Survey report* for fish and seashells of the sea within a 20 km radius of Fukushima Daiichi Nuclear Power Station

(Samples taken during the period between July and September, 2014)

December 5, 2014

Tokyo Electric Power Company

東京電力 TEPCO

* Except for the survey data obtained inside the port of Fukushima Daiichi Nuclear Power Station.

1. Objectives for surveying fish and seashells of the sea within a 20 km radius of Fukushima Daiichi NPS

(1) Grasp radioactive cesium levels of each fish species.

- Comparison with the food product standards (the total of cesium: 100 Bq/ kg)

(2) Grasp the areal distribution of radioactive cesium levels in fish and seashells.

- Sampling at fixed surveying spots (gillnet and trawler fisheries)

(3) Grasp the transition with time of radioactive cesium levels of fish and seashells.

- Basic data taken for the transition prediction.

2-1. Survey results (radioactive cesium levels by fish species)

- **More than 99% of the samples taken indicate that the measured levels fall below the standard value.**

Standard value: a total of 100 radioactive cesium (Bq/kg)

	Samples taken during Jul. to Sep. 2014.		Samples taken during Apr. to Jun. 2014.	
No. of species	**38** (of which, 1 case exceeded the standard value)	[Top 3 species with high levels] (Unit: Bq/kg) 1) Common skete 131 2) Stone flounder 96 3) Microstomus achne 91 [Below the detection limit value] 1) Zenopsis nebulosa, 2) Yellow goosefish, 3) Japanese amberjack, 4) jack mackerel, 5) chub mackerel, and others.	**42** (of which, 4 cases exceeded the standard value)	[Top 3 species with high levels] (Unit: Bq/kg) 1) Common skete 370 2) Sebastes chen 199 3) Microstomus achne 176 [Below the detection limit value] 1) crimson sea bream 2) White croaker 3) Banded houndshark 4) Dasyatis matsubarai 5) Dwarf squid 6) jack mackerel 7) Conger-eel, and others
No. of measurements taken (total)	**275** (of which, 1 case exceeded the standard value)		**307** (of which, 10 cases exceeded the standard value)	

(Note) Parts measured: Muscle for fish (except for Yellow goosefish) and octopus-kind.
A whole body for yellow goosefish, squids and crabs.

- **Species with a tendency to exceed the standard value: Common skete**
- **Species with a tendency to fall below the standard value: Flatfish, Marbled sole, Greenling, and Zeus faber, etc.**

2-2. Survey results (areal distribution of cesium)

- The ratio of exceeding the standard value is showing a decreasing tendency. The same tendency is also found with the surveying spots for gillnet and trawl-net in the coastal area.

		Samples taken during Jul. to Sep. 2014.			Samples taken during Apr. to Jun. 2014		
		No. of measurements taken	No. of results exceeding the standard value	Ratio (%)	No. of measurements taken	No. of results exceeding the standard value	Ratio (%)
Gillnet	T-B１	25	0	0	27	1	4
	T-B2	39	0	0	37	0	0
	T-B3	23	0	0	36	0	0
	T-B4	28	0	0	33	0	0
Trawl-net	T-S1	24	0	0	28	0	0
	T-S2	18	0	0	19	0	0
	T-S3	29	0	0	25	0	0
	T-S4	30	0	0	32	1	3
	T-S5	22	0	0	22	2	9
	T-S7	19	1	5	20	5	25
	T-S8	18	0	0	28	1	4

2-3. Survey results (transition with time of radioactive cesium levels)

[Tendency found for the area within a 20km radius of Fukushima Daiichi NPS]

- **The data obtained from the measurement of fish and shellfishes within a 20 km radius of Fukushima Daiichi NPS was all in all within the range of the measurement results obtained outside a 20 km radius by Fukushima prefecture etc. , showing a decreasing tendency.**

[Tendency of radioactive cesium levels]

- **Fish species with a decreasing tendency over time: flatfish, greenling, and others.**
- **Fish species exceeding the standard value: common skete only**

Note 1: Further data is required to be collected for fish and seashells within a 20 km radius of Fukushima Daiichi NPS.

Note 2: As for the transition with time, it is assumed that their respective living characteristic such as feed type, living environments (seawater and marine sediment, etc) and the way of traveling may have affected to the transition, for which further study is necessary on the mechanism.

[Reference] Transition with time of cesium levels of flatfish and greenling

Figure 1. Measurement results of flatfish (Cs134+137)

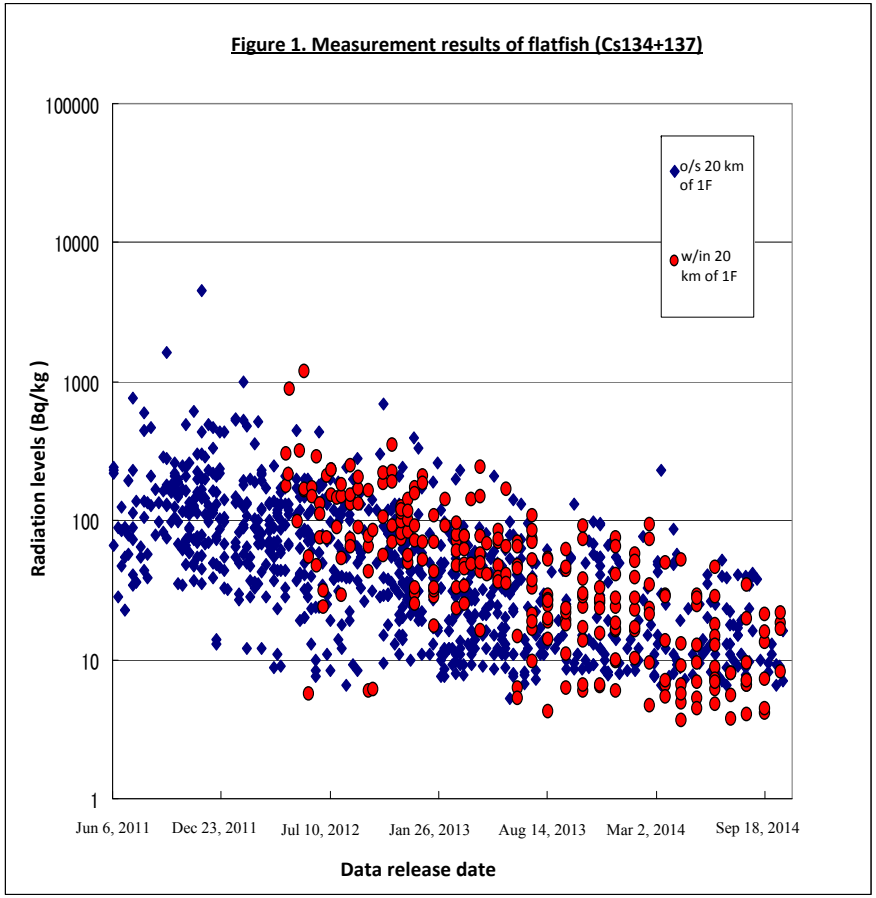
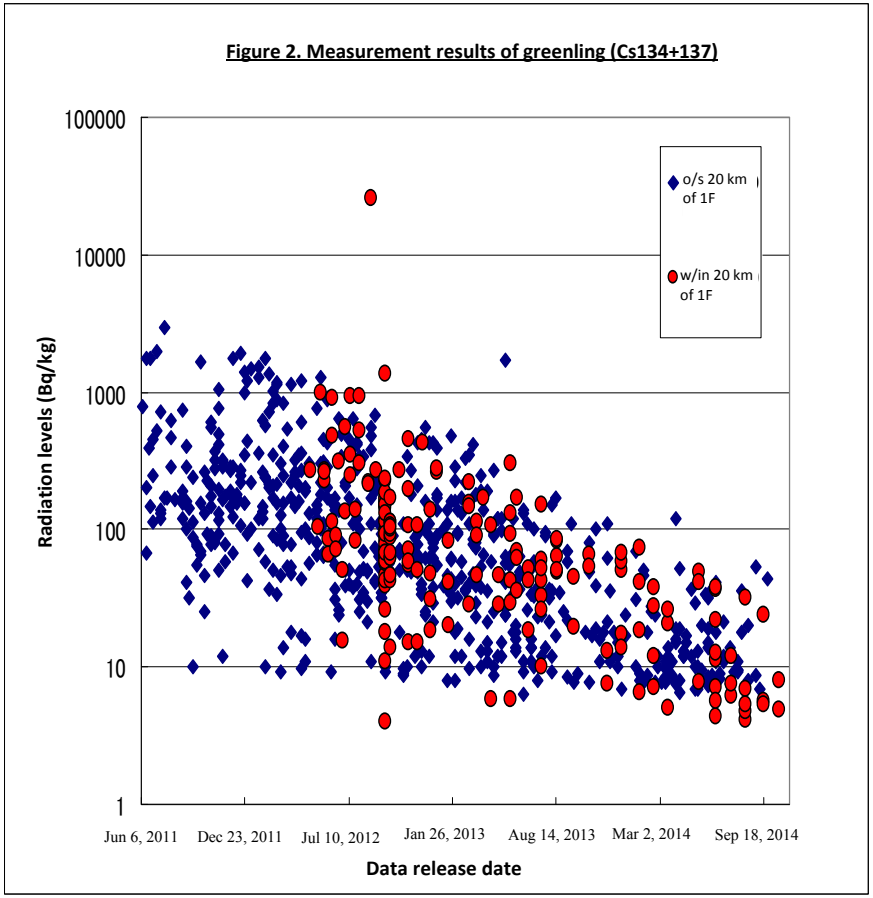


Figure 2. Measurement results of greenling (Cs134+137)



(Note) Measurement results for the area outside a 20 km radius of Fukushima Daiichi NPS were obtained from the website of the Fishery Agency and are converted into graph. Of note, the data remained below the detection limit value is not plotted.

2-4. Survey results for nuclides other than cesium

Unit: Bq/kg

Nuclide (Half-lives)	Samples taken during Jul. to Sep. 2014		Samples taken during Apr. to Jun. 2014	
	No. of samples	Result	No. of samples	Result
Ag-110m (Approx. 250 days)	0	Max.: N/A Min.: N/A Ave.: N/A	0	Max.: N/A Min.: N/A Ave.: N/A
*1 Strontium 90 (Approx. 29 yrs)	5 Common skete: 3 Stone flounder: 1 Microstomus achene: 1	Max.: 0.59 Min.: 0.065 Ave.: 0.37	5 Common skete: 2 Schlegel's black rockfish: 1 Sebastes cheni: 1 Microstomus achene: 1	Max.: 1.4 Min.: 0.039 Ave.: 0.50

- No detection found for Ag-100m.
- Strontium 90 levels were quite low at 1/100 to 1/1000 compared with that of Cesium 137.

*1: Top five fish samples with high cesium levels detected during the specified period for the sampling were selected and measured after ashing them. (Note: Top two fish samples were listed until the first quarter of FY2013)

3. Survey plan

- **Survey for the following three items continue to be conducted to grasp:**

  (1) A tendency of radioactive cesium levels by fish species,

  (2) Areal distribution of radioactive cesium levels of fish and seashell , and

  (3) Transition with time of radioactive cesium levels of fish and seashells.

- **For the time being, these sampling/ measurement activities are conducted on a monthly basis at the eleven sampling spots. (sampling may be ceased due to weather conditions.)**

Figure 3. Survey locations for fish and seashells (Mar. 2014)