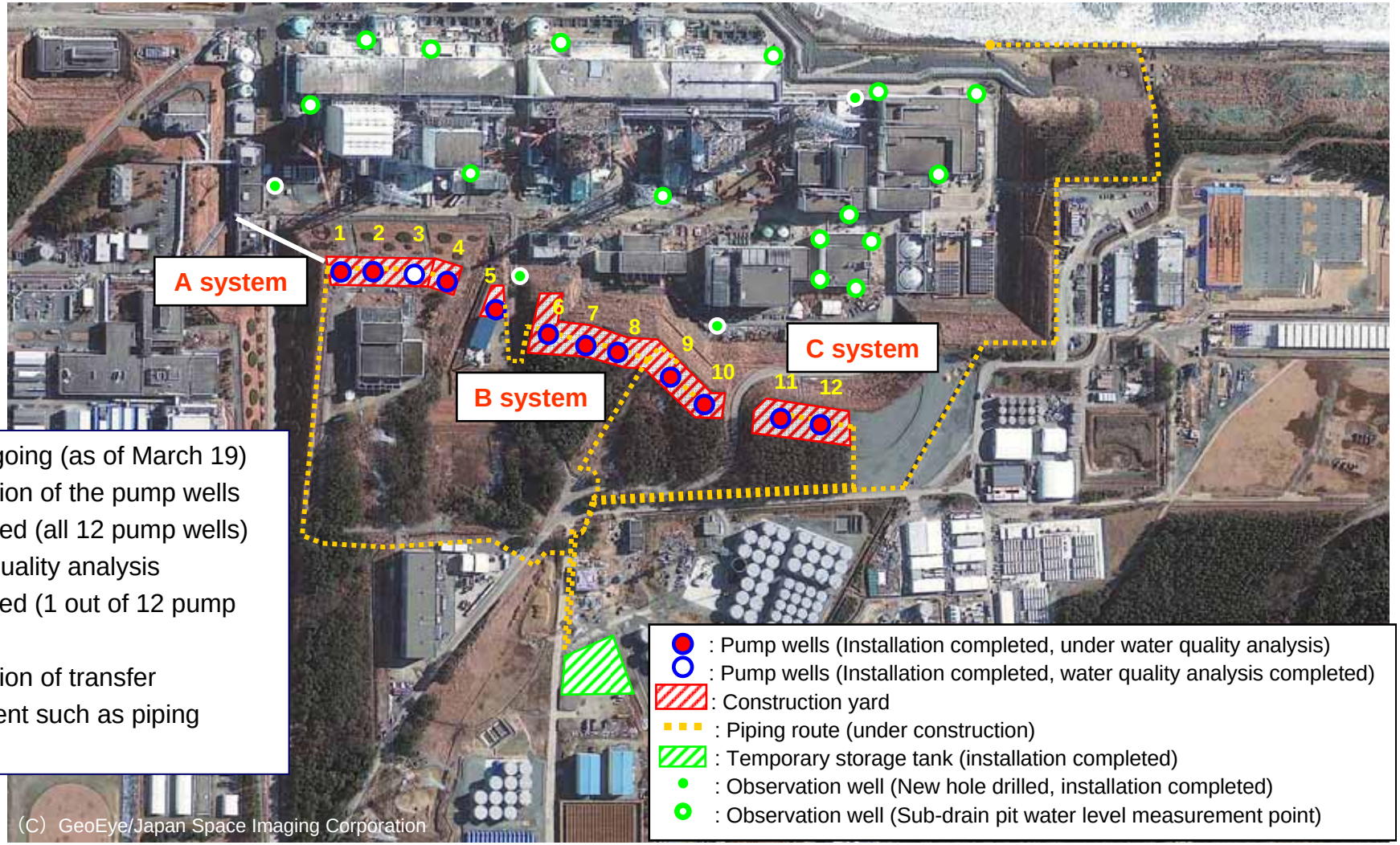
Progress Status of the Groundwater Bypass Construction

March 27, 2013

Tokyo Electric Power Company

TEPCO 東京電力

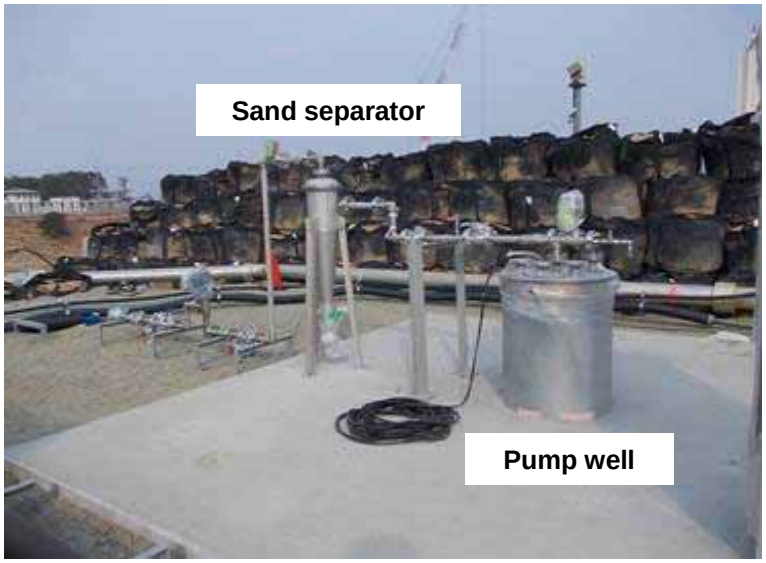
1. Construction Progress of the Groundwater Bypass



Work ongoing (as of March 19)
- Installation of the pump wells completed (all 12 pump wells)
- Water quality analysis completed (1 out of 12 pump wells)
- Installation of transfer equipment such as piping

: Pump wells (Installation completed, under water quality analysis)
: Pump wells (Installation completed, water quality analysis completed)
: Construction yard
: Piping route (under construction)
: Temporary storage tank (installation completed)
: Observation well (New hole drilled, installation completed)
: Observation well (Sub-drain pit water level measurement point)

2. Construction Progress Status (Pump Well Installation)



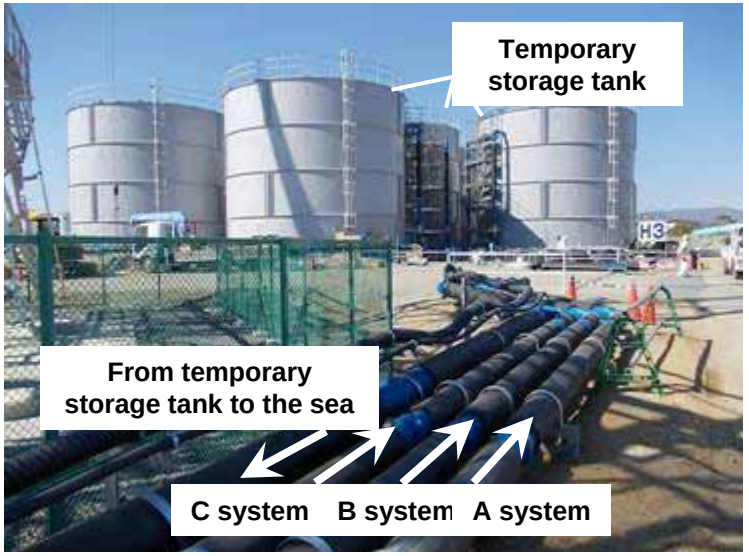
Installation of pump well No.1 and pump well facility (A system) completed

Installation of pump well No.9 (B system) completed

Installation of pump well No.11 (system C) completed

3. Construction Progress Status (Transfer Facility Installation)

Foundation installation for piping (B system)



Transfer pipe installation
(each system - temporary storage tank - sea)

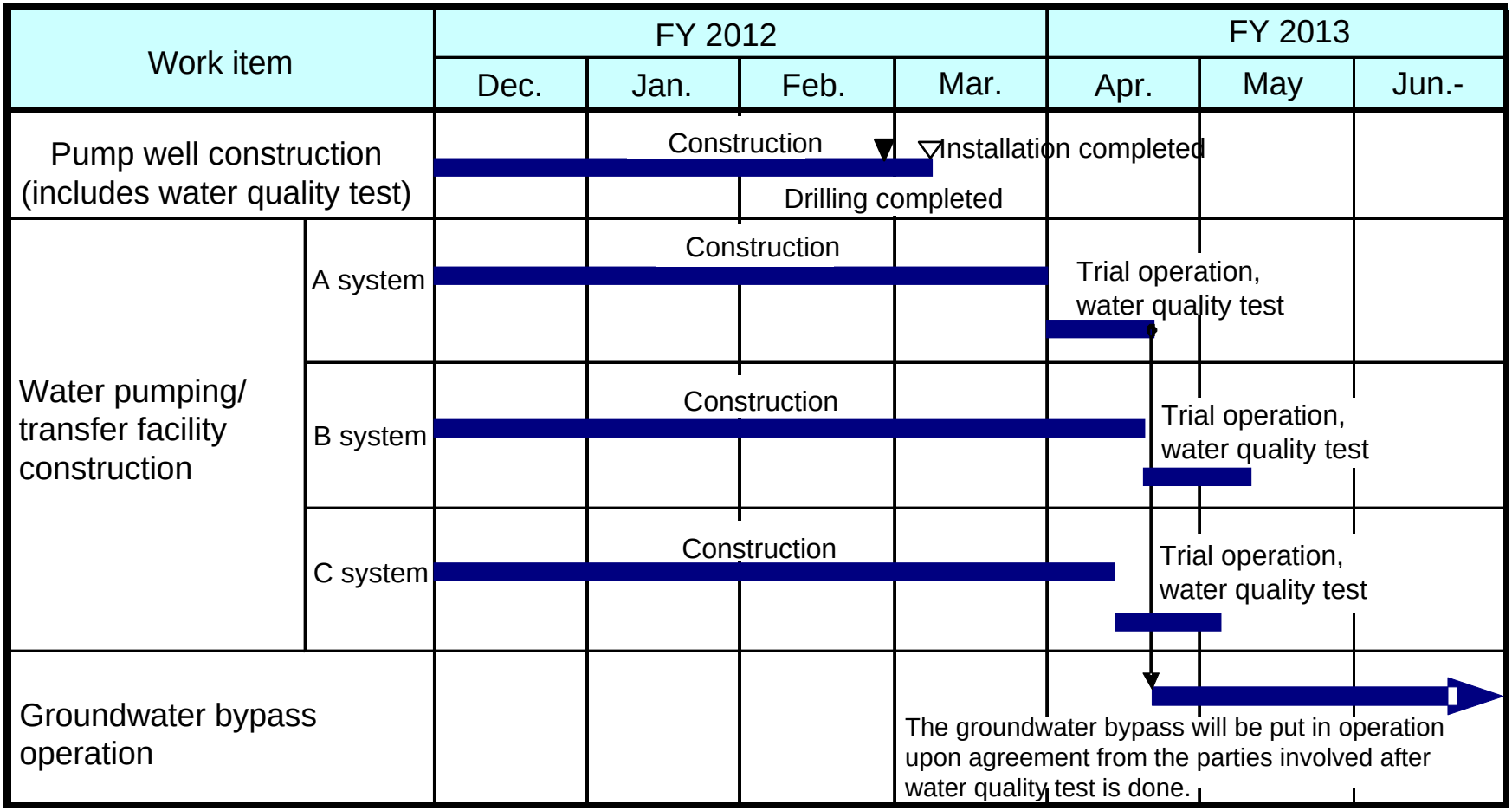
Temporary storage tank installation

Transfer pipe installation
(C system, temporary storage tank - sea)

4. Overall Schedule

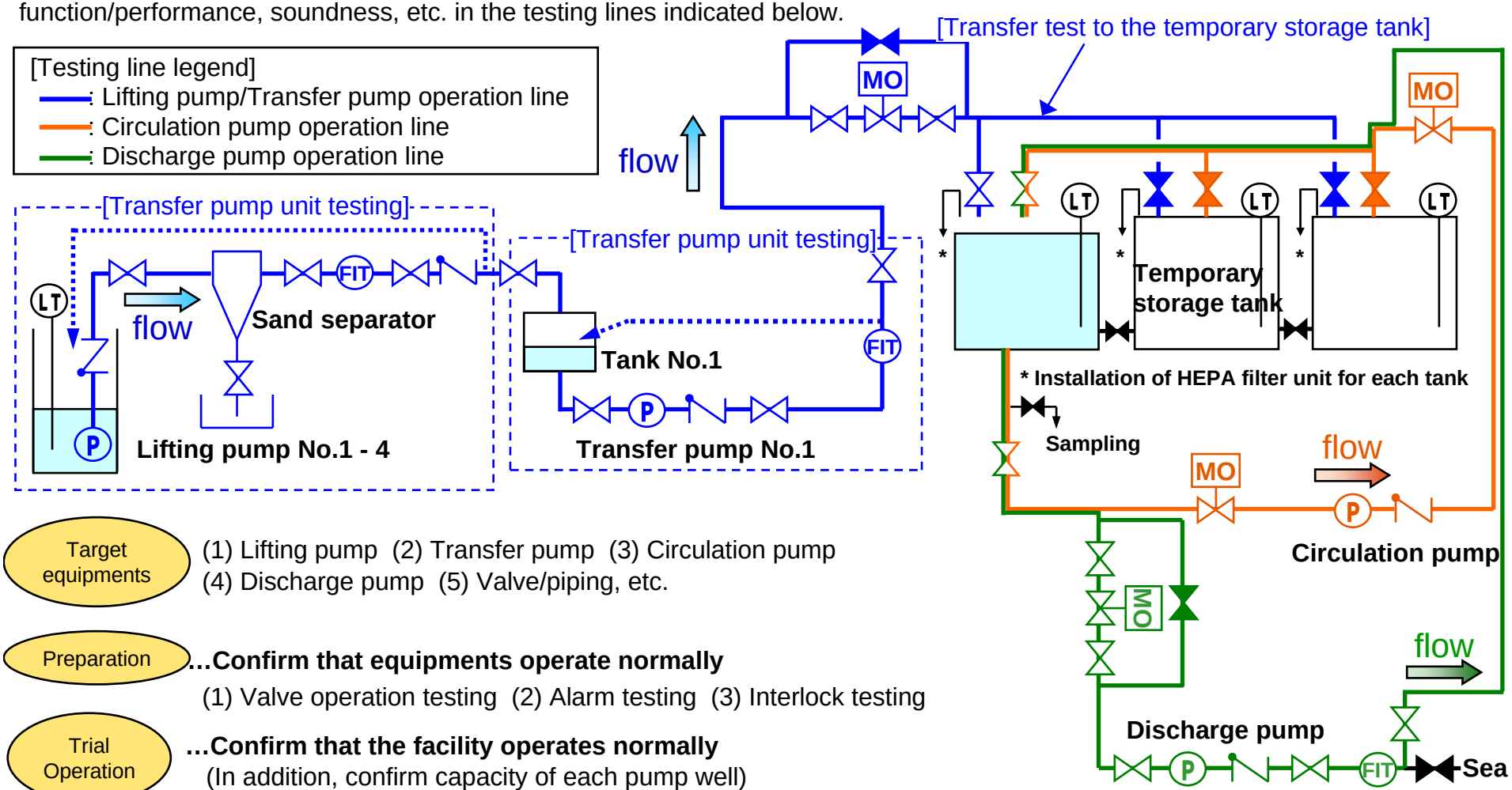
Current status (as of March 19)

- Pump wells installation construction : Installation completed (for all 12 pump wells)
- Water pumping/transfer facility construction: The transfer pipe and the pipe around the temporary storage tanks are under installation work.



5. Outline of Water Pumping/Transfer Facility Trial Operation

* As soon as all the systems are ready, equipment/facility testing, system testing and transfer testing will be conducted to confirm function/performance, soundness, etc. in the testing lines indicated below.



Target equipments

(1) Lifting pump (2) Transfer pump (3) Circulation pump
(4) Discharge pump (5) Valve/piping, etc.

Preparation

…Confirm that equipments operate normally

(1) Valve operation testing (2) Alarm testing (3) Interlock testing

Trial Operation

…Confirm that the facility operates normally

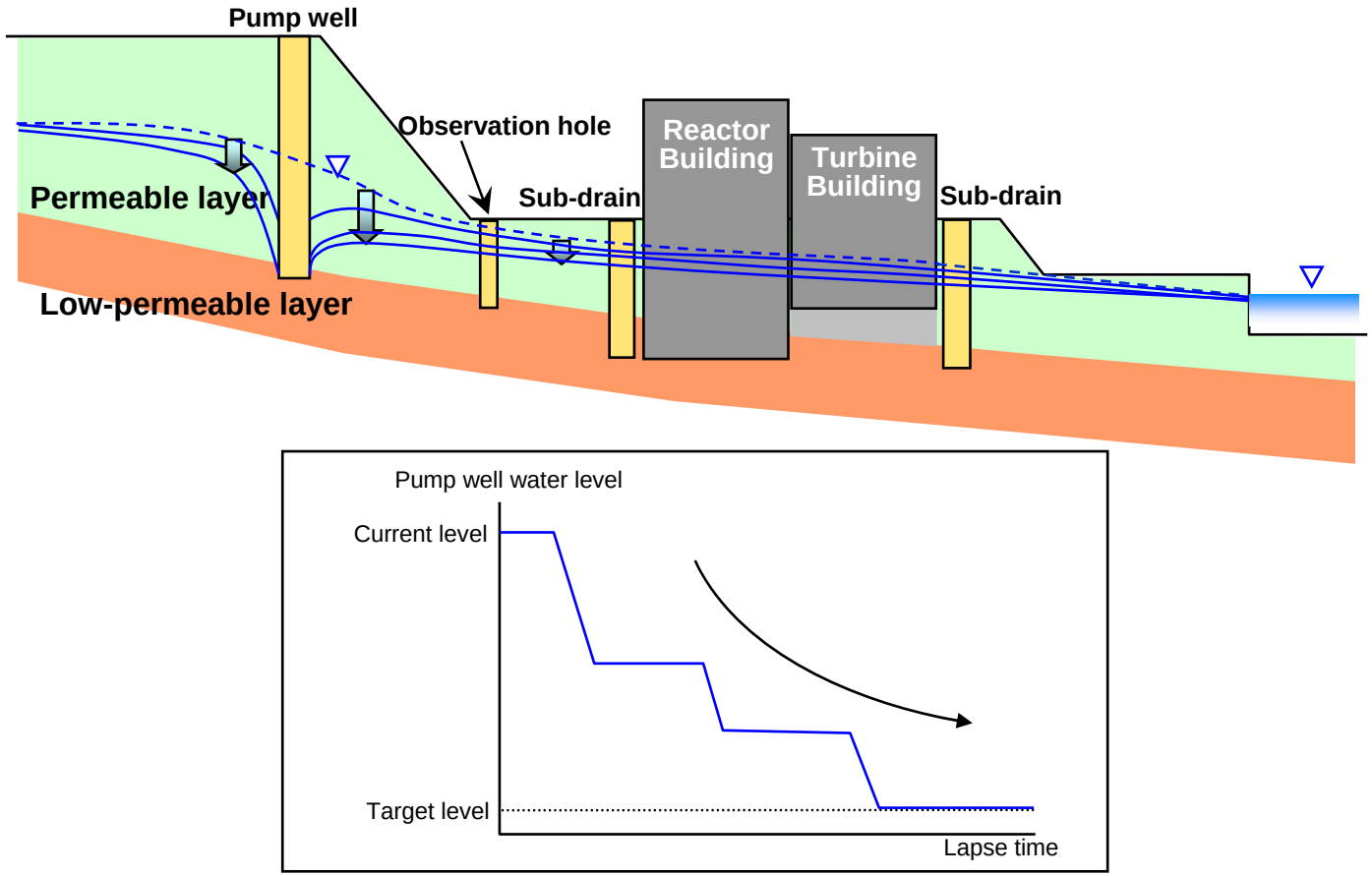
(In addition, confirm capacity of each pump well)

(1) Lifting pump unit testing, transfer pump unit testing
(2) Testing to transfer to the temporary storage tank
(3) Circulation pump unit testing
(4) Discharge pump unit testing

(1)(2) : Testing will be conducted in each system of A, B, C separately
(3) : Testing will be conducted in each tank of A, B, C separately
(4) : Testing will be conducted in A, B, C systems

6. Gradual Reduction of Groundwater

The groundwater level will be gradually reduced with the groundwater bypass put in operation. Careful water level control will be implemented to prevent the accumulated water in the buildings from leaking to the outside while monitoring the groundwater level reduction and its water quality. The sub-drains installed around the buildings will be fully utilized for the monitoring. An observation hole will be newly installed between the Reactor Building and the pump well.



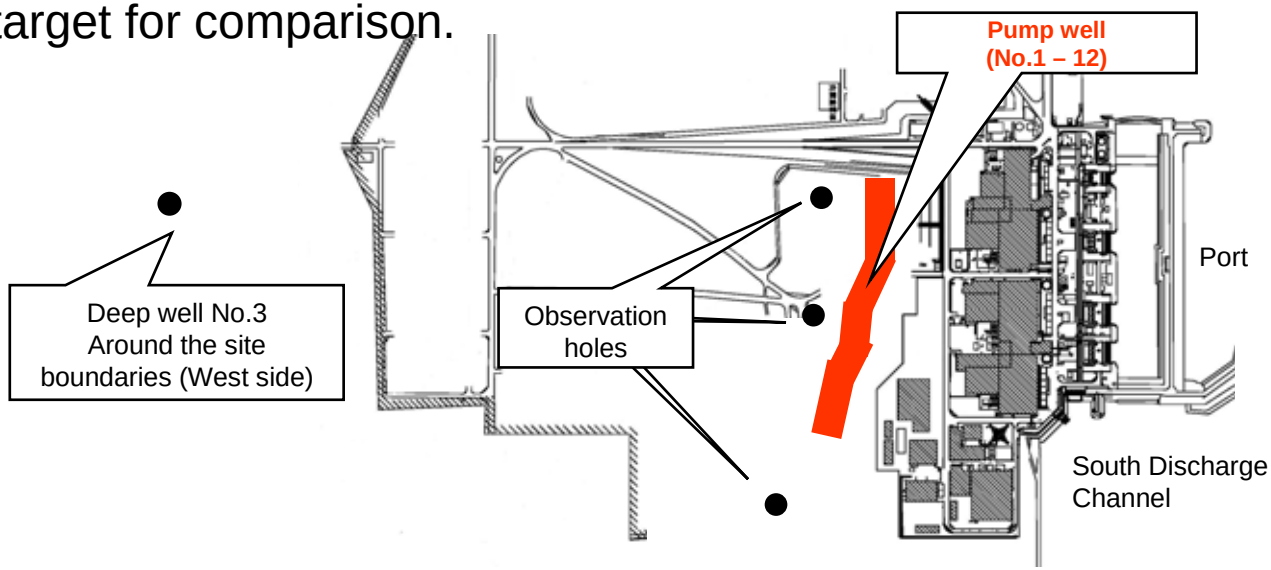
Gradual reduction of groundwater level

7. Progress Status of Water Quality Test (Progress Report) of the Pump Wells

- From December 2012 to March 2013, water quality test of groundwater sampled at each pump well (total 12 pump wells) has been ongoing.
  - ✓ As for the cesium, test result is confirmed to be below allowable limit (1Bq/L). Measurement accuracy has increased for further analysis.
  - ✓ Analysis of tritium, strontium, all α and all β is ongoing.

- Analysis result is summarized in this document and the progress will be reported with third party organization analysis.

- Data of groundwater sampled at the observation holes in the site (3 points) and the deep well No.3 around the site boundaries (west side, 1 point) in the past will be used as a target for comparison.



Locations of the pump wells, the observation holes and the deep well No.3

8. Water Quality Test Results (Progress Reports) of the Pump Wells No. 1 - 6

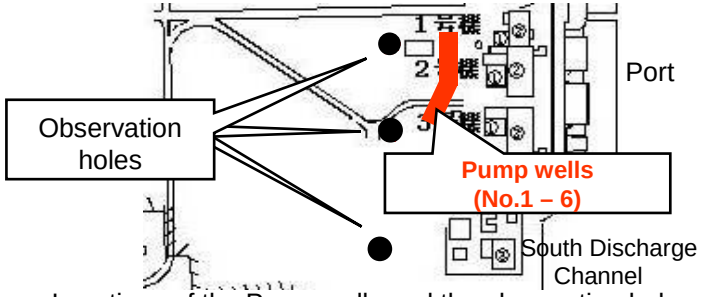
■ Groundwater was sampled from the pump well (No.1 - 12) for water quality test at TEPCO and a third party organization.

(Bq/L)

Test item \ System / Place of sampling (Sampling date)	A system				B system		Density limit specified by regulation	< Reference > Observation hole and deep well No.3 at Fukushima Daiichi NPS
	No.1	No.2	No.3 [Already reported]	No.4	No.5	No.6		
	Jan. 24, 2013	Feb. 5, 2013	Dec. 11, 2012	Feb. 1, 2013	Feb. 23, 2013	Feb. 20, 2013		
Cesium-134	(Under analysis)*1	0.021	0.011	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	60	ND - 0.087 (<0.0084)
Cesium-137	(Under analysis)*1	0.033	0.012	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	90	ND - 0.13 (<0.0088)
Strontium-89	(Under analysis)	(Under analysis)	ND (<0.236)	(Under analysis)	(Under analysis)	(Under analysis)	300	ND (<0.017 - 0.046)
Strontium-90	(Under analysis)	(Under analysis)	ND (<0.068)	(Under analysis)	(Under analysis)	(Under analysis)	30	ND (<0.0067 - 0.0072)
Tritium	9	15	10	39	22	60	60,000	7 - 184
All α	ND (<1.7)	ND (<1.7)	ND (<1.0)	ND (<1.7)	ND (<2.2)	ND (<2.0)	–	ND (<2.8 - 3.0)
All β	ND (<2.7)	ND (<6.6)	ND (<2.7)	ND (<6.5)	ND (<6.5)	ND (<6.5)	–	ND (<5.9 - 6.7)

- ND: Below the detection limit (provided in the parenthesis).
- This chart indicates data which is analyzed by TEPCO.
- Red letter indicates data which is newly obtained.

*1 Cesium analysis result of groundwater at each pump well was confirmed to be below allowable limit (1Bq/L).
Further analysis is ongoing at present.



Locations of the Pump wells and the observation holes

Observation holes are located approx. O.P.+35m above sea level.

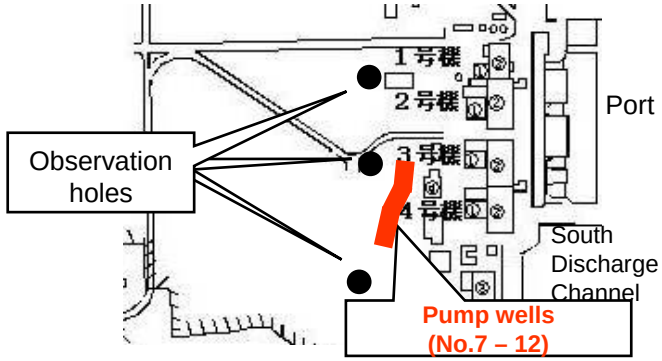
9. Water Quality Test Results (Progress Reports) of the Pump Wells No. 7 - 12

(Bq/L)

Test item \ System / Place of sampling (Sampling date)	B system				C system		Density limit specified by regulation	< Reference > Observation hole and deep well No.3 at Fukushima Daiichi NPS
	No.7	No.8	No.9	No.10	No.11	No.12		
	Mar. 1, 2013	Mar. 13, 2013	Mar. 4, 2013	Mar. 11, 2013	Feb. 12, 2013	Feb. 16, 2013		
Cesium-134	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	60	ND - 0.087 (<0.0084)
Cesium-137	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	(Under analysis)*1	90	ND - 0.13 (<0.0088)
Strontium-89	(Under analysis)	(Under analysis)	(Under analysis)	(Under analysis)	(Under analysis)	(Under analysis)	300	ND (<0.017 - 0.046)
Strontium-90	(Under analysis)	(Under analysis)	(Under analysis)	(Under analysis)	(Under analysis)	(Under analysis)	30	ND (<0.0067 - 0.0072)
Tritium	30	20	13	76	57	450	60,000	7 - 184
All α	ND (<2.2)	ND (<1.7)	ND (<2.2)	ND (<2.6)	ND (<1.7)	ND (<1.7)	–	ND (<2.8 - 3.0)
All β	ND (<6.7)	ND (<6.4)	ND (<6.6)	ND (<6.5)	ND (<2.6)	ND (<2.6)	–	ND (<5.9 - 6.7)

- ND: Below the detection limit (provided in the parenthesis).
- This chart indicates data which is analyzed by TEPCO.
- Red letter indicates data which is newly obtained.

*1 Cesium analysis result of groundwater at each pump well was confirmed to be below allowable limit (1Bq/L).
Further analysis is ongoing at present.



Locations of the Pump wells and the observation holes

* Observation holes are located approx. O.P.+35m above sea level.

10. Water Quality Test Results (progress reports) of the pump wells [Analyzed by a third party organization]

(Bq/L)

Test item \ System / Place of sampling	A system				B system	
	No.1	No.2	No.3 [Already reported]	No.4	No.5	No.6
Cesium-134	ND (<0.0074)	ND (<0.0087)	ND (<0.01)	0.015	Under analysis	Under analysis
Cesium-137	ND (<0.0075)	ND (<0.0077)	ND (<0.01)	0.037		
Strontium-89	Under analysis	Under analysis	–	Under analysis		
Strontium-90			ND (<0.005)			
Tritium			ND (<3.7)			
All α			ND (<0.1)			
All β	ND (<4)	ND (<4)	ND (<0.2)	ND (<4)		

Test item \ System / Place of sampling	B system				C system	
	No.7	No.8	No.9	No.10	No.11	No.12
Cesium-134	Under analysis	Under analysis	Under analysis	Under analysis	0.0088	Under analysis
Cesium-137					0.016	
Strontium-89					Under analysis	
Strontium-90						
Tritium						
All α						
All β					ND (<4)	

- ND: Below the detection limit (provided in the parenthesis).
- This chart indicates data which is analyzed by a third party organization.

11. Summary of Analysis Results

■ **Following is the summary of analysis result collected so far.**

■ **Cesium**

- As a result of analysis after improving measurement accuracy, extremely small amount of cesium is detected (0.012 - 0.033 Bq/L) though below allowable limit (1Bq/L).
- It is substantially lower than that of the samples collected in the river near the power station after the accident from April to November 2012 (approx. 1-2Bq/L) and is equivalent to that of the observation holes in the site and the deep well No.3 located near the site boundary in the west side.
- The density is less than one-several thousandths of the limit specified by the Reactor Regulation (Cesium-137: 90Bq/L).

■ **Tritium**

- Though 9 - 450 Bq/L tritium was detected in the analysis, the density is less than hundredths or one-several thousandths of the limit specified by the Reactor Regulation (60,000 Bq/L).
- Sample collected in the observation holes in the site and the deep well No.3* located near the site boundary from March to June 2012 was approx. 7 - 184 Bq/L.
  (* 9 Bq/L in May 2012)

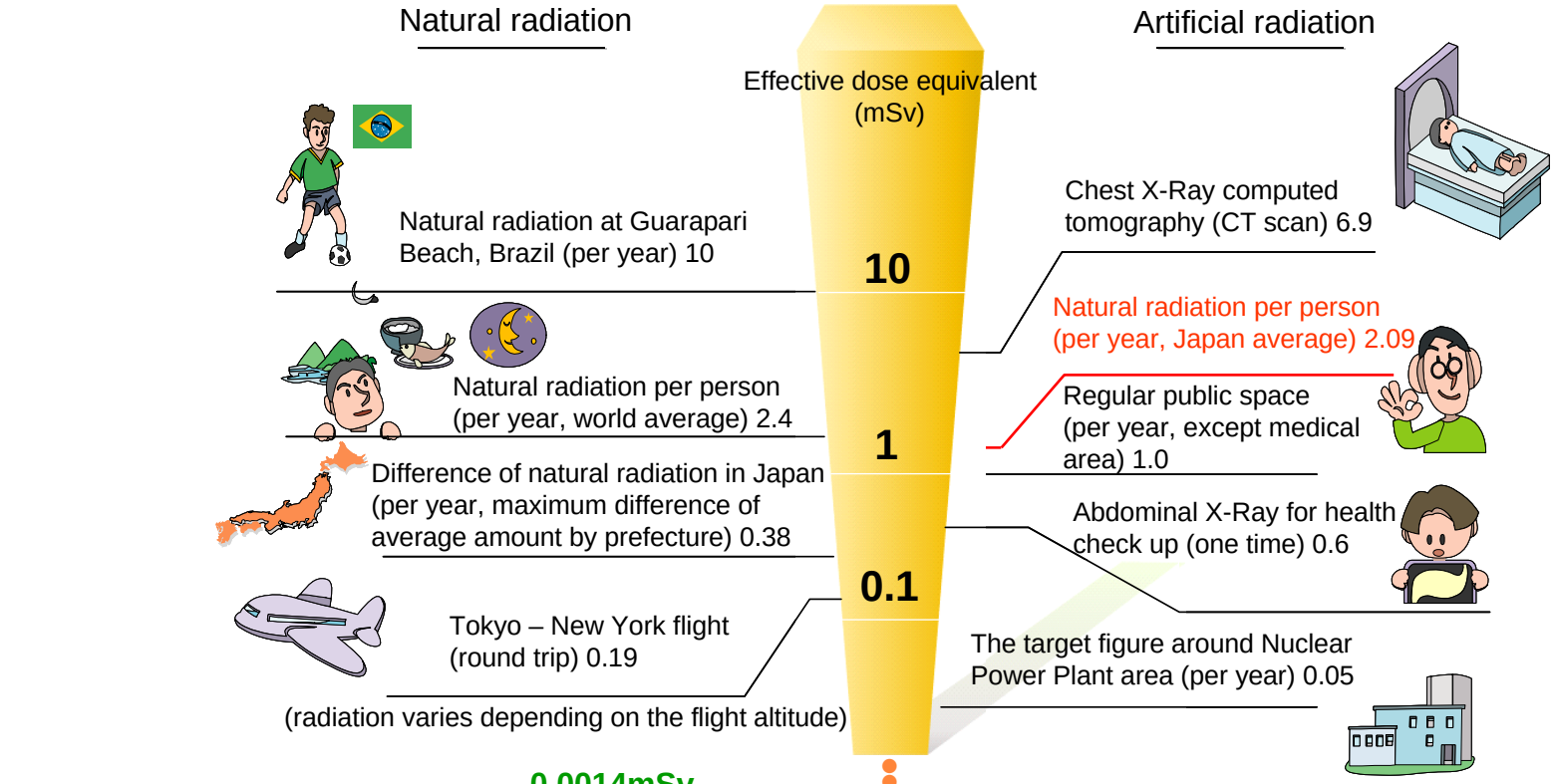
■ **Strontium, all α, all β**

- All data which have been obtained so far was below the detection limits.

12. The Impact on the Human Body (Radiation Dose)

■ The impact on the human body by ingesting is considered to be quite small.

➢ Cesium-137, strontium-90 and tritium are highly lower than the annual exposure from natural radiation of approx. 2.09mSv/year (average in Japan).



(Note) The amount of natural radiation is including the effect of inhalation of Radon.
(source) UNSCEAR 2000 Report, "Sources and Effects of Ionizing Radiation" etc.

13. Future Plans

The groundwater bypass will be put in operation with A system (pump well No.1 - 4) upon agreement from the parties involved after water quality test is done.

Preparation status toward operation launch is as follows.

A system (Pump well No.1 - 4)

- Early April: Water analysis of pump well No.1 - 4 will be completed (including a third party organization analysis)
- Late April*: Trial operation and water quality test before operation launch will be completed

*Process will be informed as soon as it is fixed

A system will be put in operation upon agreement from the parties involved after the result is reported.
We will keep Fukushima Fishermen's Association posted if the preparation toward operation is completed before next Fukushima Prefecture Union Conference.

B, C system (Pump well No.5 - 12)

- The system will be put in operation upon agreement from the parties involved after water analysis of pump wells, trial operation and water quality test are done (operation scheduled in May).

<Reference> Comparison to the Various Standard Value

(Bq/L)

Nuclide	Cesium-137	Strontium-90	Tritium
Pump well (Maximum)	0.033	ND(<0.068)	450
WHO guidelines for drinking water quality	10	10	10,000
Density limit specified by regulation	90	30	60,000
Radioactive materials in food (Drinking water)	10*	–	–
Guidelines regarding radioactive materials in the bathing area	10*	–	–

* Prescribed as total density of Cs-134 and Cs-137.

<Reference> Water Quality Test Results of the Rivers Around the Power Station (After the Accident)

Sampling location		Density (Bq/L)	
		Cesium-134	Cesium-137
Ota River	Minamisoma City	ND (<1) - 1	ND (<1) - 2
Maeda River	Futaba Town	ND (<1) - 1	ND (<1) - 1
	Namie Town	ND (<1) - 1	ND (<1) - 1
Ukedo River	Namie Town	ND (<1)	ND (<1) - 1
Kuma River	Okuma Town	ND (<1)	ND (<1)
Tomioka River	Tomioka Town	ND (<1)	ND (<1)
Kido River	Kawauchi Village	ND (<1)	ND (<1)
	Naraha Town	ND (<1)	ND (<1)

* The detection limit of cesium-134 and cesium-137 used in the investigation performed by the Ministry of the Environment is 1Bq/L.

* Source: “Radioactive material monitoring results of the public water in Fukushima Prefecture (Sampled in April-June)” (announced on July 31, 2012), “Radioactive material monitoring results of the public water in Fukushima Prefecture (Sampled in July-September)” (announced on October 11, 2012), Radioactive material monitoring results of the public water in Fukushima Prefecture (Sampled in September-November)” (announced on January 10, 2013) (Announced by the Ministry of the Environment)

<Reference> Water Quality Test Before the Operational Commencement (Draft)

1. Before operational commencement, groundwater will be sampled from all the pump wells for water quality test.
2. Besides from the water quality test, cesium-137 density will be checked to see if it's 1Bq/L or less (maximum allowed cesium density for water to be discharged) and sufficiently lower than the densities detected in the surrounding marine area and rivers.

	Monitoring before the operational commencement of the groundwater bypass
Purpose	Determine the feasibility of operational commencement
Location	Temporary storage tank
Items to check*1	1. Whether cesium-137 density is 1Bq/L or less (maximum allowed density) 2. Whether the density is sufficiently lower than that of samples collected in the surrounding marine area and rivers (representative nuclide: cesium-137)
Analysis items*2 (Detection limit)	Cesium-137 (0.01Bq/L) Tritium (3Bq/L) All α (4Bq/L) All β (7Bq/L)

*1 Each tank to be checked before the first operational commencement.

*2 Strontium-90 will be checked after the operational commencement.

<Reference> Water Quality Test After the Operational Commencement (Draft)

1. The maximum allowed cesium-137 density of the water to be discharged is 1Bq/L taking into considerations the regulation values, detection limits of public water, etc.
2. Besides from the above, detailed analysis will be performed on a regular basis (about once every 3 months (once a month for the first 3 months)) to monitor changes over a long period of time. (Data check will be performed at a third party organization as well.)

	Monitoring after the operational commencement of the groundwater bypass	
Purpose	Determine the feasibility of water discharge	Monitor density fluctuations in a long period of time
Frequency	Timing of water discharge (Monitoring to be done beforehand)	On a regular basis (About once every 3 months (once a month during the first 3 months)) - Mix the samples obtained in 3 months (composite sample) for analysis
Location	Temporary storage tank	Temporary storage tank
Item to check	Whether cesium-137 is 1Bq/L or less (maximum allowed density)	Whether the density is sufficiently lower than that of the samples collected in the surrounding marine area and rivers (representative nuclide: cesium-137) [Detailed analysis]
Analysis items (Detection limit)	Cesium-137 (1Bq/L or less)	Cesium-137 (0.01Bq/L) Strontium-90 (0.01Bq/L) Tritium (3Bq/L) All α (4Bq/L) All β (7Bq/L)

[Reference] Examples of regulation values of radioactive cesium density
(Drinking water) Cesium-134 + cesium-137 ≦ 10Bq/L
(Fish and shellfish) Cesium-134 + cesium-137 ≦ 100Bq/kg
(Density limit specified by the Reactor Regulation) Cesium-134: 60Bq/L, cesium-137:90Bq/L
(Investigation performed by the Ministry of the Environment*) Detection limit of cesium-134 and 137: 1Bq/L

*Radioactive material monitoring of groundwater and public water performed by the Ministry of the Environment