

**Survey Report* for Fish and Seashells within a 20km radius
of Fukushima Daiichi Nuclear Power Station**

(Samples taken during the period between October and December, 2014)

Tokyo Electric Power Company

March 6, 2015



東京電力

*Except for the data obtained for fish and seashells inside the port of Fukushima-Daiichi Nuclear Power Station.

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

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

- Comparison with food product standards (the total of cesium: 100 B1/kg)

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

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

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

- Recording and keeping the basic data to predict the transition.

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

- More than 99% of the samples taken indicates that the radioactive levels fell below the standard value.

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

	OCT – DEC 2014		JUL – SEP 2014	
No. of fish species	39 (Of which, 1 sample exceeded the standard value)	[Top 3 species with high levels] (Unit: Bq/kg) (1) Japanese angel shark 209 (2) Common Skete 88 (3) Microstomus achne 72 [Below the detection limit value] (1) Ovalipes punctatus, (2) Salmon , (3) Yellow goosefish, (4) Japanese amberjack, (5) Spear Squid, and others.	38 (Of which, 1 sample 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.
No. of measurements taken (total)		286 (Of which, 1 sample exceeded the standard value)		275 (Of which, 1 sample exceeded the standard value)

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

- Species with a tendency to exceed the standard value: Japanese angel shark
- Species with a tendency to fall below the standard value: Flatfish, common skete, Marbled sole, Blue crab, Gurnard, and others

2.2 Survey results (areal distribution of cesium)

- The ratio of exceeding the standard value remains low for both trawl-net surveying spots in the coastal area and gillnet surveying spots in offshore.

		OCT – DEC 2014			JUL – SEP 2014		
		No. of measurements	No. of results exceeding the standard value	Ratio (%)	No. of measurements	No. of results exceeding the standard value	Ratio (%)
Gillnet	T-B1	38	0	0	25	0	0
	T-B2	52	0	0	39	0	0
	T-B3	32	0	0	23	0	0
	T-B4	37	0	0	28	0	0
Trawl-net	T-S1	18	0	0	24	0	0
	T-S2	24	0	0	18	0	0
	T-S3	22	0	0	29	0	0
	T-S4	22	1	5	30	0	0
	T-S5	10	0	0	22	0	0
	T-S7	10	0	0	19	1	5
	T-S8	21	0	0	18	0	0

Note: Sampling has been ceased for T-S5 and S7 in November, 2014 due to the bad weather.

2.3 Survey results (transition in time of radioactive cesium levels)

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

- The data obtained from the measurement within a 20 km radius of Fukushima Daiichi NPS was all in all within the range of the measurement results obtained by an independent measurement conducted by Fukushima prefecture for outside the radius, showing a decreasing tendency.

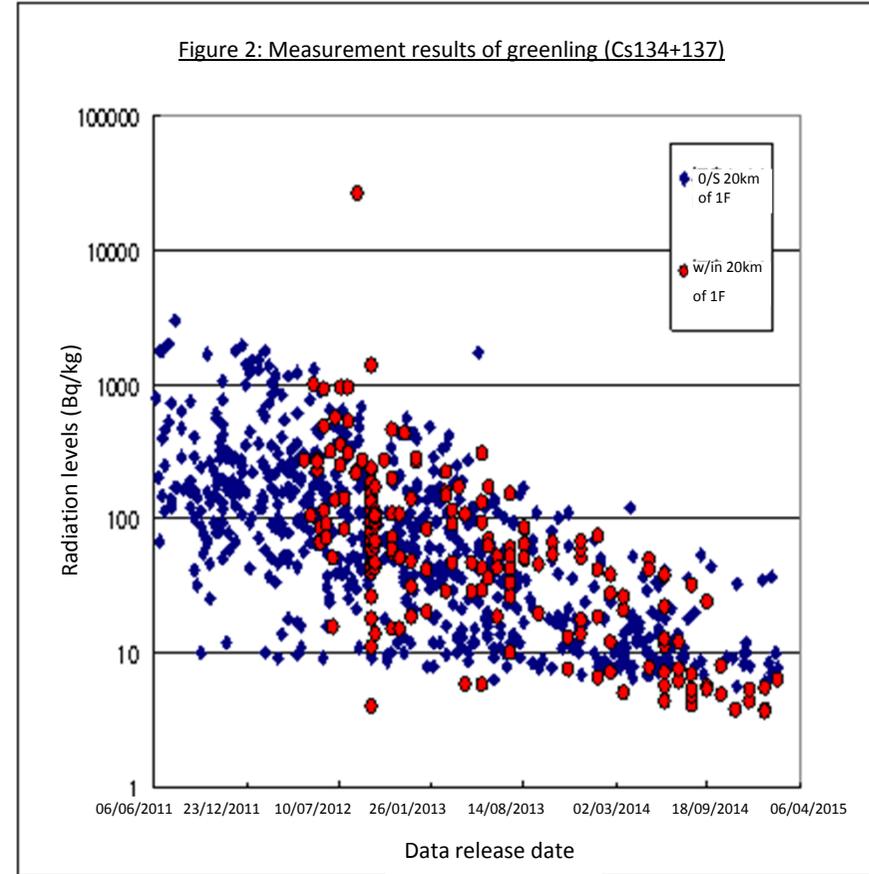
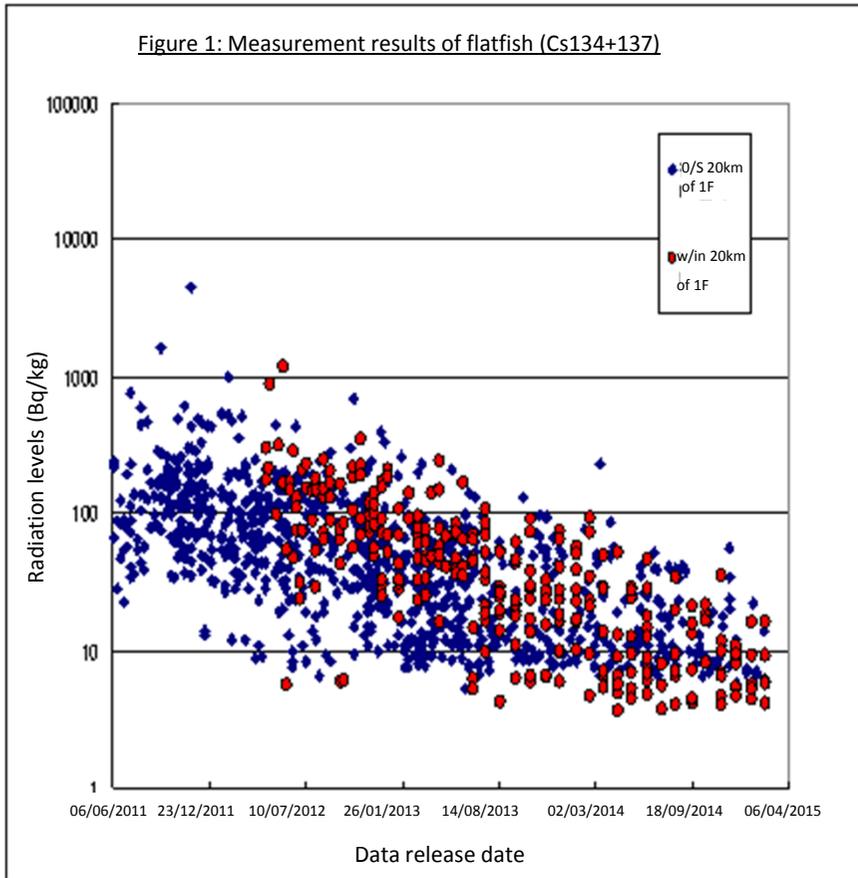
[Tendency of radioactive cesium levels]

- Fish species with a decreasing tendency over time: flatfish, greenling, and others.
- Fish species exceeding the standard value (limited): Japanese angel shark.

Note 1: Further data is required to be collected for fish and seashells within a 20km 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



(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-life)	OCT – DEC 2014		JUL – SEP 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 skate: 3 Japanese angel shark: 1 Microstomus achne:1]	Max.: 0.43 Min.: 0.046 Ave.: 0.21	5 [Common skate: 3 Stone flounder: 1 Microstomus achne:1]	Max.: 0.59 Min.: 0.065 Ave.: 0.37

*1 Top five fish samples with high cesium levels detected during the specified period for the sampling were selected and measured after ashing them.

- AG-110m: No detection recorded. (No detection has been confirmed since November 2014 when AG-110 was detected.)
- Strontium 90: The level is quite low at 1/3000 to 1/100 compared with that of Cesium 137.
- Tritium (measured with six samples taken during the period between March and August, 2014): the level of free-water type tritium has been measured at 0.078 to 0.12 (Bq/L), which is equal or less than that of sea water. And the level of organically bound tritium has been measured as less than the detection limit value (0.29 (Bq/L) (Details can be found at http://www.tepco.co.jp/nu/fukushima-np/handouts/2015/images/handouts_150225_05-j.pdf)

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 seashells, 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 (Dec. 2014)