic meters)
- effect of injected water : approx. 16cm (SD59)
- others : no abnormalities found for pumped-up and groundwater amounts entering the reactor buildings during the test period at 4m above sea level. Also, no abnormal rise in temperatures found in temperature pipes.

Relationship positions map



5-2 Water levels of related wells

- After water injection started, with no delay subdrain No. 59 water levels started to rise, approx. 10cm in the first 24 hours.
- When water injection completed, result was estimated to be approx. 16cm, taking into account actual amount of rising water level from prediction of subdrain No. 59