Progress of Landside Impermeable Wall freezing
(Phase 2 of the first stage)

July 28, 2016

TEPCO

Tokyo Electric Power Company Holdings, Inc.

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.

Changes in soil temperatures over time

Note
- Average Soil Temperature (AST) of medium-grained sandstone layer (blue line):
  average value of thermometer temperatures measured at 1m intervals except for the areas between ground surface and Ground Level 2m and the areas around the first muddy layer boarder.
- Average Soil Temperature (AST) of alternating strata layer (red line):
  Average value of thermometer temperatures measured at 1m intervals except for the areas around the upper and lower parts of the alternating layer boarder.

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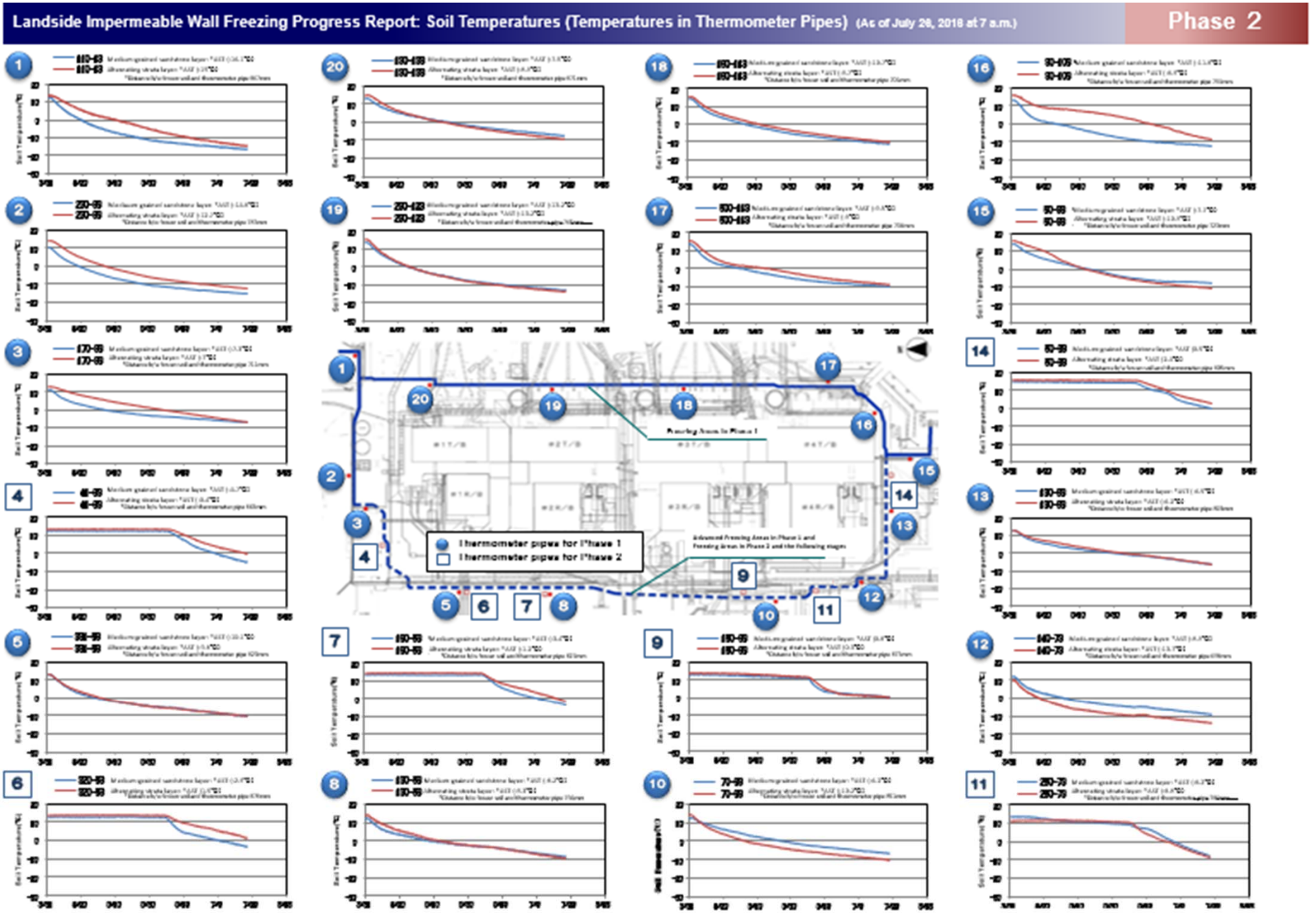

Groundwater levels and hydraulic heads
(in the medium-grained sandstone layer 1 on the seaside)

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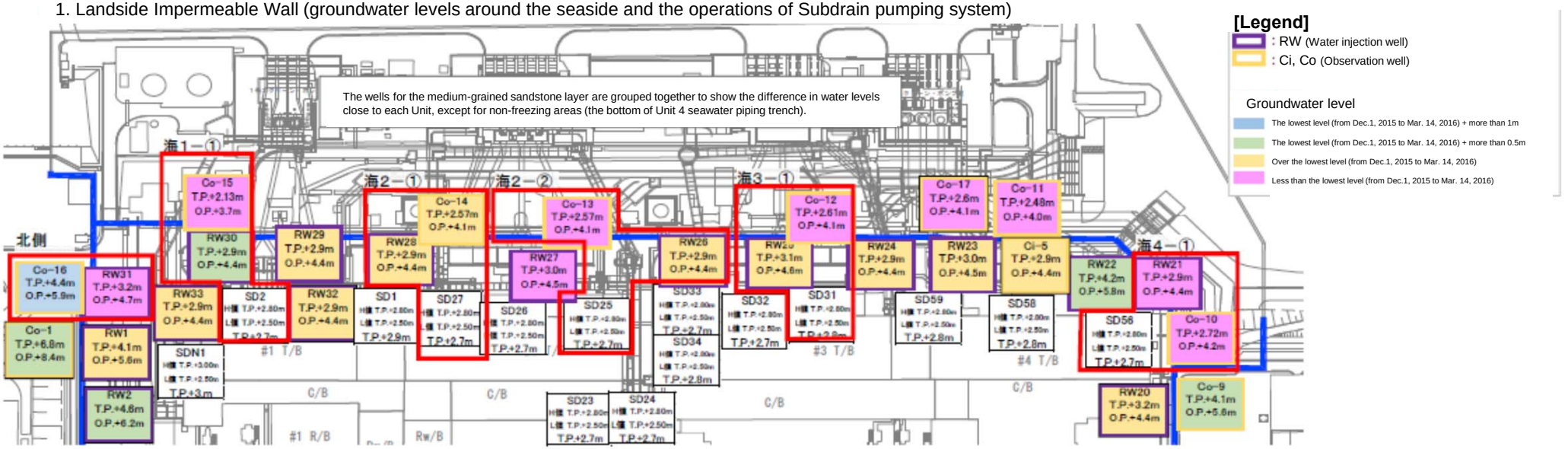
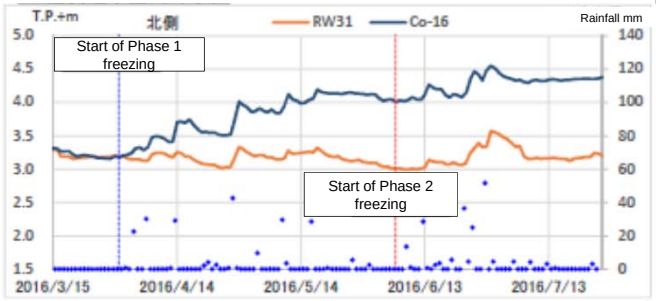
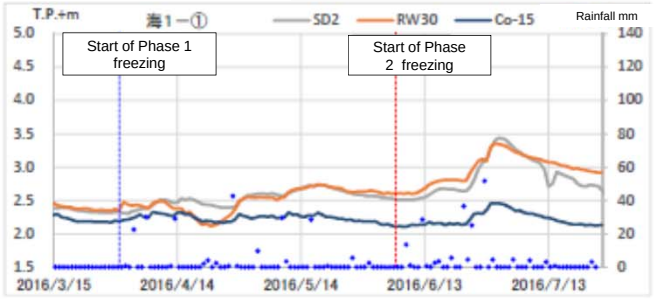
Monitoring items at initial stage of the Landside Impermeable Wall operations (Phase 2 of the first stage: the medium-grained sandstone layer 1 on the seaside)

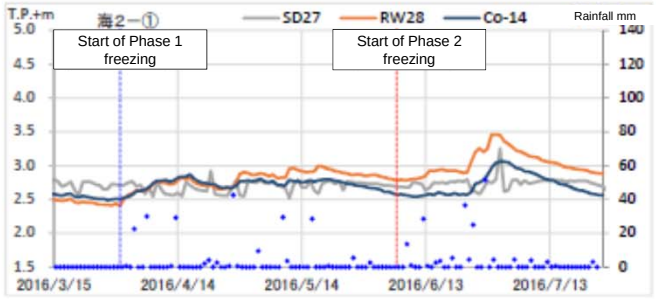
1. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

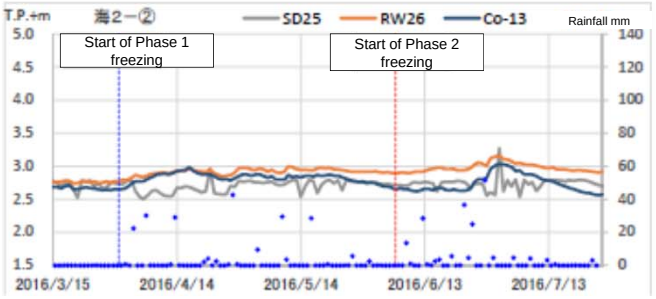


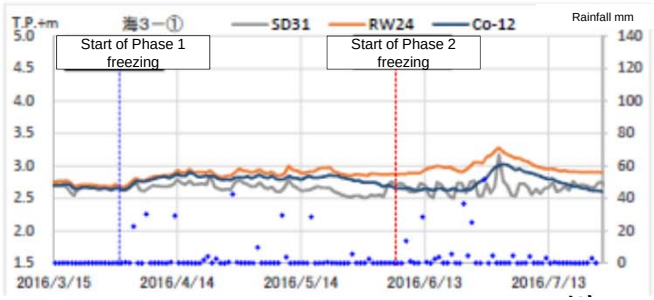
2. Groundwater levels inside and outside of the Landside Impermeable Wall

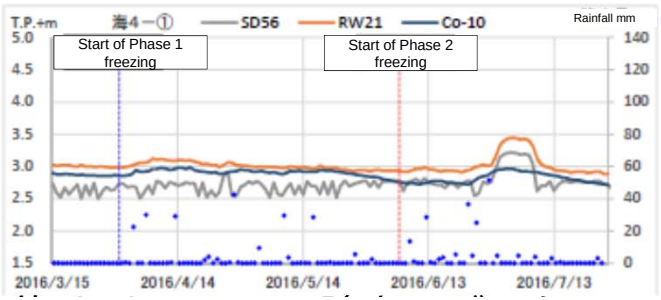










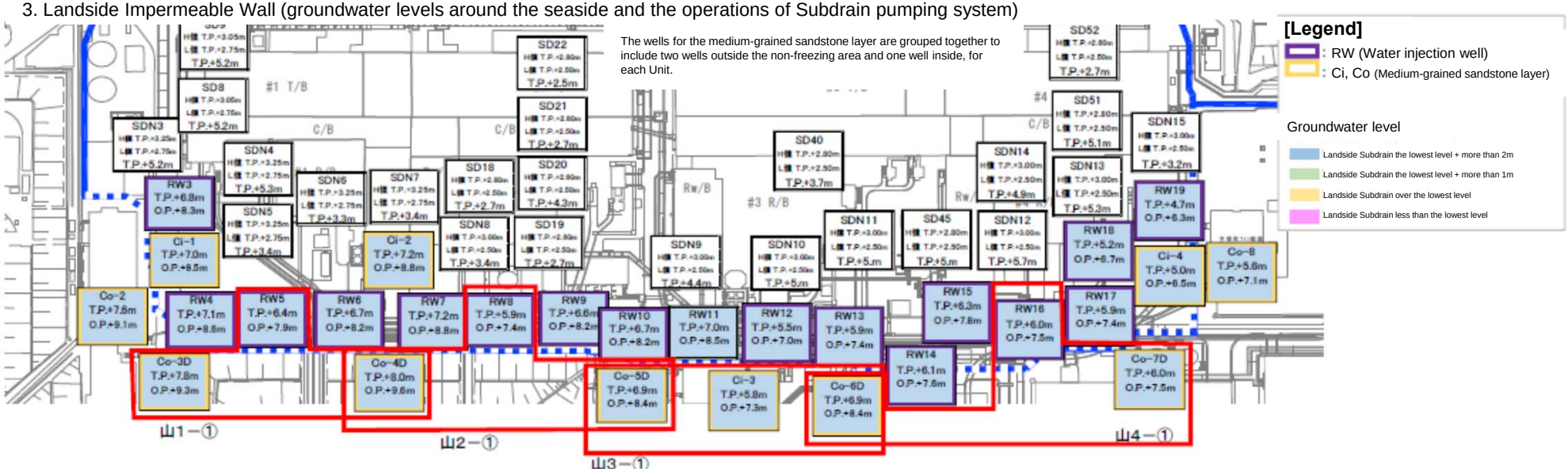


The data of groundwater levels as of 12 p.m. on July 26.

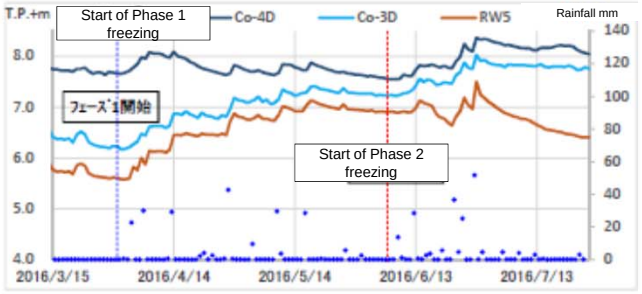
Groundwater levels and hydraulic heads
(in the medium-grained sandstone layer 2 on the landside)

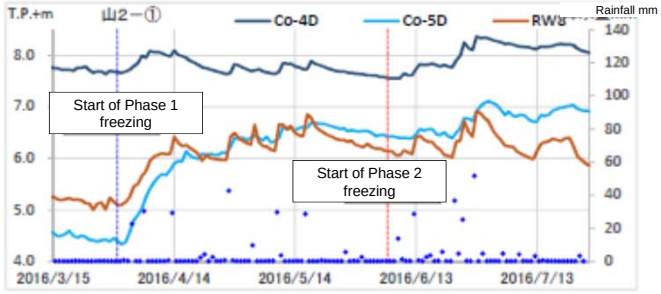
Monitoring items at initial stage of the Landside Impermeable Wall operations (Phase 2 of the first stage: the medium-grained sandstone layer 2 on the landside)

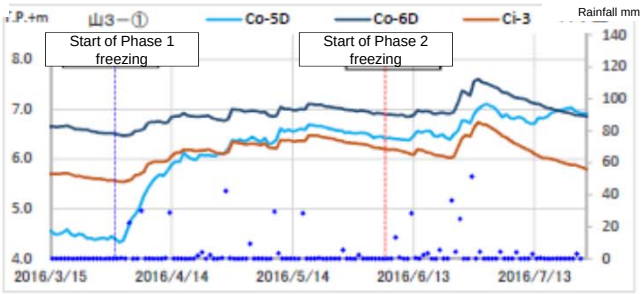
3. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

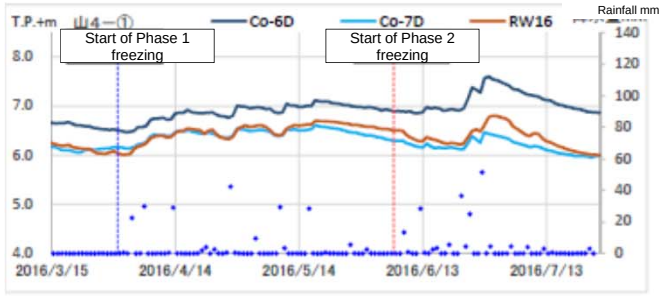


4. Groundwater levels inside and outside of the Landside Impermeable Wall







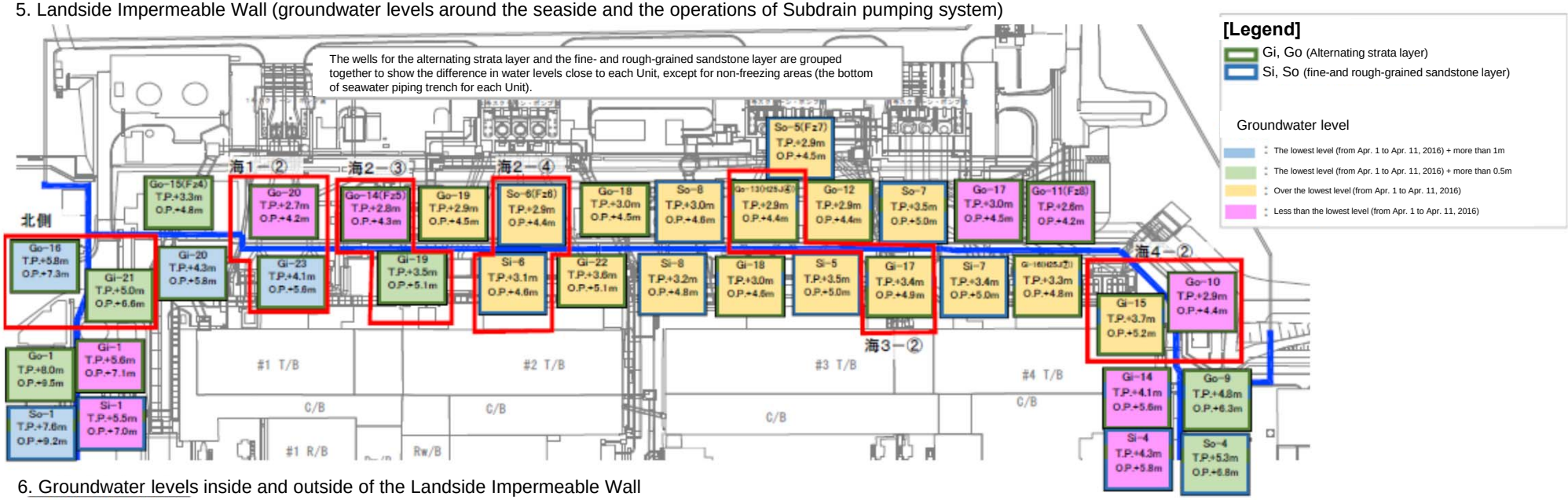


The data of groundwater levels as of 12 p.m. on July 26.

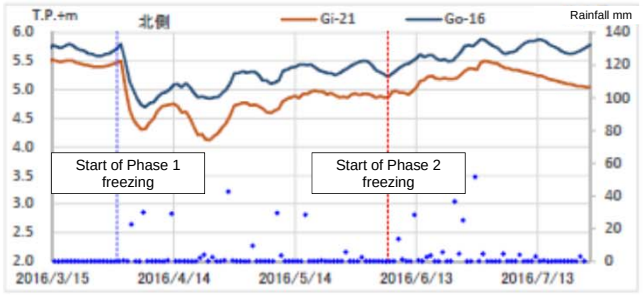
Groundwater levels and hydraulic heads
(in the alternating strata layer and the fine- and rough-grained sandstone layer 1 on the seaside)

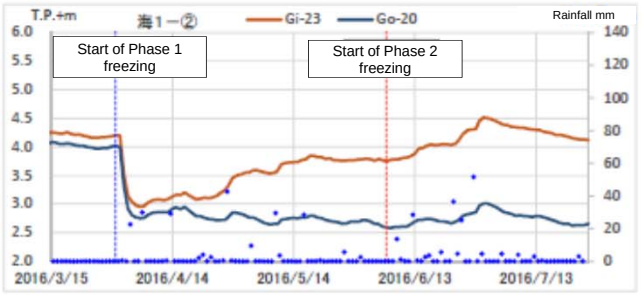
Monitoring items at initial stage of the Landside Impermeable Wall operations
(Phase 2 of the first stage: the alternating strata layer and the fine- and rough-grained sandstone layer 1 on the seaside)

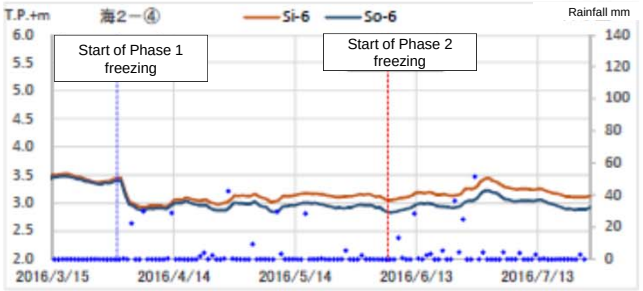
5. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

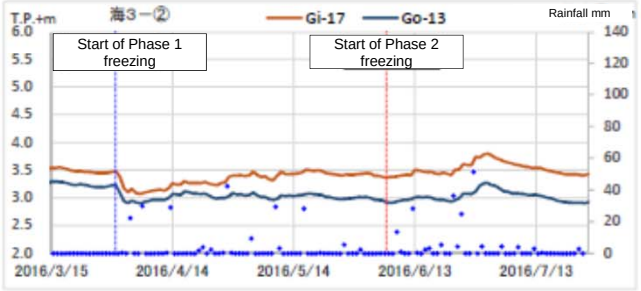


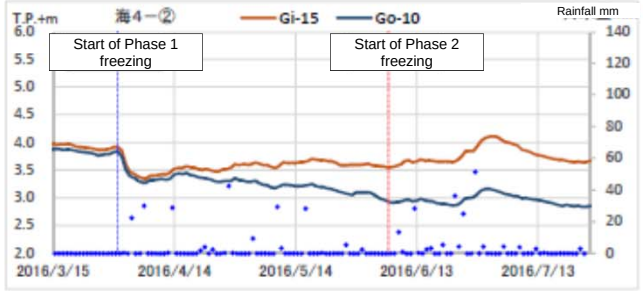
6. Groundwater levels inside and outside of the Landside Impermeable Wall









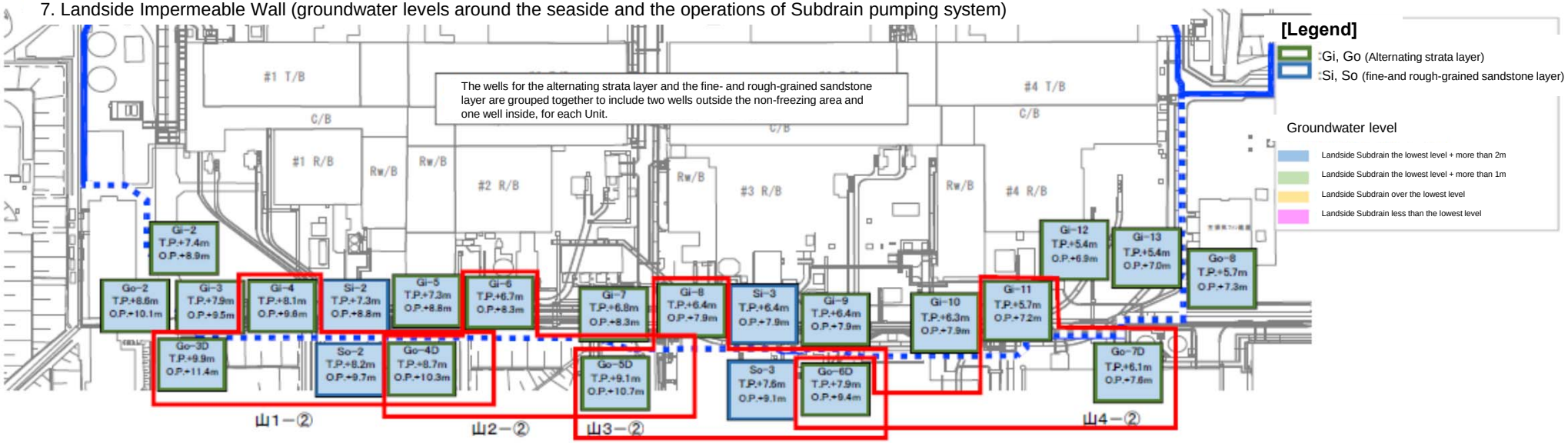


The data of groundwater levels as of 12 p.m. on July 26.

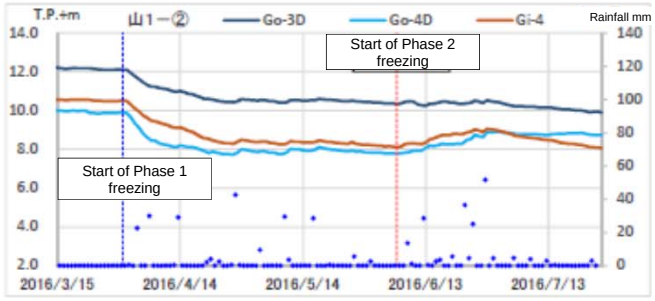
Groundwater levels and hydraulic heads
(in the alternating strata layer and the fine- and rough-grained sandstone layer 2 on the landside)

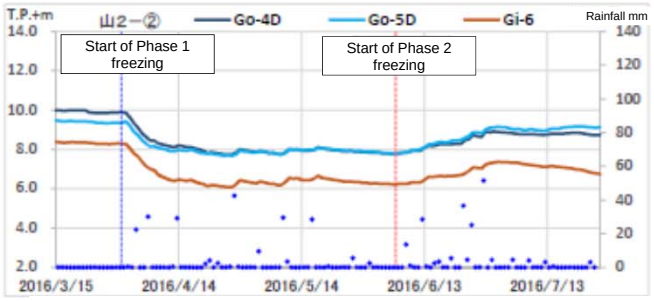
Monitoring items at initial stage of the Landside Impermeable Wall operations
(Phase 2 of the first stage: the alternating strata layer and the fine- and rough-grained sandstone layer 2 on the landside)

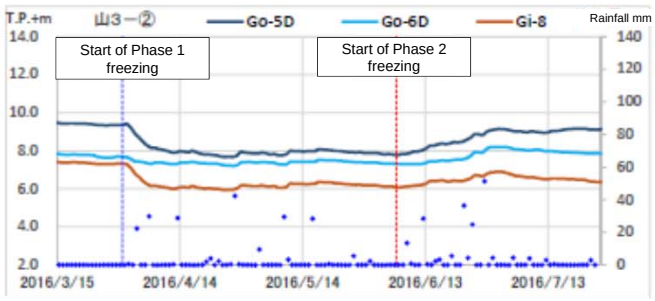
7. Landside Impermeable Wall (groundwater levels around the seaside and the operations of Subdrain pumping system)

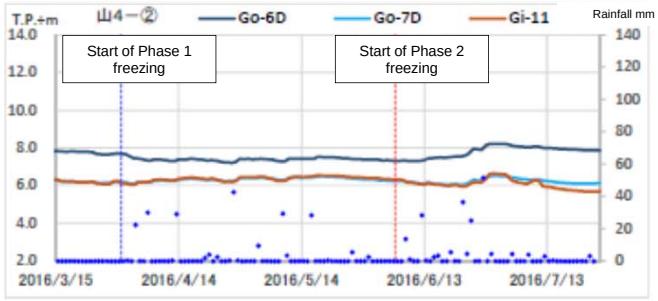


8. Groundwater levels inside and outside of the Landside Impermeable Wall







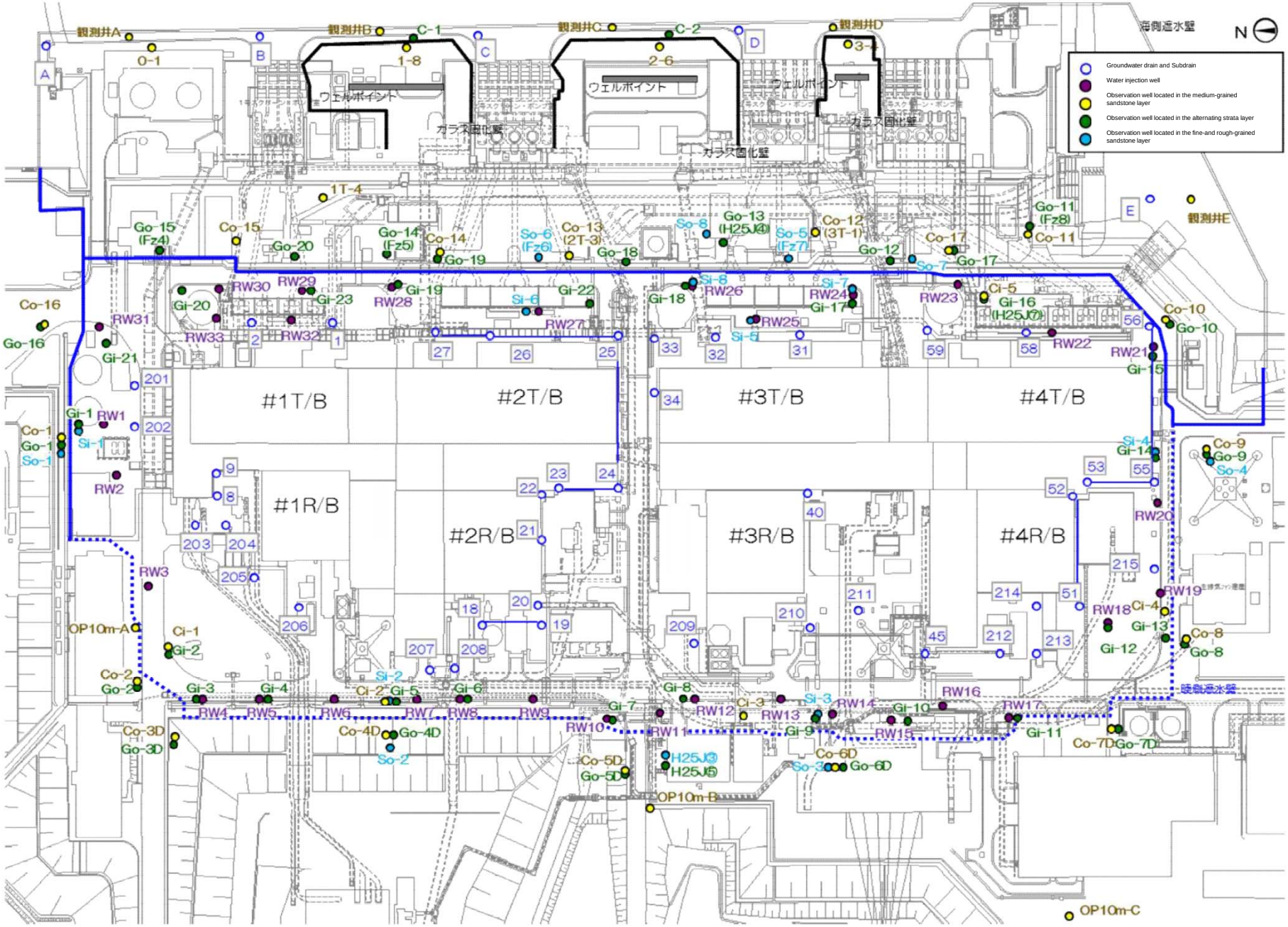


The data of groundwater levels as of 12 p.m. on July 26.

Location map of groundwater level observation wells

(as of June 2016)

TEPCO

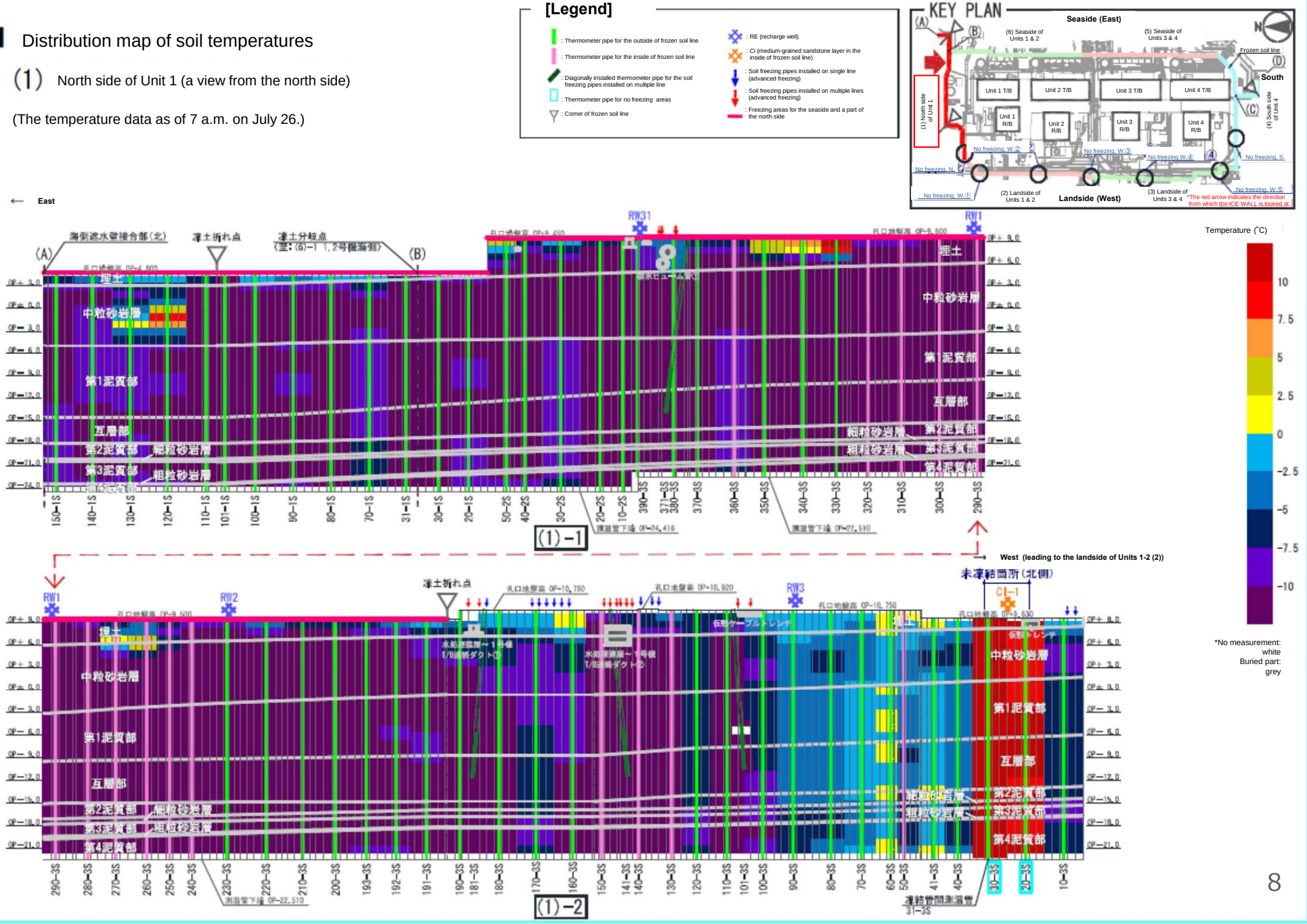


Distribution map of soil temperatures (north side of Unit1)

■ 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 July 26.)

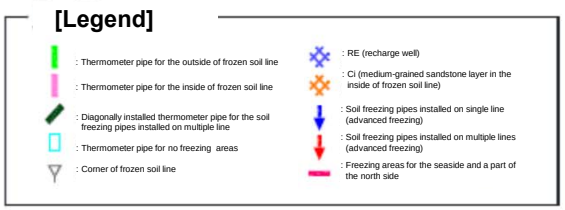


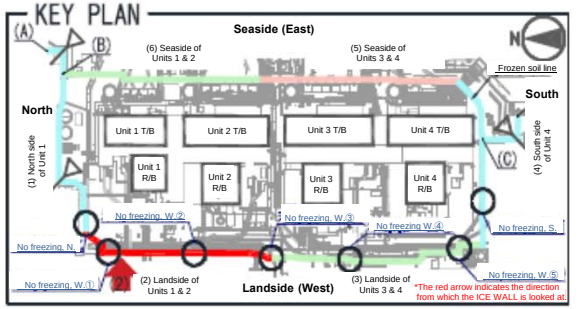
Distribution map of soil temperatures (west side of Units 1-2)

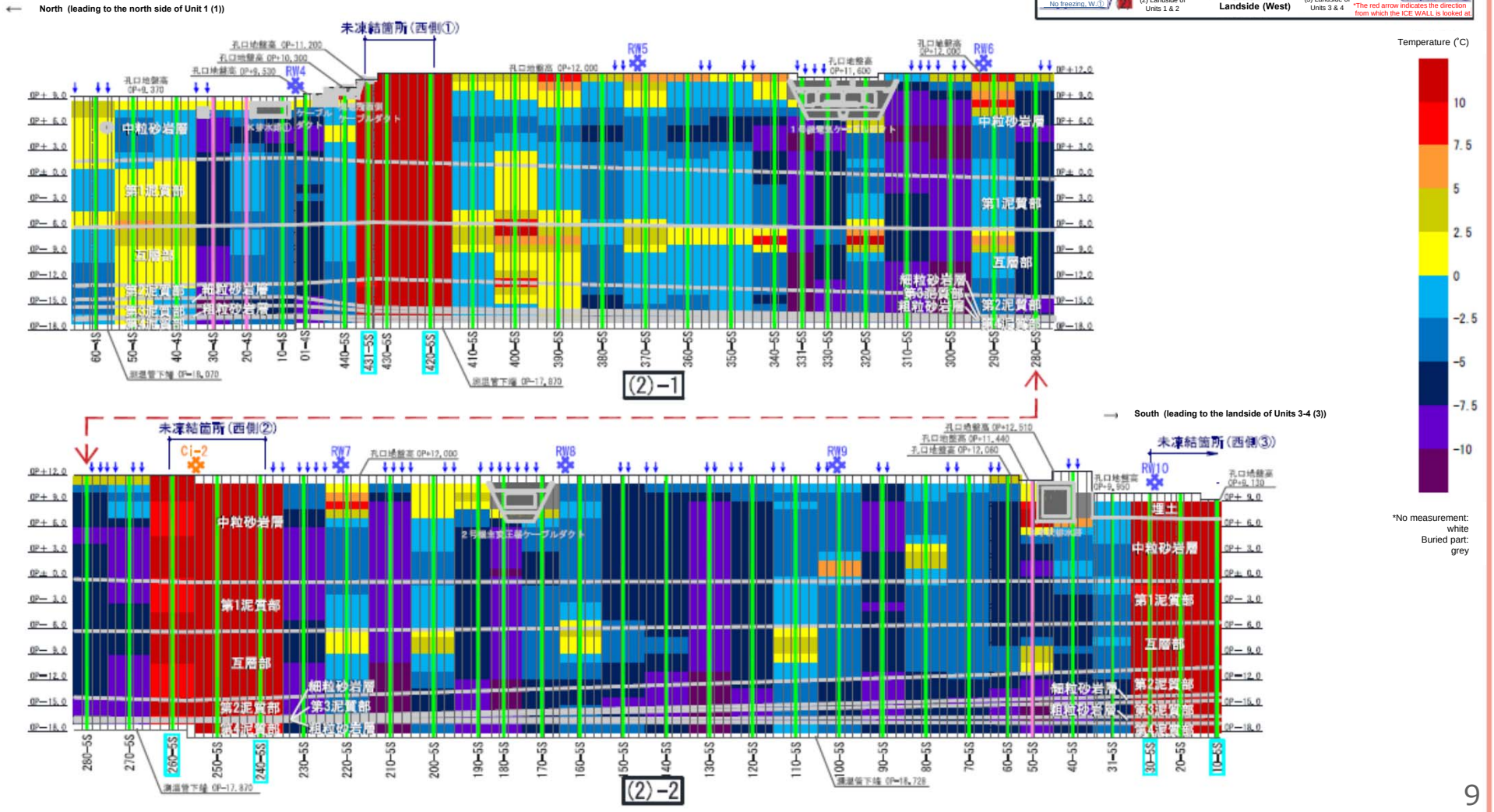
■ Distribution map of soil temperatures

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

(The temperature data as of 7 a.m. on July 26.)







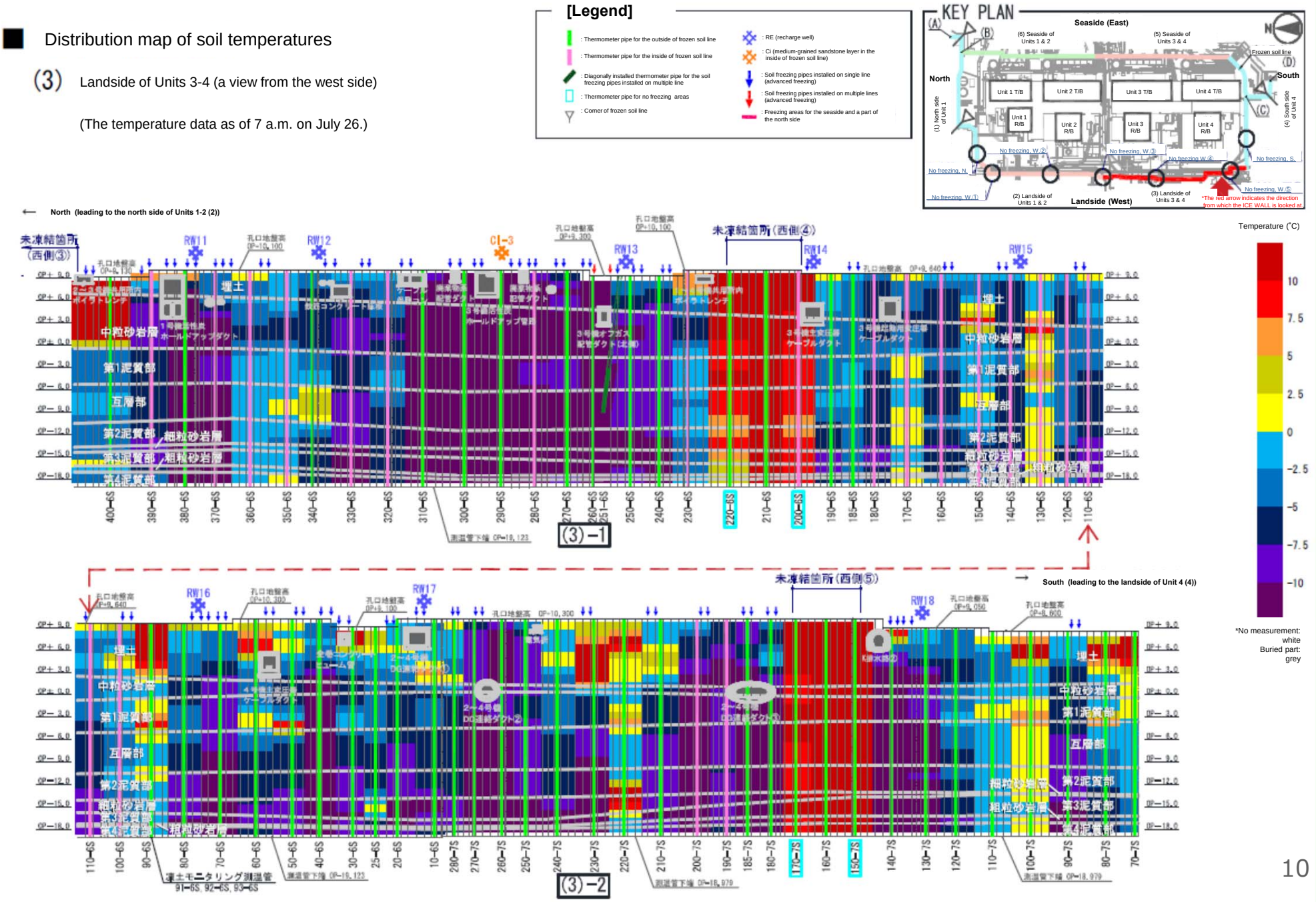
Distribution map of soil temperatures (west side of Units 3-4)

TEPCO

■ Distribution map of soil temperatures

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

(The temperature data as of 7 a.m. on July 26.)



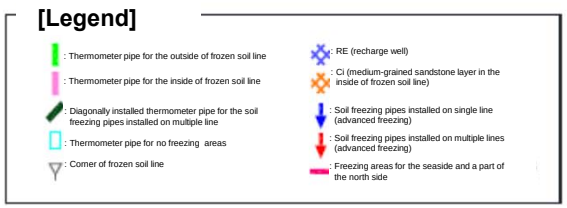
Distribution map of soil temperatures (south side of Unit 4)

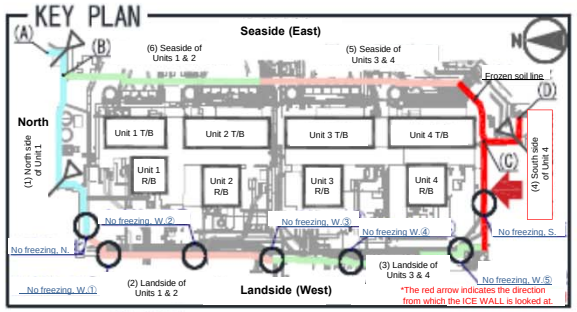
TEPCO

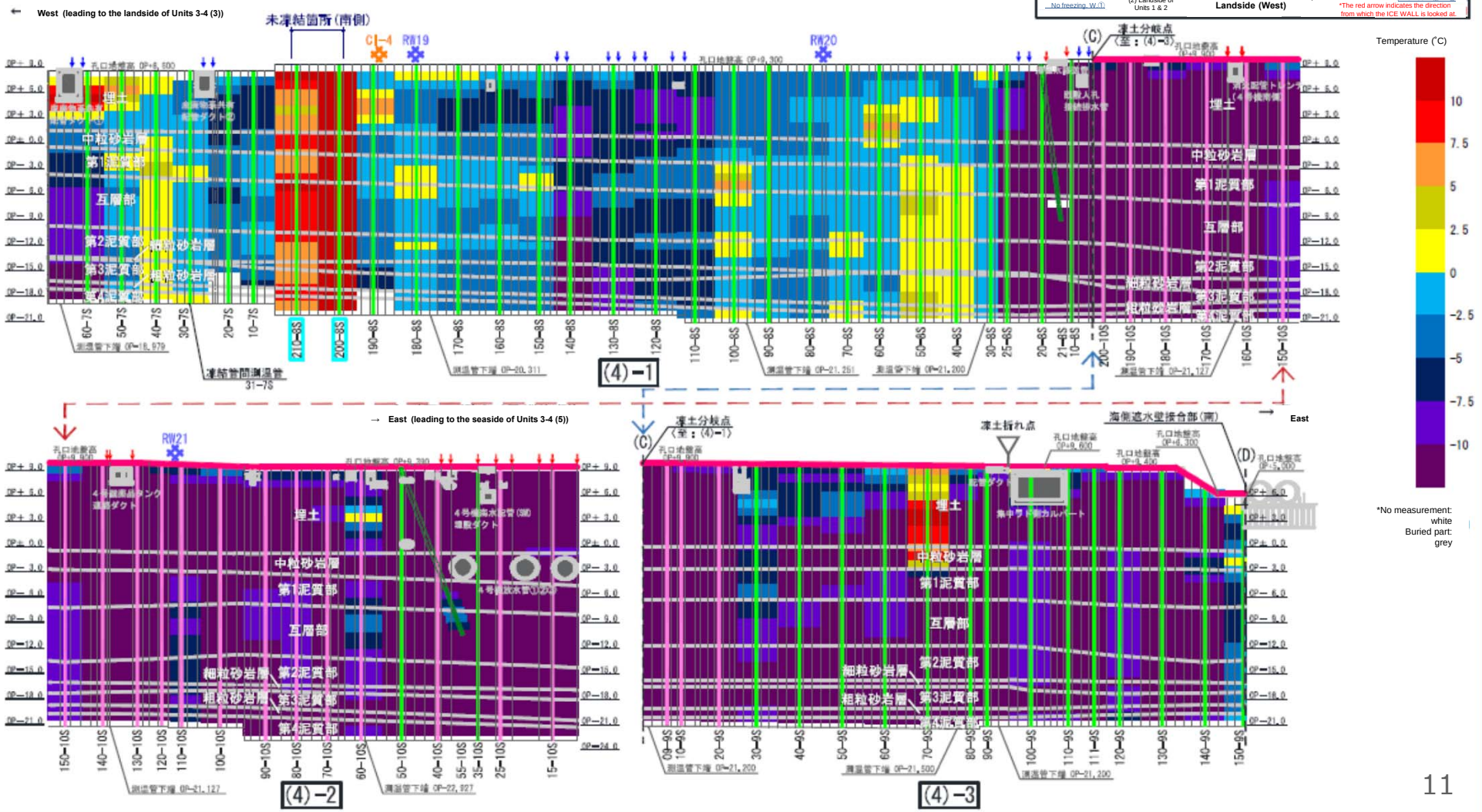
■ Distribution map of soil temperatures

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

(The temperature data as of 7 a.m. on July 26.)







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

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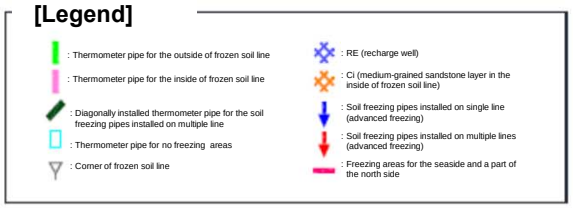
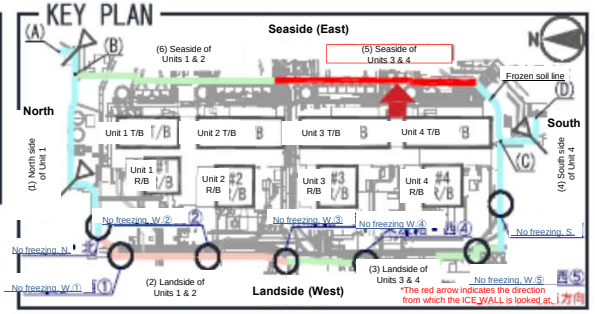
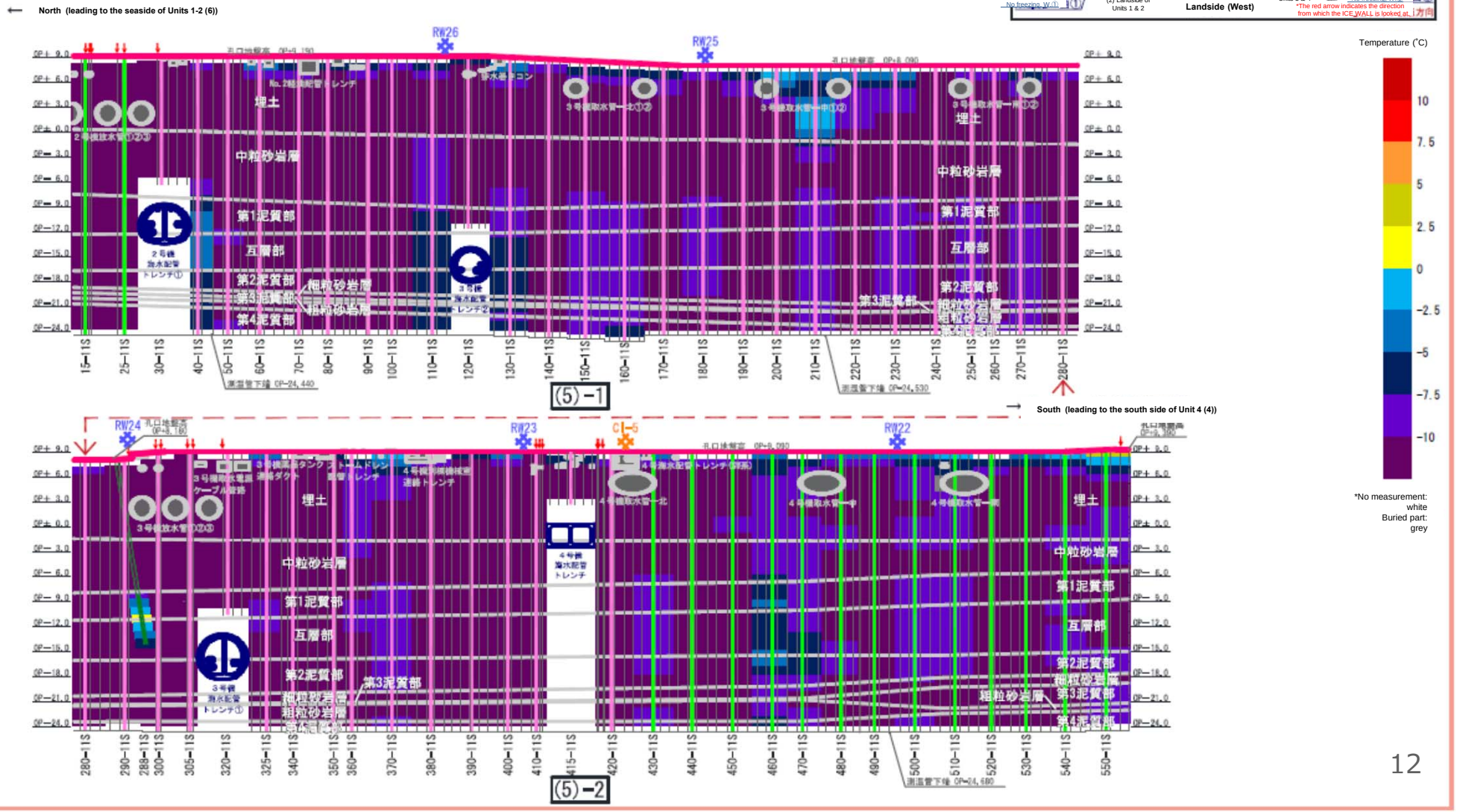
■ Distribution map of soil temperatures

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

(The temperature data as of 7 a.m. on July 26.)







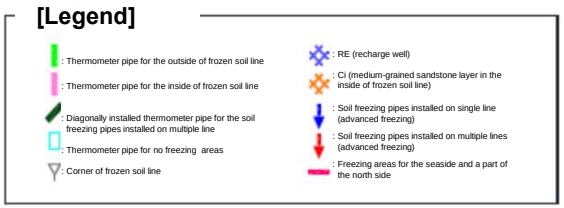
Distribution map of soil temperature (east side of Units 1-2)

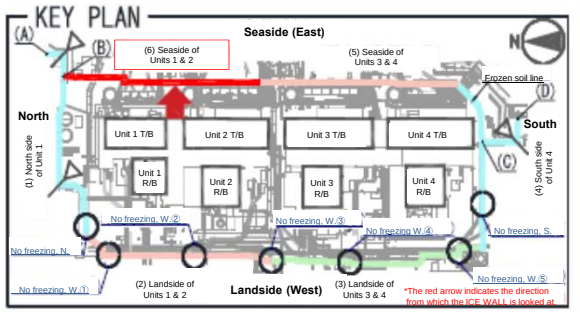
TEPCO

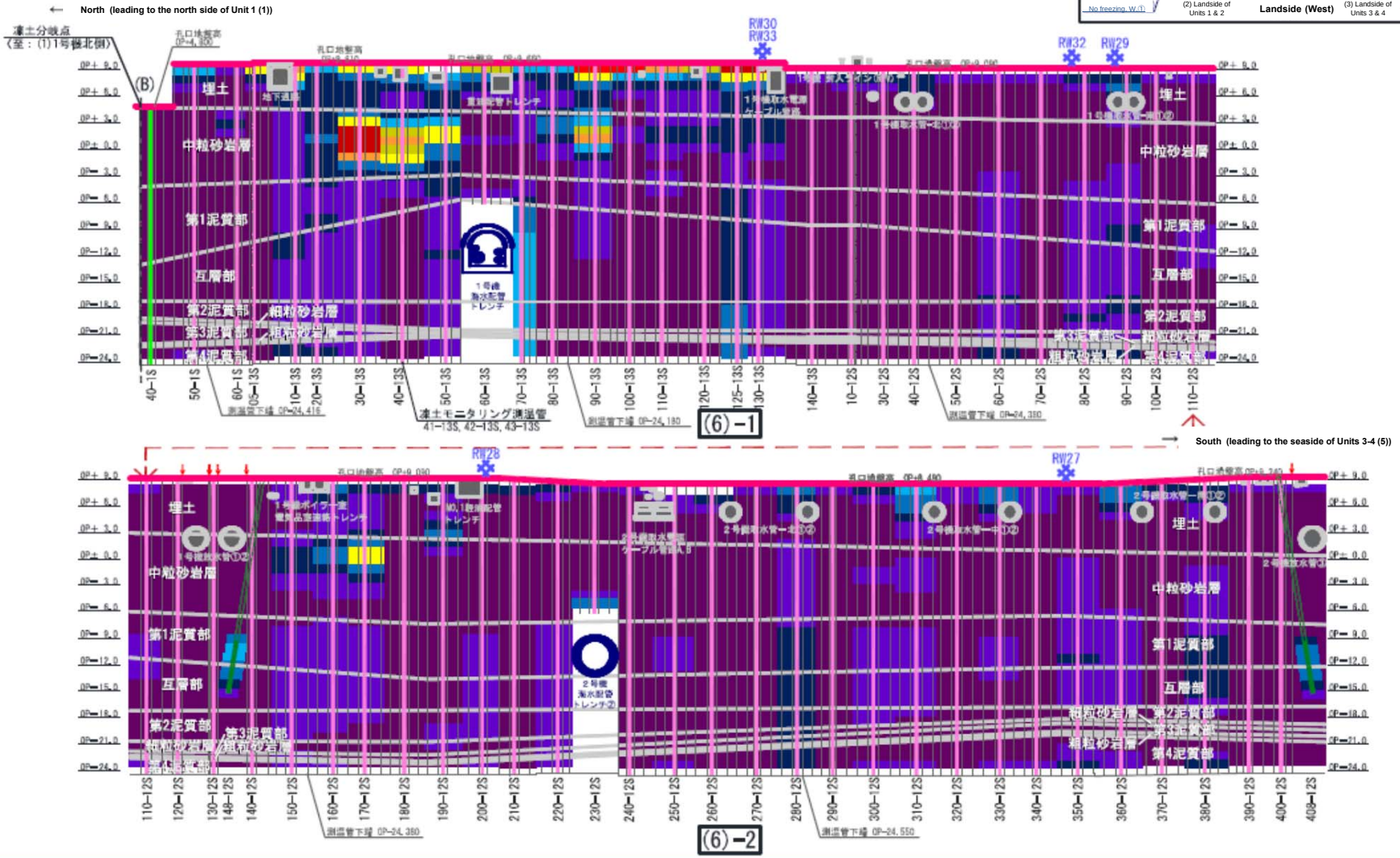
■ Distribution map of soil temperatures

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

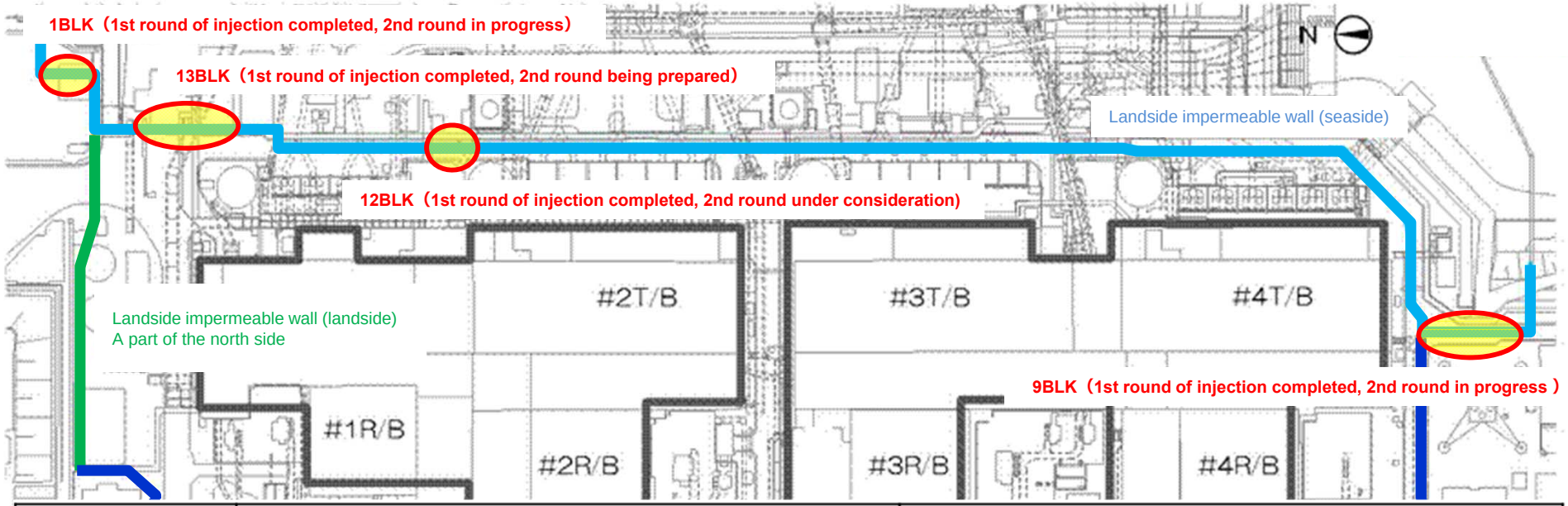
(The temperature data as of 7 a.m. on July 26.)







Progress of supplementary work



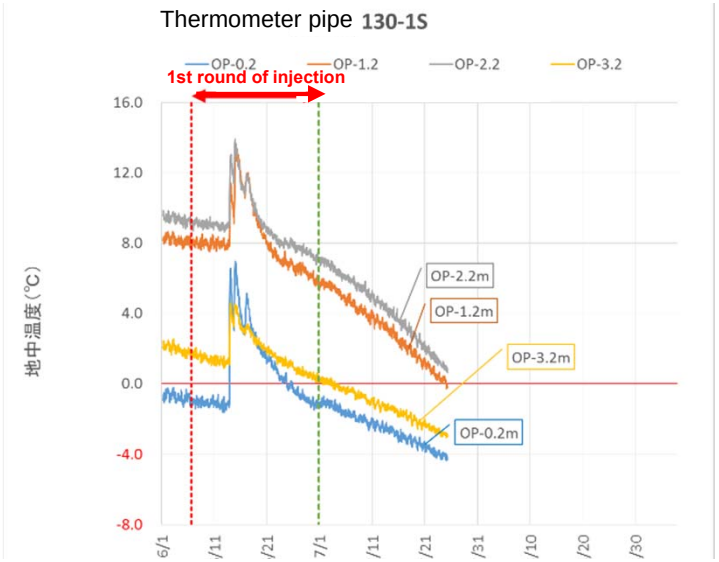
North side of Unit 1	Started on June 6	First round of injection completed on June 30 / Second round of injection started on July 14
East side of Unit 1	First round of injection completed on July 14	
South side of Unit 4	Started on June 6	First round of injection completed on June 24 / Second round of injection started on July 22

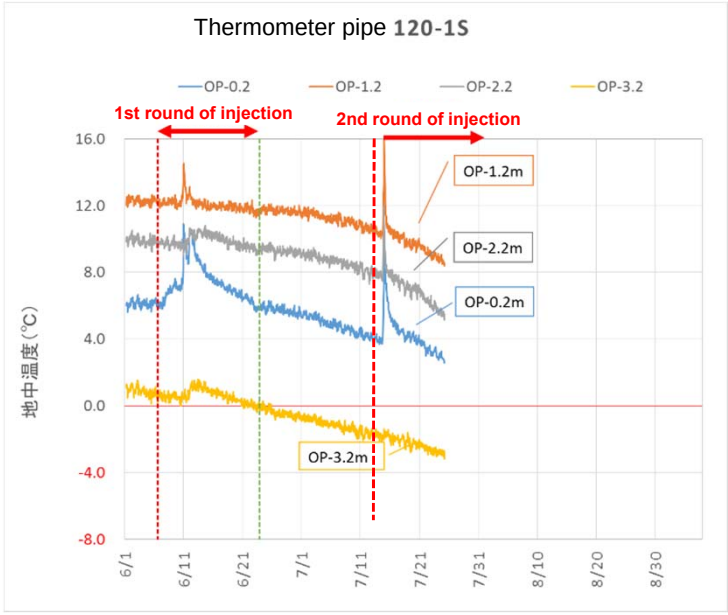
Progress of supplementary work（1BLK）

Over-time changes of the soil temperatures in the north side area of Unit 1 where the supplementary work is in progress

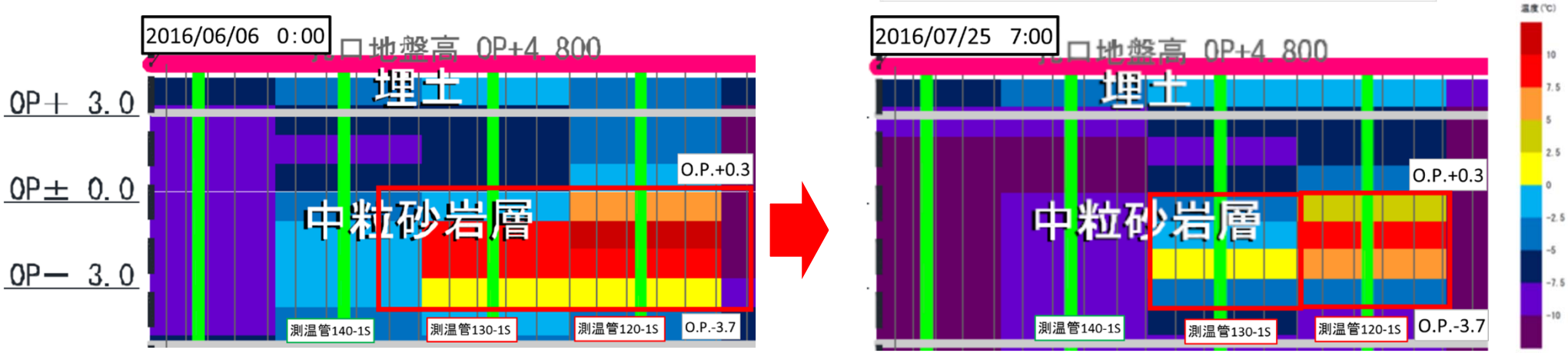
The soil temperatures temporarily increased because of water which was used to bore through the ground during the supplementary work, but it has gradually decreased. Since the soil temperature around the thermometer pipe of 120-1S has not dropped sufficiently, however, the second round of injection is currently under way. TEPCO Holdings will continue to monitor the temperature changes.

Temperature changes in the area where the supplementary work is under way





Distribution maps of soil temperatures in the area where the supplementary work is under way

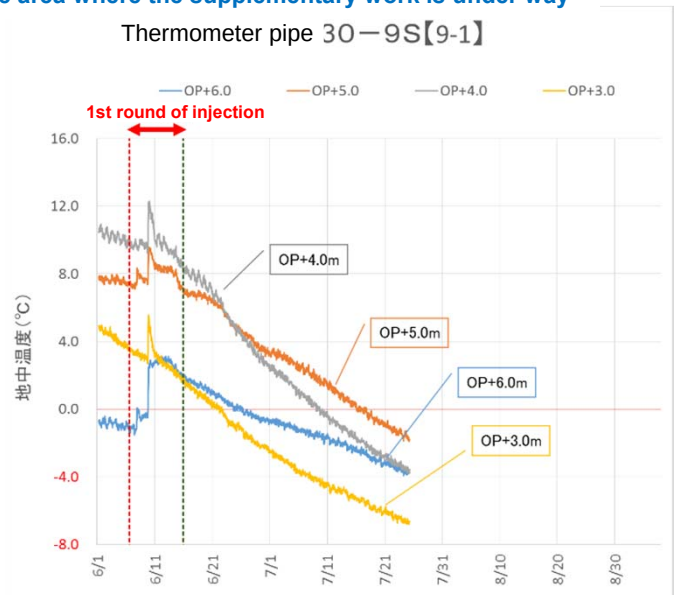


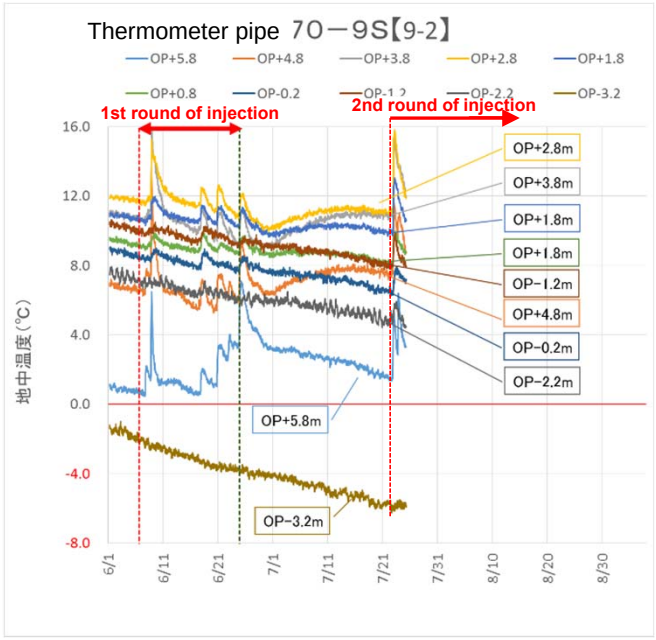
Progress of supplementary work (9BLK)

Over-time changes of the soil temperatures in the south side area of Unit 4 where the supplementary work is in progress

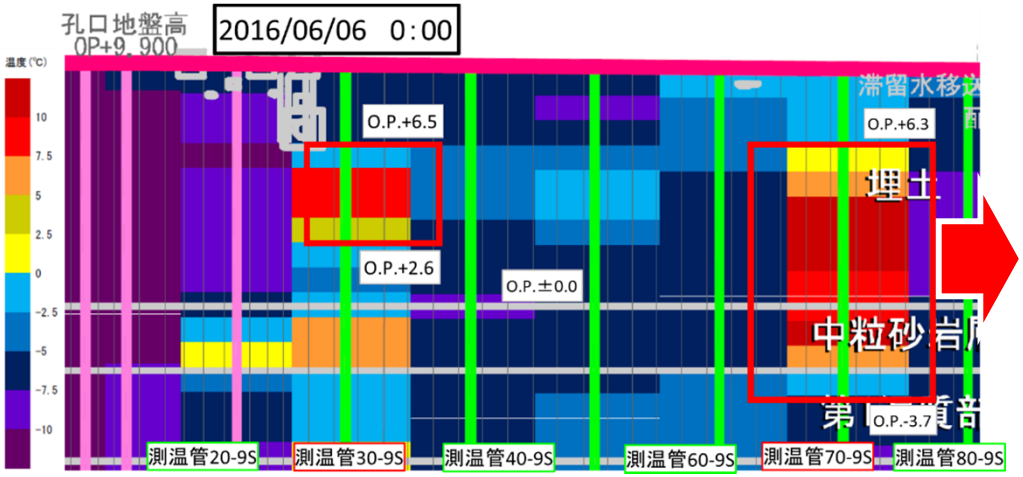
As seen in the soil temperatures in the 1BLK area, that in the 9BLK area temporarily increased because of water which was used to bore through the ground during the supplementary work. The soil temperature around the thermometer pipe of 30-9S0 has dropped to around 0 degrees Celsius, and TEPCO Holdings will continuously monitor it. In the area around the thermometer pipe of 70-9S, the second round of injection is progressing.

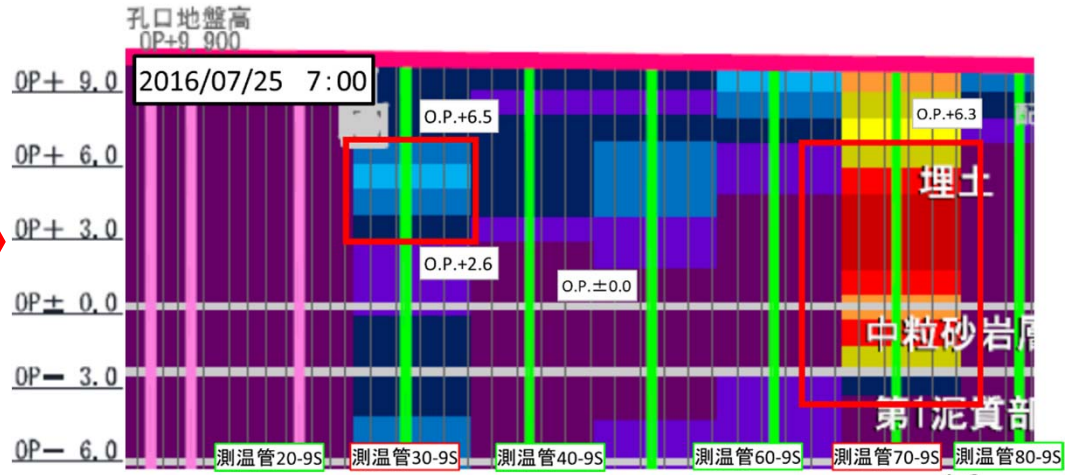
Temperature changes in the area where the supplementary work is under way





Distribution maps of soil temperatures in the area where the supplementary work is under way



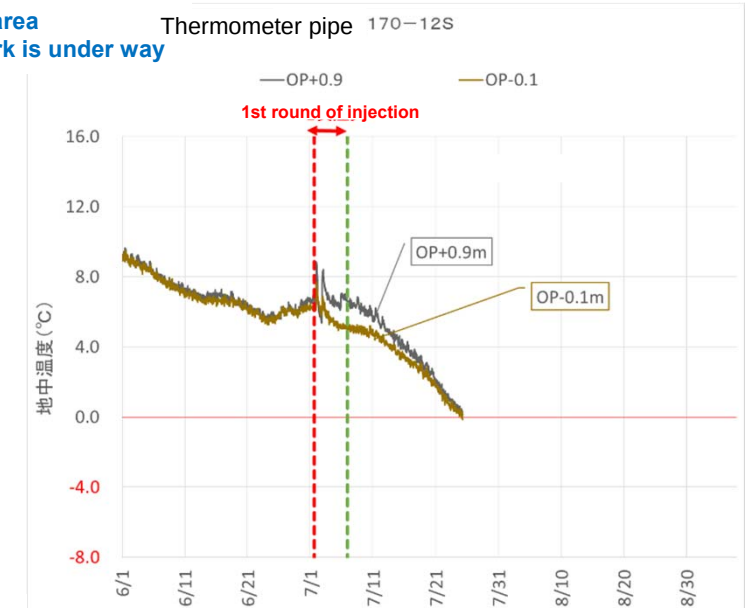


Progress of supplementary work (12BLK)

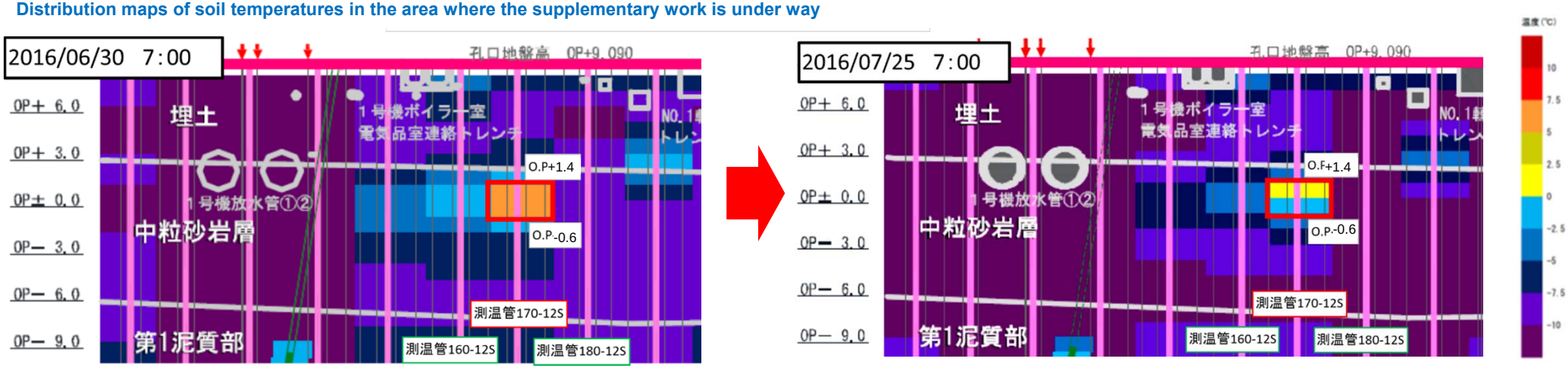
1, Over-time changes of the soil temperatures in the east side area of Unit 2 (12BLK) where the supplementary work is in progress

The soil temperatures have gradually decreased. Monitoring of the temperatures will continue.

Temperature changes in the area where the supplementary work is under way



Distribution maps of soil temperatures in the area where the supplementary work is under way

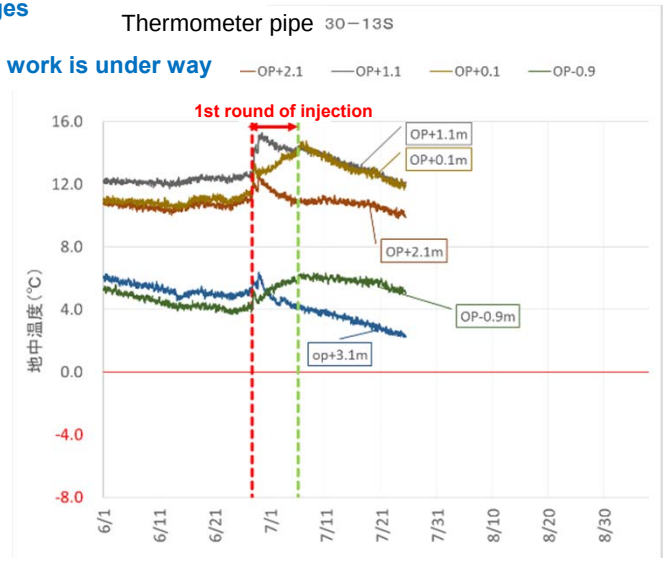


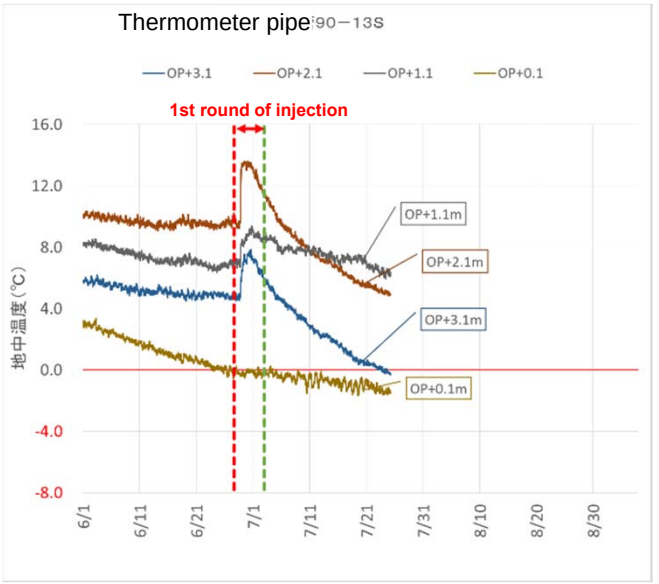
Progress of supplementary work (13BLK)

1, Over-time changes of the soil temperatures in the east side area of Unit 2 (13BLK) where the supplementary work is in progress

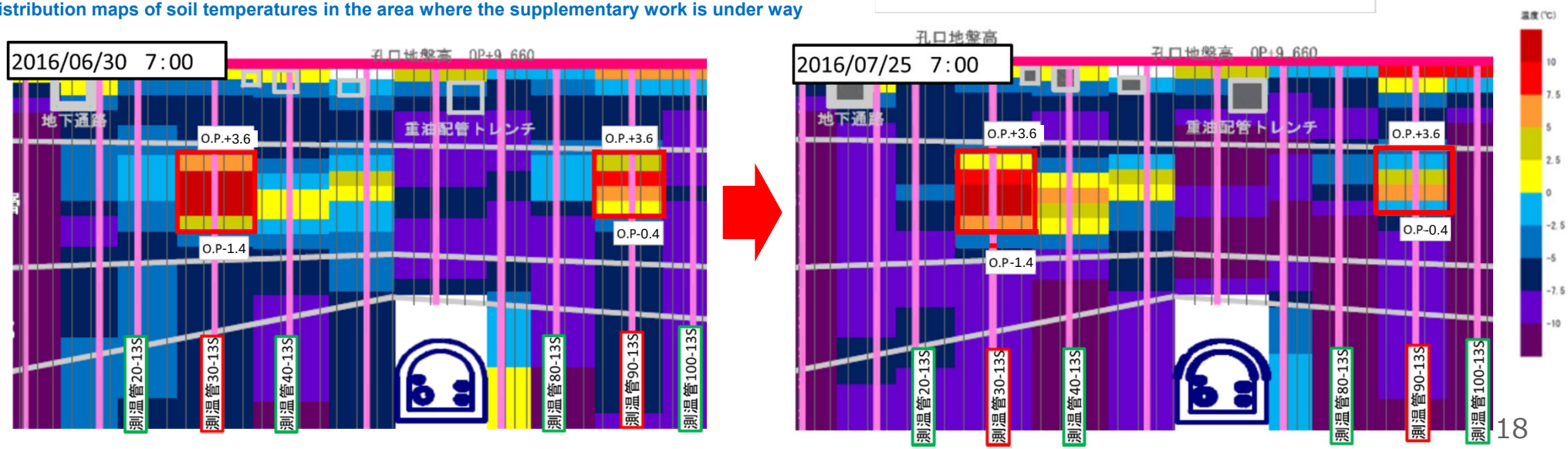
Since the soil temperature around the thermometer pipe of 30-13S has slowly decreased, the second round of injection is planned. Although the decrease of the soil temperatures around the thermometer pipes of 50-13S and 90-13S have been gradual but steady, monitoring of the temperatures is still under way.

Temperature changes in the area where the supplementary work is under way





Distribution maps of soil temperatures in the area where the supplementary work is under way



[Reference] Purpose of supplementary work

■ Purpose

- To help further freeze soil in places where the soil temperatures have slowly dropped due to fast flowing groundwater, the speed at which the groundwater runs has to be reduced by making the permeability of the soil as low as that of soil in the vicinity of the places.
- The purpose of the supplementary work lines not in constructing different walls from the landside impermeable wall but in changing locally highly permeable soil areas into areas with low permeabilities observed in the soil of the surrounding area.

■Process

① Previous state:
In places where soil have high permeability and groundwater is gushing, freezing does not proceed as scheduled.

②Fluids injection：
By injecting some fluids into spaces in places where groundwater runs fast and lowering the permeability of the soil, the speed at which the groundwater flows will be reduced.

③Facilitation of freezing:
The reduction of the speed of groundwater flow will make the soil easier-to-freeze and expand frozen area. Then, thermometer pipes will gradually start to show the effectiveness of this work.

④When the soil temperatures do not significantly drop, the second round of injection will begin. The injection will continue depending on how much the temperatures have dropped.