

Current radioactive concentration of the seawater in Miyagi, Fukushima, Ibaraki and Chiba

Att. 1

- Japan adopts the world highest level of standard for food and water, and conducts strict monitoring and distribution management.
- In Fukushima Prefecture where the accident occurred, annual radiation exposure from food and water is lower than 0.01 mSv.
- The results of monitoring of sea water in Japan are constantly below the standard of 10 Bq/L ("Guidelines for Radioactive Substances in Bathing Areas")
- Influence of contaminated water is limited in the port of Fukushima Daiichi NPS, whose area is smaller than 0.3 km².



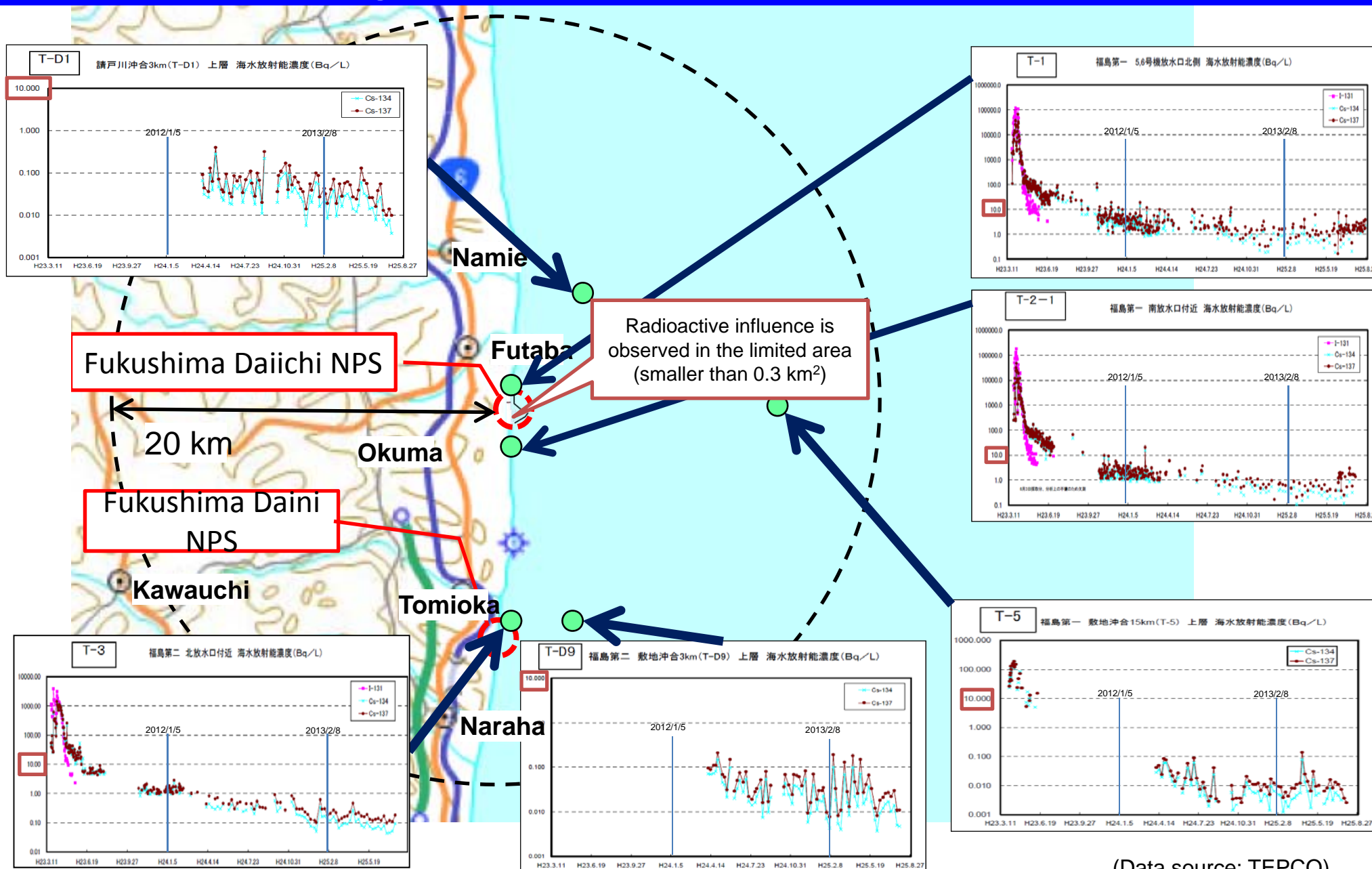
<Explanation note>

- Sea Area Monitoring at offshore of Miyagi, Fukushima, Ibaraki and Chiba Prefecture (sampling date: May 16 – Jun 2, 2013, published on August 7 by Nuclear Regulation Authority (NRA)) indicates 0.021 Bq/L or less for Cs-134 and Cs-137, most results are not detectable for Cs-134, much lower than the standard of 10 Bq/L.
- "Guidelines for Radioactive Substances in Bathing Areas" released by Ministry of Environment gives an indication of the water quality for municipalities to open bathing areas as follows :
 - The concentration of radioactive Cs (Cs-134 and Cs-137) is lower than or equal to 10 Bq/L.
- Not detectable indicates the case that the detected radioactivity concentration in seawater was lower than the minimum detectable activity 0.001Bq/L.

(Data source: NRA)

Time-series radioactive concentration of the seawater surrounding Fukushima Daiichi NPS (2011.3.11 – current)

Att. 2



(Data source: TEPCO)

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

Att. 3

- 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 principles for contaminated water countermeasures

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

Immediate countermeasures

1. Removing water containing high amount of radioactive materials from the trench (underground space where the pipes and electronic cables are set) (start from August 22) **【Removing】**
2. Improving the soil by sodium silicate (liquid glass), paving the land surface with asphalt, pumping out the underground water (pumping out: start from August 9) **【Isolating】【Preventing leakage】**
3. Pumping out ground water from the mountain side (Bypassing ground water) **【Isolating】**

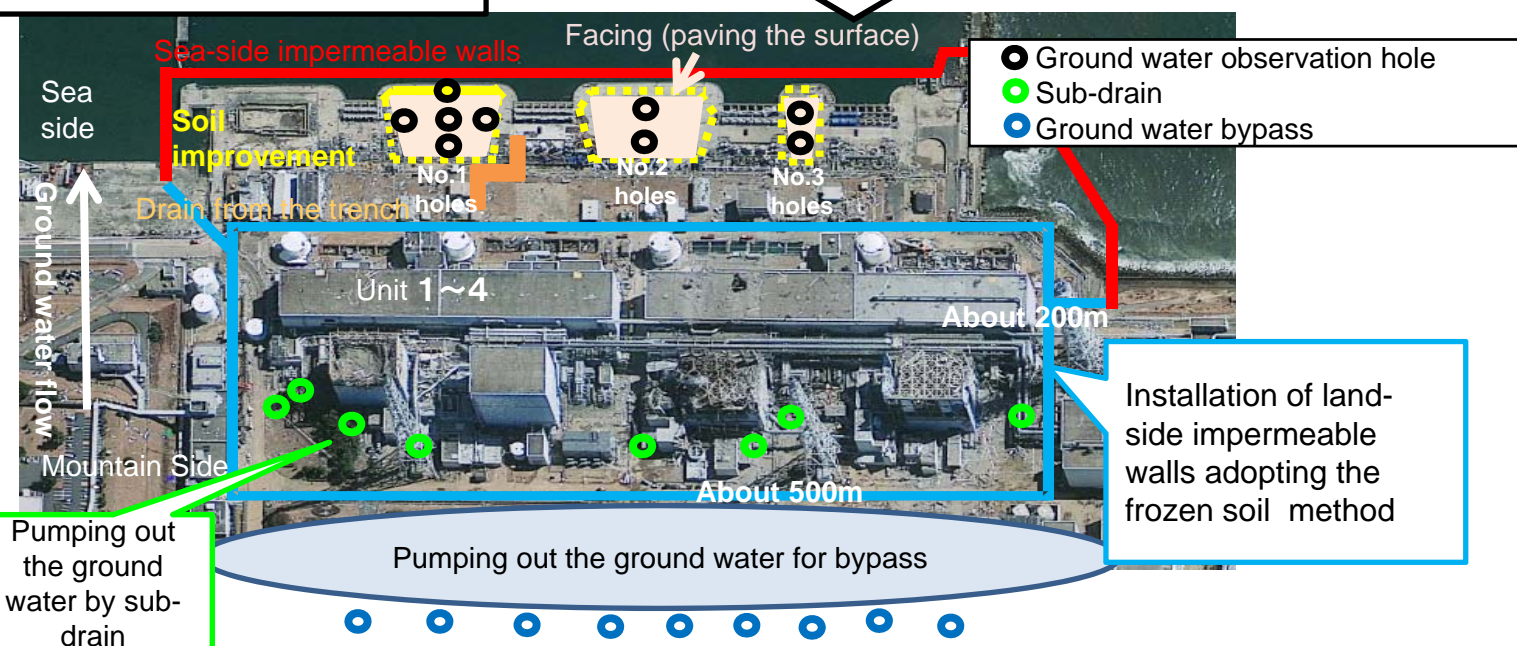
Fundamental countermeasures (Coming 1-2years)

1. Pumping out the ground water from the sub-drains **【Isolating】**
2. Installation of sea-side impermeable walls **【Preventing leakage】**
3. Installation of land-side impermeable walls adopting the frozen soil method **【Isolating】【Preventing leakage】**
4. Installation of high performance contaminated water treatment equipment **【Removing】** etc.

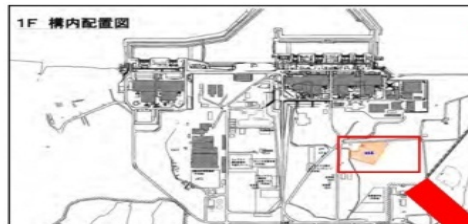
Current situation of the ground water

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 other water is considered to be contaminated by the water in the trench and flows into the port through the soil.

Overview of the countermeasures



H4 area is located about 500 m away from the sea



The place where paddles were found

No. 5 tank



East area of the No.12 tank

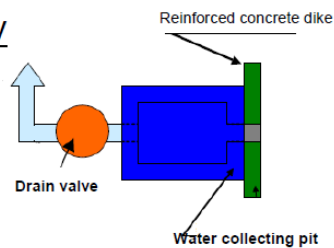


North area of the No.11 tank

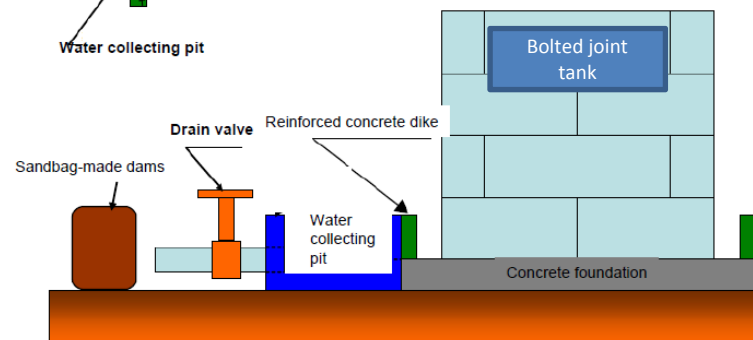


Structure of the Tank Area

Plane view

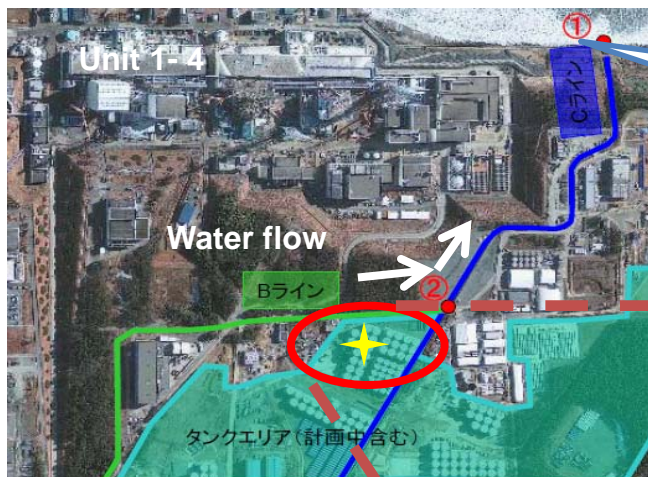


Section view



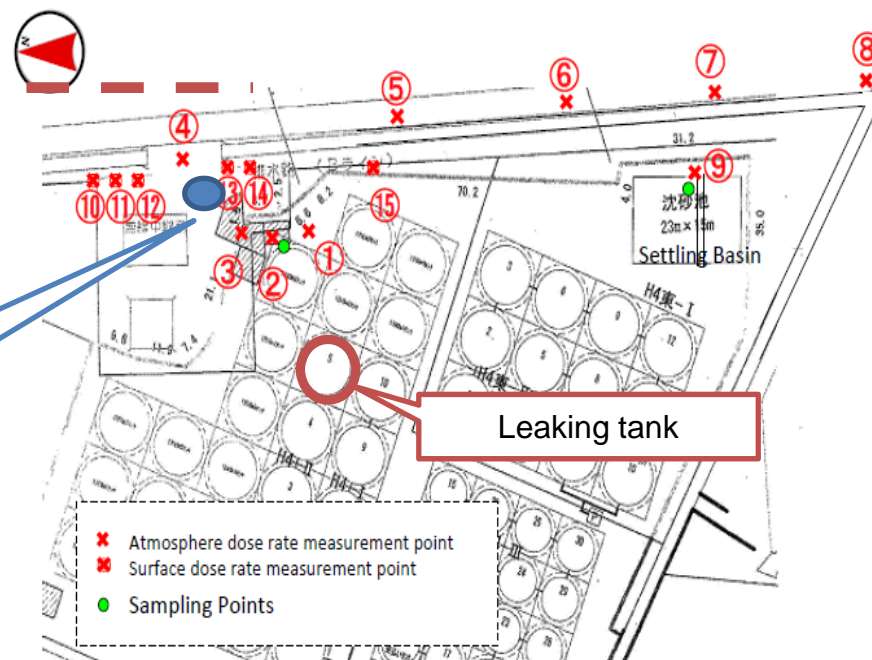
Radiation dose at the surrounding area of the tank

Att. 5



Total beta and cesium concentration at outlet of the dike was under detection limit (sampled on August 26)

5.8 mSv was detected at the dike (on August 21)



Dose Rate

Date: Aug. 19, 2013
Unit: [mSv/h]

| Sampling Point | Dose rate | |
|----------------|------------------|----------|
| | $\gamma + \beta$ | γ |
| ① | >100 | 1.5 |
| ② | 5.5 | 0.1 |
| ③ | 0.08 | 0.05 |
| ④ | 0.04 | 0.04 |
| ⑤ | 0.06 | 0.06 |
| ⑥ | 0.06 | 0.06 |
| ⑦ | 0.045 | 0.045 |
| ⑧ | 0.06 | 0.06 |
| ⑨ | 0.015 | 0.15 |
| ⑩ | 90.0 | 0.36 |
| ⑪ | 96.0 | 0.45 |
| ⑫ | 90.0 | 0.35 |
| ⑬ | 0.35 | 0.07 |
| ⑭ | 0.12 | 0.11 |
| ⑮ | 0.024 | 0.015 |

Sample Water Analysis

Sampling Date: Aug. 19, 2013

| Sampling Point | γ nuclide (Bq/cm ³) | | | | | Total β (Bq/cm ³) | Chlorine (ppm) |
|----------------|--|---------|---------|--------|--------|-------------------------------------|----------------|
| | Cs-134 | Cs-137 | Co-60 | Mn-54 | Sb-125 | | |
| Leaked Water | 4.6E+1 | 1.0E+2 | 1.2E+0 | 1.9E+0 | 7.1E+1 | 8.0E+4 | 5,200 |
| Settling Basin | <2.0E-2 | <2.6E-2 | <1.3E-2 | - | - | 4.1E+1 | — |
| Gutter | <1.9E-2 | <2.7E-2 | <1.4E-2 | - | - | 1.3E-1 | — |

(Data source: TEPCO)

Countermeasures for contaminated water leakage from the bolted tank Att. 6

- ❑ On August 19, TEPCO found 300 m³ of highly-contaminated water leakage from a bolted joint tank in the H4 area. TEPCO has been investigating the root cause.
- ❑ TEPCO inspected all of bolt jointed tanks (305 units) on August 22 in accordance with the direction of METI. TEPCO found traces with high dose on two other tanks at near the bottom of the shell. These traces had dried up already and there was no indication that the leaked water had flowed out the dike. Also, the stored water level of each tank had been the same level as that of the beginning of storage.
- ❑ TEPCO started transfer of contaminated water from the leaking tank from August 19 and completed it on August 21.

Directions of METI

1. **Enhanced management of the tanks and the surrounding area** (the switch to “normally closed” drain valve operation from “normally open,” reinforcing concrete at the bottom of the tanks, installation of water level gauges and leak detectors into the bolted joint tanks, and introduction of a central control system)
2. **Reinforced patrol** (increase of patrols from twice to four times a day, and checking & recording dose levels as well as detailed information)
3. **Accelerated replacement from bolted joint tanks to welded joint tanks**
4. **Acceleration of the highly-contaminated water treatment (operation of ALPS* from mid-September) and a decrease of radiation dose of the surrounding area by collecting the contaminated soil**
5. **Identification of the risks of storing highly-contaminated water and taking actions against the risks**

*ALPS: Advanced Liquid Processing System, multi-nuclide removal equipment

Major Countermeasures of TEPCO

1. **Total inspection of bolted joint tanks:**
2. **Water transfer from tanks, similar to No.5 tank, which were moved after installation :** Transfer of contaminated water from the two tanks with a similar history to H4-I-No.5 tank had started. One of them completed on August 27.
3. **Contaminated soil collection :** Start from August 23. It is under examination for the early completion.
4. **Inspection and reinforcement of the surrounding dikes:** The dikes around the tanks were confirmed not to be contaminated on August 22. Land embankments and waterproof sheets have been added to the sandbags outside the H4 area where the leakage occurred.
5. **Enhanced monitoring:** Since August 20, monitoring for the trenches leading to the sea has been enhanced. The possibility of leakage into the sea is under investigation.
6. **Reinforced patrol:** Urgent reinforcement to approx. 50 patrol workers. Adoption of “post responsibility system” at each tank for early recognition of any sign of accident by carefully monitoring situation, and etc.
7. **“Normally closed” drain valve operation for contaminated water tanks:** Switch to “normally closed” drain valve operation from “normally open,” in addition to improvement of rainwater management in the dike.

TEPCO is considering to include installation of water level gauges and leak detectors into the bolted joint tanks, introduction of a central control system and replacement from bolted joint tanks to welded joint tanks as its countermeasures.