<Reference>

Results and Assessment of Measurements on Groundwater Bypass Temporary Storage Tank Water

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1. Background of current situation

- We found the following problems:

  - A self-shielding effect against the background (BG) occurs when measurements for nuclides (cesium-134 and cesium-137) that emit gamma rays are performed in Fukushima Daiichi on samples having low radioactivity densities, such as water in a groundwater bypass temporary storage tank.

  - When measurements are performed using 2-liter Marinelli container, the results are affected to an extent of several Bq/L.

- In Fukushima Daini where the self-shielding effect does not occur, measurements were performed again on temporary storage tank (Gr-A-1) water sampled on April 16. The samples showed results below the allowance limit of 1Bq/L in terms of cesium-137. However, the densities of cesium-134 and cesium-137 were 0.22Bq/L and 0.39Bq/L.

  (The above information was previously announced.)

- The detected cesium-137 density in the temporary storage tank water was 0.39Bq/L although the cesium-137 densities in the pump well water were 0.012-0.14Bq/L*1. For the purpose of determining the reason for this, assessment was conducted using results of measurements for cesium performed at a third-party institution on water sampled from the tank on April 16 (sampled separately from water measured at Fukushima Daini), and further measurements performed at Fukushima Daini and at another third-party institution, separately, on water sampled from the tank on June 4 and 5.

*1 The radioactivity densities with respect to cesium-137 in water sampled from the pump wells No.1 to No.12 from December 2012 to March 2013.

2. Results of measurements on groundwater bypass temporary storage tank (Gr-A-1) water

- Shown below are results obtained in measurements for cesium-134 and cesium-137 in water sampled from the temporary storage tank (Gr-A-1) on April 16, June 4 and June 5, 2013. The measurements were performed at Fukushima Daini and at third-party institutions, separately.

(Unit: Bq/L)

	No.	Analysis type	Measured nuclide	Measurement result	Detection limit value
Water sampled on April 16, 2013	1	Regular analysis (Fukushima Daini)	Cesium-134	ND	0.13
			Cesium-137	0.31	0.15
	2	Detailed analysis (Fukushima Daini)	Cesium-134	0.22	0.021
			Cesium-137	0.39	0.039
	3	Detailed analysis (Third-party institution)	Cesium-134	0.011	0.0016
			Cesium-137	0.023	0.00074
Water sampled on June 4, 2013	4	Regular analysis (Fukushima Daini)	Cesium-134	ND	0.13
			Cesium-137	ND	0.15
	5	Detailed analysis (Fukushima Daini)	Cesium-134	0.020	0.014
			Cesium-137	0.035	0.016
	6	Regular analysis (Third-party institution)	Cesium-134	ND	0.16
			Cesium-137	ND	0.19
Water sampled on June 5, 2013	7	Regular analysis (Fukushima Daini)	Cesium-134	ND	0.13
			Cesium-137	ND	0.16

Notes: - "ND" indicates a case where the result is below the detection limit value. Inside ( ) is a place at which the measurements were performed.
- In the detailed analysis, an analysis was performed with an increased amount of sample so as to further reduce the detection limit value.

4. Reason

- Sufficiently low densities were shown in the measurements at the third-party institutions (Nos. 3 and 6) and in the measurements at Fukushima Daini (Nos. 4, 5 and 7). Based on these results, water in the temporary storage tank was confirmed to have almost the same densities as groundwater in the pump wells.
- Detection of 0.31 and 0.39Bq/L of cesium-137 in water sampled on April 16 and subjected to measurements at Fukushima Daini (Nos. 1 and 2) is considered attributable to entry of ambient contamination into samples (contamination) during sampling or during the analyses at Fukushima Daiichi.

<Possible routes of contamination>

- ✓During sampling, contamination may have entered into a sampling container.
- ✓After sampling, when the samples were moved from sampling containers to different containers, such as graduated cylinders, in the laboratory, a very small level of contamination left in these containers may have entered into the samples.

5. Countermeasures

- The following countermeasures will be taken in cases where samples having low radioactivity densities such as those sampled from the underground bypass are handled:
  - ✓ As we have done so far, we will continue to take extra caution to prevent entry of ambient contamination into samples (contamination) during sampling of raw samples and handling of samples for measurements (by sufficient pre-blowing before sampling, wearing uncontaminated rubber gloves, etc.)
  - ✓ After the start of operation of a new laboratory in the laboratory building (annexed to the area entry/exit control facility), measurements will be performed in that laboratory.
  - ✓ Until the start of analyses in the new laboratory, an area used exclusively for handling low-density samples will be secured in the existing laboratory, and measurements will be performed with samples switched in that area.

Outside appearance of the laboratory building
(with one story above ground and one below)

Ge semiconductor detectors installed in
the new laboratory (in the first basement)

[Reference] Assessment of measurement results (cesium)