

Fact sheet: overview of contaminated ground water leakage at TEPCO's Fukushima Daiichi NPS

On June 19, 2013, TEPCO announced that ground water in the area between the turbine buildings and plant port in Fukushima Daiichi NPS had been contaminated with radioactive materials. Furthermore, TEPCO announced that a part of this contaminated ground water leaks to the near plant zone of the plant port, the area between the seawall and the secondary breakwater on July 22.

Total beta¹ activity in the sea water was only detected in the near plant zone while total beta activity in other points of the plant port and open sea was below detection limit or similar.

TEPCO took immediate countermeasures and planned fundamental countermeasures to be implemented within one to two years. The Government of Japan expressed that it would provide proactive support to facilitate TEPCO's activities.

This document is intended to provide a series of factual information of the contaminated ground water leakage and the countermeasures for this issue.

1. On June 19, 2013, TEPCO announced that they had detected contaminated ground water in observation well No. 1 at the eastwards (seawards) area between the turbine buildings and plant port in Fukushima Daiichi NPS. The situation of contaminated ground water is illustrated in Attachment 1 with the highest values and in Attachment 2 with the latest ones. The contaminated ground water was found during the following investigations. TEPCO conducted investigations to identify the cause of that a few points of the plant port contamination stayed at a certain level with setting up an external expert group this April. Against this backdrop, TEPCO had dug observation wells in the eastwards area of the turbine buildings and made radioactive analyses of the ground water in the wells.

2. Furthermore, TEPCO announced on July 22 that the contaminated ground water was leaking to the near plant zone of the plant port. There were a few points which indicated the significant changes of radioactive material concentrations in the near plant zone, and a significant change was not observed at the other parts inside or outside of the port. The

¹ Excluding tritium

radioactive material concentrations at the port boundary have been below the detection limit or a small number of becquerels per liter (as of August 14). It is considered that no meaningful influence is induced outside the port according to the observation. Attachment 3 illustrates the radioactive material concentrations of sea water both inside and outside the port. According to TEPCO, the amount of tritium leaked in 2 years and 2 months, from May 2011 to July 2013, is estimated to range from 20 trillion to 40 trillion becquerels. For reference, the maximum allowed annual release of tritium for the Fukushima Daiichi normal operation phase is 22 trillion becquerels per year.

3. TEPCO currently estimates that the source of the contamination is the remaining contaminated water in the power supply cable trenches connecting the turbine building of Unit 2 and the sea water circulation pumps near the sea shore where highly contaminated water from the reactor building intruded during the aftermath of the accident in April 2011, and that this water is leaking and contaminating part of the ground water which flows into the plant area from the mountain side of the facilities and flows into the sea port water, while investigating other possibilities of path and root causes.

Currently TEPCO estimates that the whole plant area of Units 1 to 4 has approx. 1000 m³ of ground water flow every day and 400 m³ of this flows into the basement of the facility buildings. Some part of the remaining water is considered to be contaminated by the water in the trench and flows into the port through the soil.

4. The followings are countermeasures either being, or to be taken against the contaminated ground water leakage (refer to Attachment 4).

Immediate Countermeasures

1) Soil improvement by sodium silicate

In the eastwards area from the turbine building where the contamination of ground water was detected, preparation is underway to improve the soil for preventing the contaminated ground water leakage to sea, to pave the land surface with asphalt to prevent rain water inflow, and to pump out the dammed up ground water (TEPCO estimates the amount of pumping to be around 140 m³ per day)

The injection of sodium silicate started from July 8 for the sea-side soil improvement between Units 1 and 2 and the soil improvement was completed on August 10. The contaminated ground water dammed up by the soil improvement has been being pumped out since August 9. In addition, TEPCO started preparation for isolating the contaminated area to be completed in October. TEPCO is preparing for soil improvement between Units 2 and 3 as well as between Units 3 and 4.

- 2) Pumping out contaminated water from the trenches and isolating them.

For the countermeasures against the highly contaminated water in the trenches, TEPCO plans to pump out the contaminated water from a part of the trenches and isolate them by the end of October.

Furthermore, TEPCO will start pumping out water from other trenches in September. TEPCO will examine the freezing method to block the water flow between the turbine buildings and the trenches as soon as possible. If the freezing method is feasible, TEPCO will start isolating the trenches by the freezing method.

- 3) Bypassing ground water

This countermeasure is to pump out ground water at the mountain-side area from the reactor buildings in order to reduce the amount of ground water inflow into this area (the facilities have been installed already.). The current status is the explanation process to the local stake holders.

Fundamental Countermeasures

- 4) Pumping out the ground water from the sub-drain (under planning)

This countermeasure will be discussed under the “Committee on Countermeasures for Contaminated Water Treatment” of the “Council for the Decommissioning of TEPCO’s Fukushima Daiichi NPS”.

- 5) Installation of sea-side impermeable walls (under construction)

The sea-side impermeable walls have been under construction since FY 2012 (e.g., digging holes from June 2012 and placing steel pipe sheet piles from April 2013.) The estimation completion date is around September 2014.

- 6) Installation of land-side impermeable walls

Installation of land-side impermeable walls which surround the area of Units 1 to 4 is being considered. This measure is being prepared in case the other measures (e.g., bypassing ground water and pumping out water from sub-drains adjacent to the reactor buildings) to control ground water level do not work sufficiently. The land-side impermeable walls will be constructed by the frozen soil method, which is evaluated to have good impermeability and on-site workability, and are aimed to be operational as soon as possible. The feasibility study for the land-side impermeable walls by the frozen soil method will be implemented by the end of FY 2013. The land-side impermeable walls will be installed in the first half of FY 2013.

5. On August 2, the Nuclear Regulation Authority settled the Working Group for Review on Contaminated Water Countermeasures of the Supervision and Evaluation Committee for the Specified Nuclear Power Facilities and started its technical supports to TEPCO.

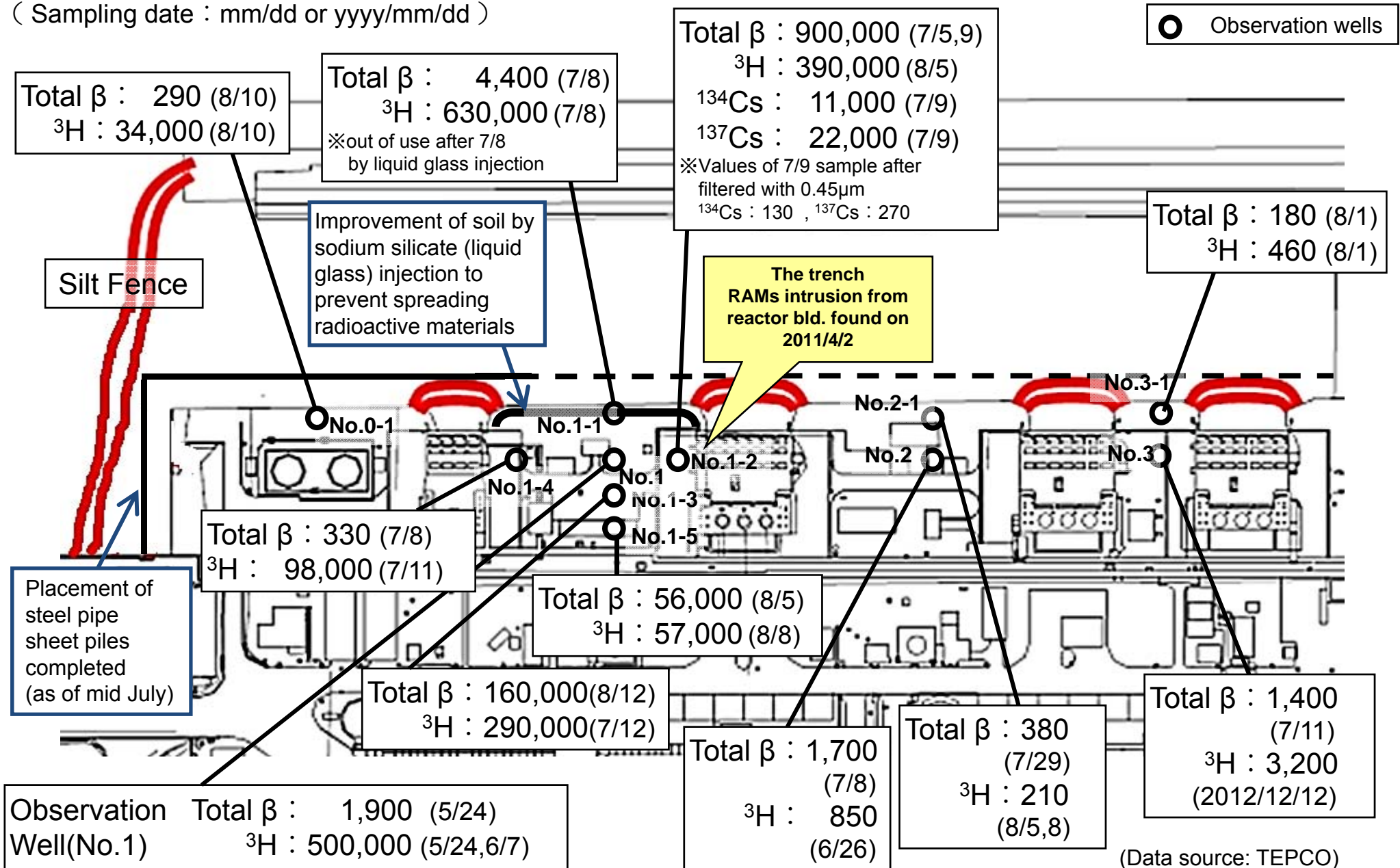
6. At the Nuclear Emergency Response Headquarters meeting held on August 8, Prime Minister Abe stated that not only TEPCO but also the government itself should make contribution in planning and implementing the countermeasures for the contaminated water leakage issue. On August 9, the Council for Decommissioning of TEPCO's Fukushima Daiichi NPS – chaired by The METI Minister Motegi – decided to establish procedures and methodologies for each activity to settle completely the contaminated ground water leakage issue in both immediate and fundamental countermeasures by the end of the coming September based on the basic principles (refer to Attachment 4).

7. On August 19, TEPCO announced that they found water leak from a drain valve of a tank dike in the H4 area which is one of the installation locations of contaminated water tanks in Fukushima Daiichi NPS. Because high radiation dose was detected in the puddle of water having leaked outside the dike, TEPCO determined that the water had leaked from the contaminated water tank. TEPCO found water spread in the neighborhood of the No.5 tank in the H4 area and confirmed that the water level of the No. 5 tank was 3 m lower than its normal level. TEPCO estimates that the amount of the leaked contaminated water was 300 m³. In cooperation with the Government of Japan, TEPCO is making efforts for investigating the cause of this issue and preventing the similar events (refer to Attachment 5).

Activities in Ground Water at East Side of Turbine Bld. [Highest] Att. 1

Maximum Values since Dec. 2012 as of August 14 [Unit : Bq/liter] Total β: Excluding tritium

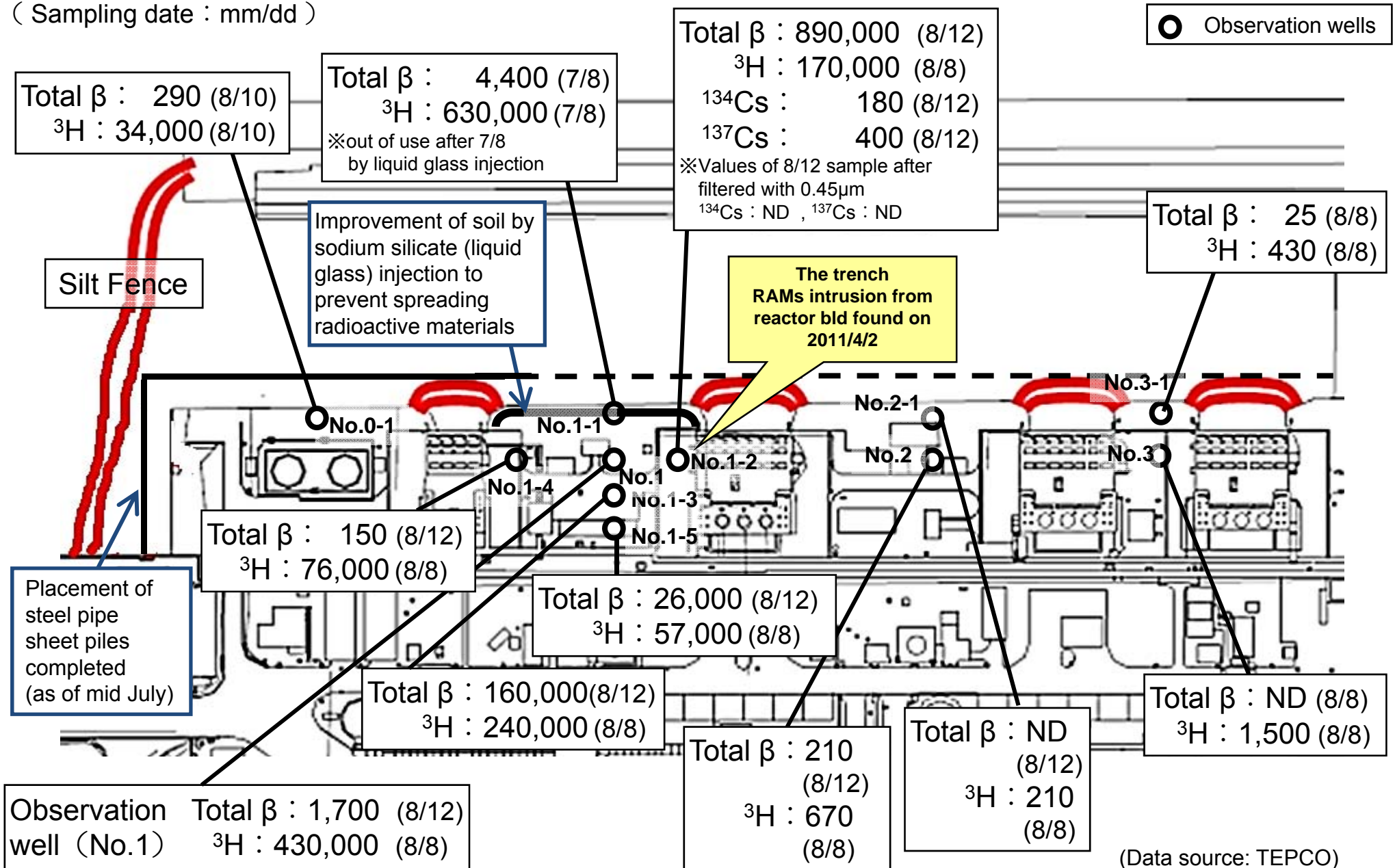
(Sampling date : mm/dd or yyyy/mm/dd)



Activities in Ground Water at East Side of Turbine Bld. [Latest] Att. 2

Latest Values as of August 14 [Unit : Bq/liter] Total β: Excluding tritium

(Sampling date : mm/dd)

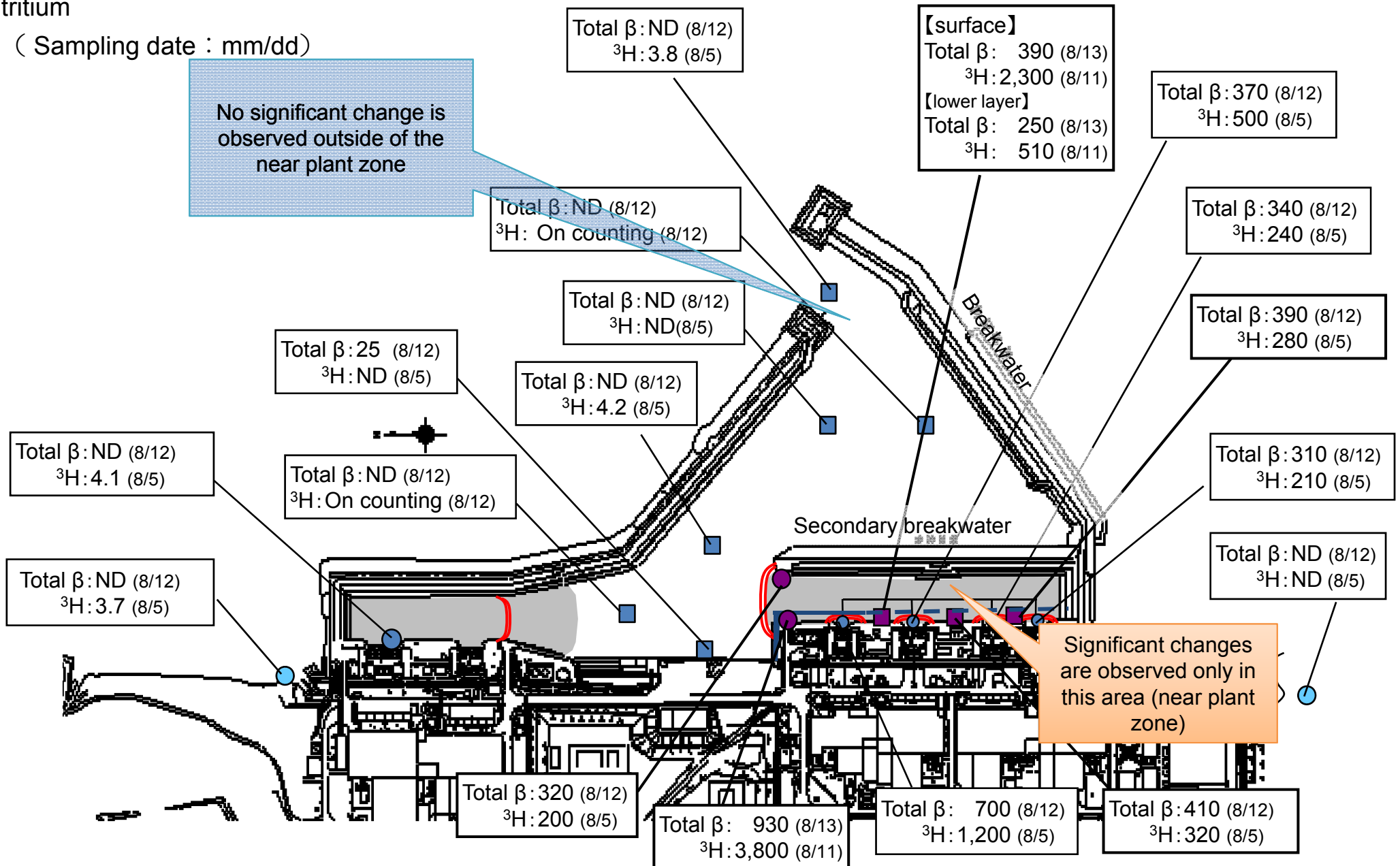


(Data source: TEPCO)

Sea Water Activity Inside and Outside [Latest]

Latest Values as of August 14 [Unit : Bq/liter] Total β: Excluding tritium

(Sampling date : mm/dd)



(Data source: TEPCO)

Countermeasures for the contaminated ground water leakages at TEPCO's Fukushima Daiichi Nuclear Power Station

- ◇Contaminated ground water was detected in the area between the turbine buildings and plant port of the Fukushima Daiichi NPS.
- ◇Fundamental countermeasures will be taken in several phases in addition to the immediate countermeasures.

Three general principles when taking countermeasures for contaminated Water

1. Securing the source of the contamination
2. Isolating ground water from the contamination source
3. Preventing leakage of the contaminated water



Immediate countermeasures

1. Remove water containing high amount of radioactive materials from the trench (underground space where the pipes and electronic cables are set) (Starting from mid August)【 **Securing** 】
2. Improving the soil by sodium silicate (liquid glass), paving the land surface with asphalt, pumping out the underground water(this pumping out process starts this week) 【 **Isolating** 】【**Preventing leakage** 】
3. Pumping out ground water from the mountain side (Bypassing ground water)【 **Isolating** 】

Fundamental countermeasures (Coming 1-2years)

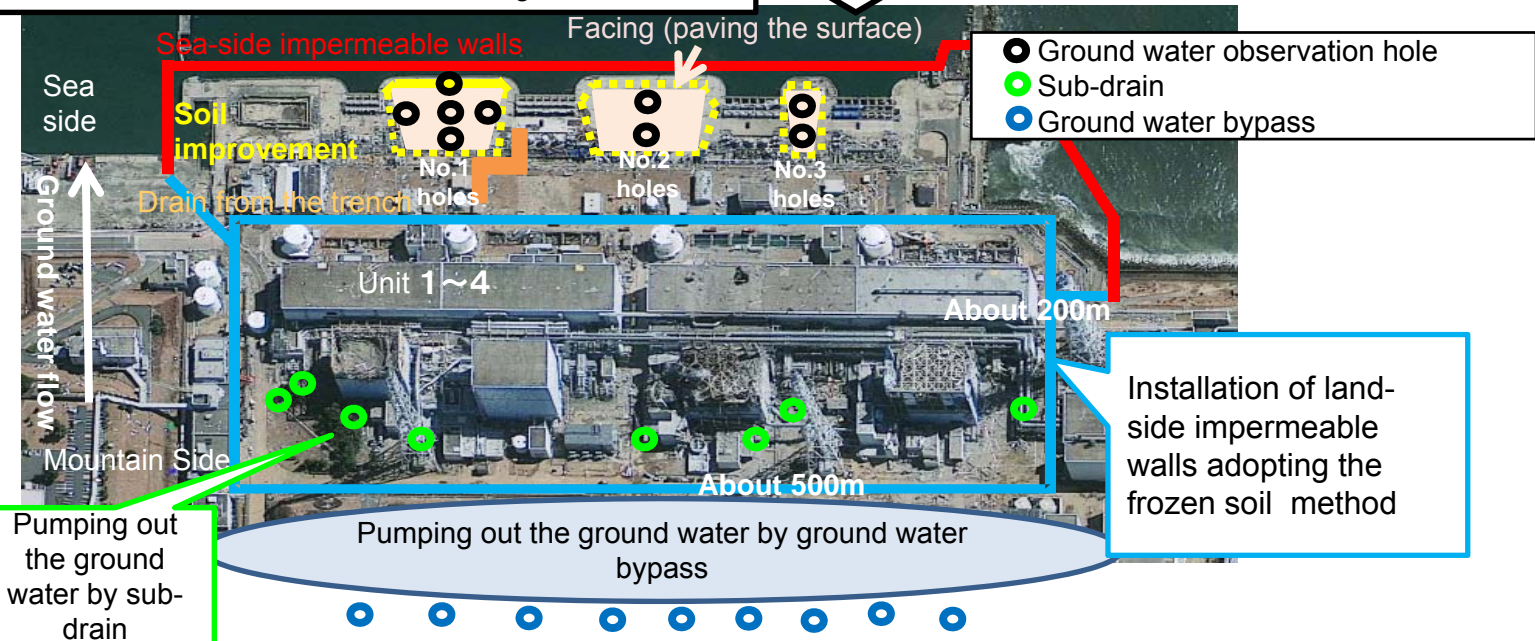
1. Pumping out the ground water from the sub-drains 【 **Isolating** 】
2. Installation of impermeable walls in the sea 【 **Preventing leakage** 】
3. Installation of land-side impermeable walls adopting the frozen soil method 【 **Isolating** 】【**Preventing leakage** 】



Current situation of the ground water

TEPCO estimates that the whole area of units 1 to 4 has approx. 1000 m³ of ground water flow every day and 400 m³ of this flows into the basement of the facility buildings. And some part of the remaining water is considered to be contaminated by the water in the trench and flows into the port through the soil.

Overview of the countermeasures being or to be taken

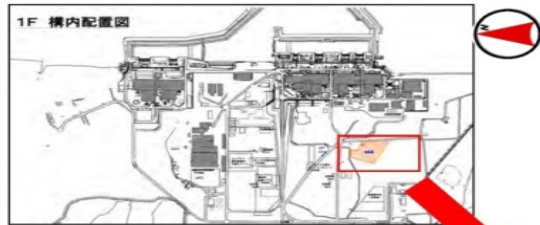


Pumping out the ground water by sub-drain

Pumping out the ground water by ground water bypass

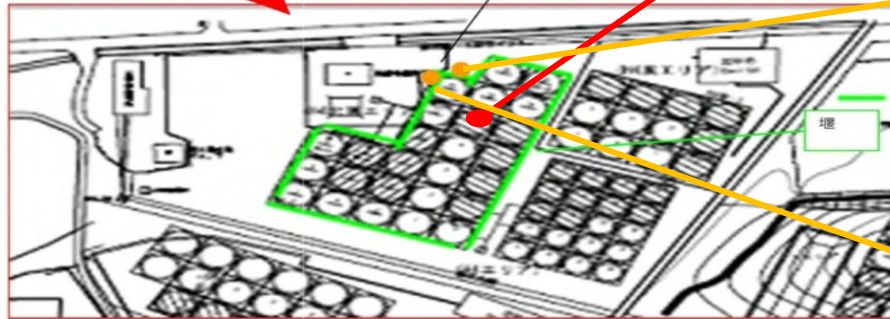
Installation of land-side impermeable walls adopting the frozen soil method

Water Leak at a Tank in the H4 area in Fukushima Daiichi NPS Att. 5



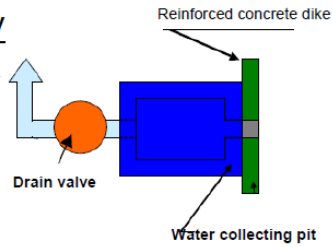
The place where paddles were found

No. 5 tank



Structure of the Tank Area

Plane view



Section view

