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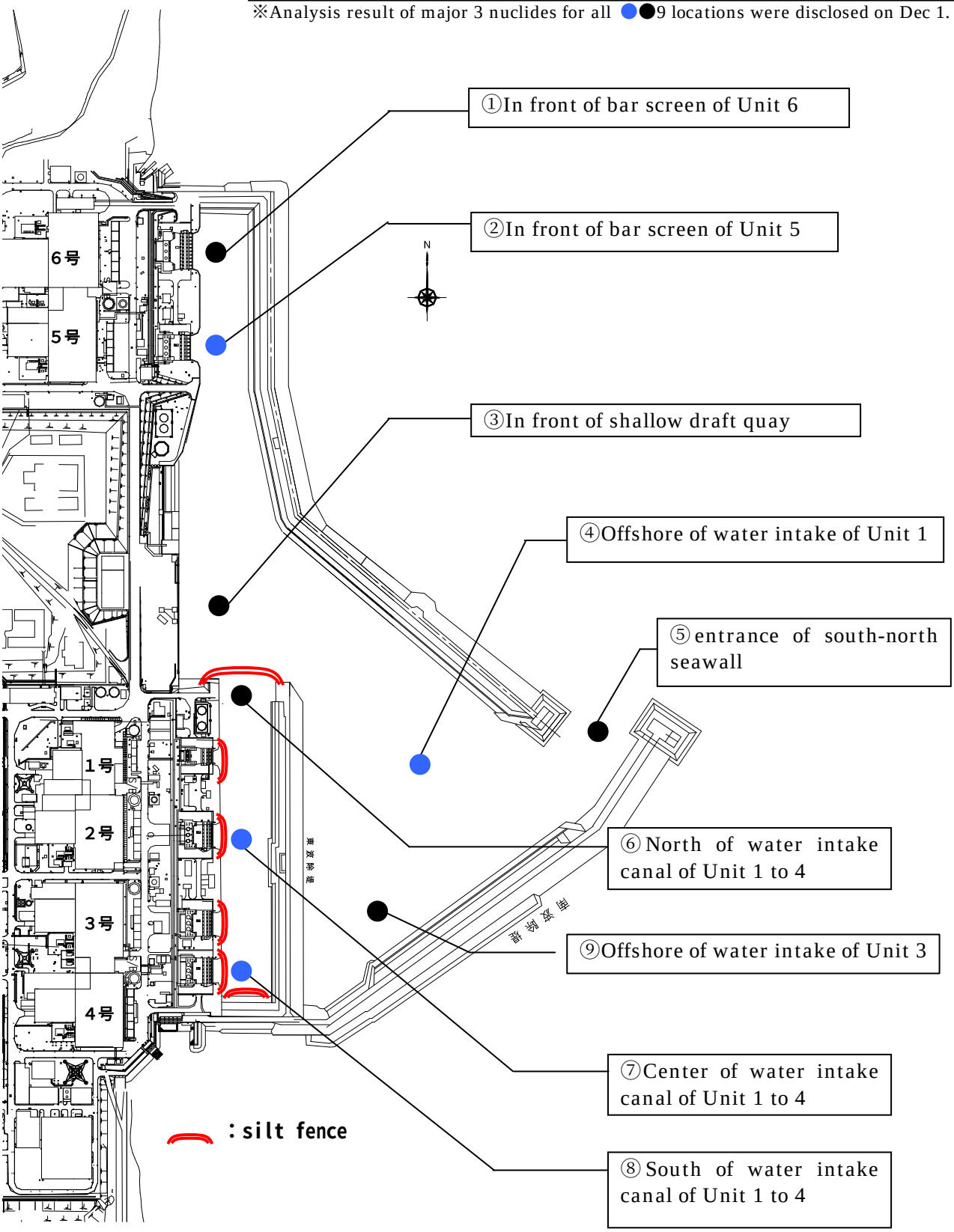
J a n u a r y 1 2 , 2 0 1 2
Tokyo Electric Power Company

Revised version

Survey Map of ocean soil inside the harbor

● Sampling location for α, β, γ nuclide
● Sampling location for γ nuclide

※Analysis result of major 3 nuclides for all ●●9 locations were disclosed on Dec 1.



Result of Pu Analysis of the ocean soil in the harbor of Fukushima Daiichi NPS

1. Measurement result

(Unit：Bq/kg･dry soil)

Sampling Location	Sampling date Analysis institution	Pu-238	Pu-239,Pu-240
In front of bar screen of Unit 5	11/24 JCAC	N.D. [$<1.1\times10^{-2}$]	$(1.4\pm0.14)\times10^{-1}$
Offshore of water intake of Unit 1		$(3.8\pm0.66)\times10^{-2}$	$(1.8\pm0.15)\times10^{-1}$
Center of water intake canal of Unit 1 to 4	11/25 JCAC	$(8.0\pm0.48)\times10^{-1}$	$(7.5\pm0.46)\times10^{-1}$
South of water intake canal of Unit 1 to 4		$(7.4\pm0.49)\times10^{-1}$	$(7.6\pm0.50)\times10^{-1}$
Past range of detected amount in the offshore of Fukushima Daiichi and Daini NPS (1999-2008)※		—	1.7×10^{-1}～5.6×10^{-1}

[ ] in the radioactivity density means detection limit

※：Source "Report of radioactivity measurement in the surrounding environment of NPS, 2009"(published by Fukushima prefecture NPS safety management technology conference)

2. Evaluation

Pu-238, Pu-239, 240 detected on Nov 24 and 25 are considered to be released from the nuclear accident because of the following reasons.

- Pu-238, which was not detected in the coast line near the NPS, was detected.
- Detected density of Pu-239, 240 in the water intake canal of Unit 1 to 4 exceeded the past maximum detected amount in the offshore of Fukushima Daiichi and Daini NPS.

Result of U Analysis of the ocean soil in the harbor of Fukushima Daiichi NPS

1. Measurement result

(Unit：Bq/kg･dry soil)

Sampling Location	Sampling date Analysis institution	U-234	U-235	U-238
①Offshore of water intake of Unit 1	11/24 JCAC	$(3.7\pm0.22)\times10^{0}$	N.D. [$<1.0\times10^{-1}$]	$(3.7\pm0.22)\times10^{0}$
②Center of water intake canal of Unit 1 to 4	11/25 JCAC	$(1.1\pm0.07)\times10^{1}$	$(6.8\pm1.3)\times10^{-1}$	$(1.1\pm0.06)\times10^{1}$
③South of water intake canal of Unit 1 to 4		$(1.3\pm0.08)\times10^{1}$	$(3.1\pm1.0)\times10^{-1}$	$(1.5\pm0.08)\times10^{1}$
Radioactivity in relation to natural uranium (Bq/g)		1.2×10^{4}	5.7×10^{2}	1.2×10^{4}
Relative isotopic abundance (wt%)		0.0054	0.72	99.3

2. Evaluation

We evaluate that Uranium detected in this analysis is in the same level with the Uranium existing in the natural environment.

- While Uranium in the natural environment is in the status of radioactivity equilibrium where U234 and U238 has same radioactivity density, U-234 and U-238 in all 3 samples indicated the same level of radioactivity density.
- The below calculated result is almost equivalent to the isotopic abundance of U-235 to U-238, which is U-235/U-238＝0.0073

  [Sample②] U-235:8.5×10^{-6}g/kg･dry soil(0.68Bq/kg･dry soil), U-238: 8.8×10^{-4}g/kg･dry soil(11Bq/kg･dry soil), U-235/U-238=0.0096※

  [Sample③] U-235:3.9×10^{-6}g/kg･dry soil(0.31Bq/kg･dry soil), U-238: 1.2×10^{-3}g/kg･dry soil(15Bq/kg･dry soil), U-235/U-238=0.0032※

  ※calculation result may not match due to rounding arrangement.

Result of Am, Cm Analysis of the ocean soil in the harbor of Fukushima Daiichi NPS

1. Measurement result

(Unit：Bq/kg·dry soil)

Sampling Location	Sampling date Analysis institution	Pu-238	Pu-239 Pu-240	U-234	U-235	U-238	Am-241	Cm-242	Cm-243 Cm-244
①Offshore of water intake of Unit 1	11/24 JCAC	$(3.8\pm0.66)\times10^{-2}$	$(1.8\pm0.15)\times10^{-1}$	$(3.7\pm0.22)\times10^{0}$	N.D. $[<1.0\times10^{-1}]$	$(3.7\pm0.22)\times10^{0}$	$(8.1\pm1.0)\times10^{-2}$	$(1.6\pm0.15)\times10^{-1}$	N.D. $[<1.2\times10^{-2}]$
② Center of water intake canal of Unit 1 to 4	11/25 JCAC	$(8.0\pm0.48)\times10^{-1}$	$(7.5\pm0.46)\times10^{-1}$	$(1.1\pm0.07)\times10^{1}$	$(6.8\pm1.3)\times10^{-1}$	$(1.1\pm0.06)\times10^{1}$	$(3.5\pm0.26)\times10^{-1}$	$(4.9\pm0.17)\times10^{0}$	$(3.8\pm0.27)\times10^{-1}$
③South of water intake canal of Unit 1 to 4		$(7.4\pm0.49)\times10^{-1}$	$(7.6\pm0.50)\times10^{-1}$	$(1.3\pm0.08)\times10^{1}$	$(3.1\pm1.0)\times10^{-1}$	$(1.5\pm0.08)\times10^{1}$	$(3.3\pm0.29)\times10^{-1}$	$(3.8\pm0.15)\times10^{0}$	$(2.6\pm0.25)\times10^{-1}$
Average nuclide density proportion in Unit 1 to 3 (proportion when Pu-238 is set to be 1) *1		1	—	—	—	—	0.1	10	1

*1：Calculated amount based on ORIGEN code (rounded number)

2. Evaluation

- Because Cm-242,243,244 does not exist in the natural environment and Cm-242 having half-time of about 160 days is detected in this analysis, they are considered to be released from the nuclear accident.
- Detected level of Am-241 is in the equivalent level with the past measured range (0.055～0.34)*

* Source “Aomori prefecture nuclear center report Vol.2”(2007) published by Aomori prefecture nuclear center

Nuclide analysis results of ocean soil in the harbor of Fukushima Daiichi

(Data summarized on **1**/12)

Place of Sampling	In front of bar screen of Unit 5	Offshore of water intake of Unit 1	Center of water intake canel of Unit 1 to 4	South of water intake canel of Unit 1 to 4
Date of sampling	24-Nov-11	24-Nov-11	25-Nov-11	25-Nov-11
Detected Nuclides (Half-life)	radioactivity density （I-131,Cs-134,Cs-137：Bq/kg・moist soil，Sr-89,Sr-90：Bq/kg・dry soil)			
I-131 (about 8 days)	ND	ND	ND	ND
Cs-134 (about 2 years)	6,900	13,000	150,000	730,000
Cs-137 (about 30 years)	8,500	16,000	190,000	870,000
Sr-89 (about 51 days)	4.9	14	230	440
Sr-90 (about 29 years)	15	28	620	1,200

Past range of detected amount of Sr-90 in the offshore of Fukushima Daiichi and Daini NPS (1999-2008): ND～0.17 Bq/kg・dry soil
Source "Report of radioactivity measurement in the surronding environment of NPS, 2009"(published by Fukushima prefecture NPS safety management technology conference)

* "-" in the radioactivity density means N/A of measurement

* I-131，Cs-134，Cs-137 was disclosed on December 1.

* Institution conducted analysis: Japan Chemical Analysis Center（Sr-89，Sr-90），TEPCO（I-131，Cs-134，Cs-137）

* "ND" means the sampled data is below measurement limit. The measurement limit is as follows:
I-131: approx. 4,600Bq/kg・moist soil。
Please not that these nuclides are sometimes detected even when ther are below the limits, contingent on the detector or samples.

（Evaluation）

The detected density of Sr-90 exceeds the maximum detected amount in the past. It is considered to be released by the nuclear accident.

【Definite Report】Nuclide analysis results of ocean soil in the harbor of Fukushima Daiichi <1/2>

Place of Sampling	In front of bar screen of Unit 6	In front of bar screen of Unit 5	In front of shallow draft quay	Offshore of water intake of Unit 1	entrance of south-north seawall
Time of Sampling	24-Nov-11 10:40	24-Nov-11 10:50	24-Nov-11 11:00	24-Nov-11 10:30	24-Nov-11 10:05
Detected Nuclides (Half-life)	radioactivity density （Bq/kg・moist soil)				
I-131 (about 8 days)	ND	ND	ND	ND	ND
Cs-134 (about 2 years)	42,000	6,900	49,000	13,000	3,900
Cs-137 (about 30 years)	53,000	8,500	62,000	16,000	4,900
Mn-54 (approx.310days)	ND	ND	ND	16	26
Co-60 (approx.5yrs)	ND	ND	ND	ND	ND
Tc-99m (approx.6hrs)	ND	ND	ND	ND	ND
Ag-110m (approx.250days)	ND	ND	ND	ND	ND
Sb-125 (approx.3yrs)	ND	ND	ND	ND	ND
Te-129 (approx.70mins)	ND	ND	ND	ND	ND
Te-129m (approx.34days)	ND	ND	ND	ND	ND
Cs-136 (approx.13days)	ND	ND	ND	ND	ND
Ba-140 (approx.13days)	ND	ND	ND	ND	ND
La-140 (approx.40hrs)	ND	ND	ND	ND	ND

* "ND" means the sampled data is below measurable limit.
The detection limits of major three nuclide that are not detected are as follows: I-131: approx. 190Bq/kg・moist soil。
Please note that these nuclides are sometimes detected even when they are below the limits, contingent on the detector or samples.

【Definite Report】Nuclide analysis results of ocean soil in the harbor of Fukushima Daiichi <2/2>

Place of Sampling	North of water intake canal of Unit 1 to 4	Center of water intake canal of Unit 1 to 4	South of water intake canal of Unit 1 to 4	Offshore of water intake of Unit 3	
Time of Sampling	25-Nov-11 10:31	25-Nov-11 10:37	25-Nov-11 10:45	24-Nov-11 10:20	
Detected Nuclides (Half-life)	radioactivity density （Bq/kg・moist soil)				
I-131 (about 8 days)	ND	ND	ND	ND	
Cs-134 (about 2 years)	640,000	150,000	730,000	46,000	
Cs-137 (about 30 years)	760,000	190,000	870,000	57,000	
Mn-54 (approx.310days)	ND	ND	ND	170	
Co-60 (approx.5yrs)	ND	ND	ND	110	
Tc-99m (approx.6hrs)	ND	ND	ND	ND	
Ag-110m (approx.250days)	ND	ND	ND	ND	
Sb-125 (approx.3yrs)	ND	ND	ND	ND	
Te-129 (approx.70mins)	ND	ND	ND	ND	
Te-129m (approx.34days)	ND	ND	ND	ND	
Cs-136 (approx.13days)	ND	ND	ND	ND	
Ba-140 (approx.13days)	ND	ND	ND	ND	
La-140 (approx.40hrs)	ND	ND	ND	ND	

* "ND" means the sampled data is below measurable limit.
The detection limits of major three nuclide that are not detected are as follows: I-131: approx. 4600Bq/kg・moist soil。
Please note that these nuclides are sometimes detected even when they are below the limits, contingent on the detector or samples.