November 26, 2012
Tokyo Electric Power Company

Nuclide Analysis Results of Fish and Shellfish
(The Ocean Area Within 20km Radius of Fukushima Daiichi NPS)

[Categorized by the radioactive cesium level (by fish species, Since October 2012)]

- Total amount of radioactive cesium 134 and 137
  Unit: Bq/kg (Raw)
- Sampling period: October 9 - October 25, 2012
- Guideline value (April 1, 2012 and later): 100Bq/kg

〔20km Radius of Fukushima Daiichi NPS (exclude In the Port of Fukushima Daiichi NPS)〕

Fish	Maximum	Minimum	Number of measurements (Measurement results exceeding the guideline value)
Schlegel's black rockfish	1470	–	1 (1)
Common skete	780	151	9 (9)
Greenling	450	15	10 (4)
Flatfish	350	69	11 (6)
Marbled sole	290	26	5 (2)
Banded dogfish	270	–	1 (1)
Stone flounder	212	44	3 (1)
Stingray	178	6.4	4 (1)
Spotted halibut	165	–	1 (1)
Flathead (Platycephalus sp.)	124	31.9	3 (1)
Smooth dogfish	121	16.3	4 (1)
Angel shark	117	8.7	3 (1)
Acanthopagrus schlegeli	75	–	1
Sea bass	64	–	1
Drumfish	57	27.4	7
Cynoglossus joyneri	34	–	1
Dasyatis matsubarai	34	7.5	2
Pagrus major	25	ND	3
Carcharhinus	20.2	5.6	3
Littlemouth flounder	20	–	1
Common horse mackerel	18.9	–	1
Dory	18.8	4.2	3
Sea robin	14.9	12.5	3
Crimson sea bream	12.9	5.6	2
Striped jewfish	12.1	4.9	2

Fish	Maximum	Minimum	Number of measurements
Pennahia argentata	8.9	–	1
Lepidotrigla microptera	6.4	–	1
Ridged-eye flounder	5.5	–	1
Yellowtail	3.6	ND	2
Oplegnathus punctatus	ND	–	1
Arothron hispidus	ND	–	1
Chum salmon	ND	–	1
Squids	Maximum	Minimum	Number of measurements
Loliginid	ND	–	1
Octopuses	Maximum	Minimum	Number of measurements
–	–	–	–
Crustacea	Maximum	Minimum	Number of measurements
Blue crab	37	ND	7
Ovalipes punctatus	19.9	4.3	2

Number of samples	35
Samples with cesium exceeding 100Bq/kg	12 (34%)
Number of measurements	103
Number of measurement results exceeding 100Bq/kg	29 (28%)

* Figures in parenthesis are ratios over 100 Bq/kg.

(Remark) ND for Cs134: approx. 3.2Bq/kg, Cs137: approx. 3.2Bq/kg

〔In the Port of Fukushima Daiichi NPS〕

Fish	Maximum	Minimum	Number of measurements (Measurement results exceeding the guideline value)
Common Japanese conger	15500	–	1(1)
Brown hakeling	4200	–	1(1)
Schlegel's black rockfish	2230	1760	2(2)

[Categorized by the radioactive cesium level (by fish species, March - September)]

- Total amount of radioactive cesium 134 and 137
  Unit: Bq/kg (Raw)
- Sampling period: March 29 - September 19, 2012
- Guideline value (April 1, 2012 and later): 100Bq/kg

Fish	Maximum	Minimum	Number of measurements (Measurement results exceeding the guideline value)
Greenling	25800	ND	86 (44)
Sebastes cheni	1880	540	6 (6)
Barfin flounder	1670	690	2 (2)
Sea bass	1610	33	17 (11)
Banded dogfish	1430	4.4	9 (3)
Microstomus achne	1260	ND	36 (22)
Flatfish	1190	5.6	51 (30)
Common skete	1000	168	47 (47)
Marbled sole	920	21.3	42 (23)
Spotbelly rockfish	830	–	1 (1)
Starry flounder	810	580	2 (2)
Sea raven	670	25	7 (5)
Schlegel's black rockfish	620	410	4 (4)
Stingray	460	55	7 (5)
Stone flounder	390	29	10 (4)
Angel shark	222	66	4 (3)
Dasyatis matsubarai	205	ND	10 (2)
Flathead (Platycephalus sp.)	187	140	3 (3)
Smooth dogfish	169	4.7	10 (2)
Acanthopagrus schlegeli	160	94	2 (1)
Drumfish	127	38	15 (4)
Sea robin	107	19.9	6 (1)
Pacific cod	107	16.7	11 (1)
Littlemouth flounder	103	10	8 (1)
Carcharhinus	93	4.6	8
Pennahia argentata	69	15	7
Common Japanese conger	66	21.4	2
Dory	63	12.5	11
Roundnose flounder	57	4.5	8
Lepidotrigla microptera	53	6.4	21
Ridged-eye flounder	53	–	1
Northern dogfish	50	ND	15
Long shanny	47	16.4	3
Lophius litilon	42	ND	17
Common horse mackerel	38	10.7	5
Pagrus major	38	ND	8
Slippery sole	36	21.6	4
Crimson sea bream	26	ND	4
Salangichthys ishikawae	23	–	1
Shark-skin flounder	17	ND	2

(Remark) ND for Cs134: approx. 3.1Bq/kg, Cs137: approx. 3.3Bq/kg

Fish	Maximum	Minimum	Number of measurements
Chub mackerel	14.3	ND	2
Sand eel	12.9	ND	4
Balloonfish	10.2	ND	2
Pointhead flounder	8.3	4.1	2
Yellowtail	6.5	ND	5
Pelagic thresher	6	–	1
Korean flounder	4.8	ND	2
Flathead flounder	4.1	–	1
Zenopsis nebulosa	ND	–	2
Alaska pollack	ND	–	1
Japanese butterfish	ND	–	1

Squids	Maximum	Minimum	Number of measurements
Andrea cuttlefish	ND	–	5
Loliginid	ND	–	9
Loligo bleekeri	ND	–	3

Octopuses	Maximum	Minimum	Number of measurements
Chestnutoctopus	9.1	ND	6
Octopus (Enteroctopus) dofleini	7.7	ND	13
Common Octopus	ND	–	1

Crustacea	Maximum	Minimum	Number of measurements
Blue crab	40	ND	16
Ovalipes punctatus	26	ND	16

Number of samples	59
Samples with cesium exceeding 100Bq/kg	24 (41%)
Number of measurements	605
Number of measurement results exceeding 100Bq/kg	227 (38%)

* Figures in parenthesis are ratios over 100 Bq/kg.

[Table 1 - 1. Results obtained at Each Measurement Point (1)]

Measurement Point (Date of Sampling)	Samples (Sample names in blue letters: 100Bq/kg or less)
T1 (May 30)	Pacific cod, Greenling, Flatfish, Marbled sole, Common horse mackerel, Microstomus achne, Lepidotrigla microptera, Pennahia argentata, Dory, Lophius litilon, Chestnutoctopus, Loliginid, Andrea cuttlefish **Littlemouth flounder, Stone flounder, Common skete**
T1 (June 14)	Greenling, Microstomus achne, Lophius litilon, Flatfish, Lepidotrigla microptera, Common horse mackerel, Octopus (Enteroctopus) dofleini, Chestnutoctopus
T1 (August 28)	Stone flounder, Marbled sole, Microstomus achne, Lepidotrigla microptera, Dory, Crimson sea bream
T1 (October 25)	Flatfish, Greenling, Marbled sole, Sea robin, Striped jewfish, Dory, Crimson sea bream, Yellowtail **Common skete, Stone flounder**
T2 (May 30)	Pacific cod, Greenling, Long shanny, Lepidotrigla microptera, Marbled sole, Slippery sole, Microstomus achne, Lophius litilon, Common horse mackerel, Pointhead flounder , Octopus (Enteroctopus) dofleini, Loliginid, Korean flounder, Chestnutoctopus, Common Octopus, Andrea cuttlefish
T2 (June 14)	Sea raven, Microstomus achne, Flatfish, Lepidotrigla microptera, Greenling, Lophius litilon, Littlemouth flounder, Common horse mackerel, Loliginid, Chestnutoctopus **Marbled sole**
T2 (August 28)	Dory, Marbled sole, Crimson sea bream, Lepidotrigla microptera, Smooth dogfish, Balloonfish, Littlemouth flounder, Greenling
T2 (October 25)	Flatfish, Marbled sole, Smooth dogfish, Littlemouth flounder, Greenling, Crimson sea bream, Sea robin, Lepidotrigla microptera, Ridged-eye flounder, Striped jewfish, Dory, Loliginid
T3 (July 9)	Marbled sole, Stone flounder, Littlemouth flounder, Slippery sole, Dory, Lepidotrigla microptera, Lophius litilon, Octopus (Enteroctopus), dofleini **Greenling, Common skete, Flatfish, Microstomus achne**
T3 (August 20)	Microstomus achne, Stone flounder, Greenling, Lepidotrigla microptera, Dory, Lophius litilon, Flatfish **Common skete**
T3 (September 10)	Microstomus achne, Marbled sole, Dory, Lepidotrigla microptera, Flatfish **Common skete**
T3 (October 21)	Angel shark, Stone flounder, Stingray **Common skete, Flatfish, Marbled sole**
T4 (July 9)	Littlemouth flounder, Flatfish, Slippery sole, Lepidotrigla microptera **Common skete, Marbled sole**
T4 (August 20)	Marbled sole, Dory, Flatfish, Stone flounder, Lepidotrigla microptera, Smooth dogfish, Zenopsis nebulosa, Lophius litilon, Pagrus major **Common skete, Greenling, Microstomus achne**
T4 (September 10)	Flatfish, Dory, Roundnose flounder, Smooth dogfish, Lepidotrigla microptera, Crimson sea bream, Zenopsis nebulosa, Pagrus major **Common skete, Stone flounder, Marbled sole**
T4 (October 21)	Marbled sole, Stone flounder, Sea robin, Stingray, Pagrus major **Common skete, Flatfish, Angel shark**
G1 (July 4)	Greenling, Marbled sole, Drumfish, Stingray, Pennahia argentata, Banded dogfish, Yellowtail **Sea bass, Common skete, Acanthopagrus schlegeli, Flatfish**
G1 (August 1)	Drumfish, Flatfish, Sea bass, Carcharhinus, Blue crab **Greenling, Common skete, Stingray**
G1 (September 5)	Flatfish, Drumfish, Blue crab **Common skete, Stingray, Angel shark**
G1 (October 18)	Drumfish, Carcharhinus, Oplegnathus punctatus, Blue crab **Common skete, Flatfish, Flathead (Platycephalus sp.)**

[Table 1 - 2. Results obtained at Each Measurement Point (2)]

Measurement Point (Date of Sampling)	Samples (Sample names in blue letters: 100Bq/kg or less)
G2 (July 4)	Flatfish, Marbled sole, Common horse mackerel, Pagrus major, Ovalipes punctatus, Yellowtail, Octopus (Enteroctopus) dofleini **Common skete, Microstomus achne, Greenling**
G2 (August 1)	Dasyatis matsubarai, Pagrus major, Smooth dogfish, Northern dogfish, Banded dogfish, Marbled sole, Ovalipes punctatus, Blue crab **Common skete, Flatfish**
G2 (September 5)	Dasyatis matsubarai, Flatfish, Drumfish, Dory, Carcharhinus, Ovalipes punctatus, Blue crab, Chub mackerel **Sebastes cheni, Common skete**
G2 (October 18)	Flatfish, Drumfish, Dasyatis matsubarai, Carcharhinus, Blue crab, Arothron hispidus **Stingray, Greenling**
G3 (July 18)	Marbled sole, Pagrus major, Blue crab, Ovalipes punctatus, Yellowtail, Northern dogfish, Dasyatis matsubarai **Schlegel's black rockfish, Microstomus achne, Common skete, Flatfish, Greenling**
G3 (August 8)	Drumfish, Pagrus major, Smooth dogfish, Blue crab, Carcharhinus **Microstomus achne, Common skete, Flatfish, Sea bass**
G3 (September 19)	Carcharhinus, Banded dogfish, Blue crab **Common skete, Greenling, Flatfish, Marbled sole**
G3 (October 13)	Flathead (Platycephalus sp.) , Sea bass, Drumfish, Blue crab, Cynoglossus joyneri, Smooth dogfish, Pagrus major **Common skete, Flatfish, Spotted halibut**
G4 (July 18)	Dasyatis matsubarai, Flatfish, Sea robin, Northern dogfish **Microstomus achne, Common skete, Marbled sole, Sea bass, Greenling**
G4 (August 8)	Chub mackerel, Pagrus major, Ovalipes punctatus **Sebastes cheni, Microstomus achne, Greenling, Banded dogfish, Flatfish, Dasyatis matsubarai**
G4 (September 19)	Marbled sole, Drumfish, Flatfish, Carcharhinus, Dasyatis matsubarai **Stingray, Common skete**
G4 (October 13)	Flatfish, Drumfish, Pagrus major, Common horse mackerel, Angel shark, Dasyatis matsubarai, Carcharhinus, Ovalipes punctatus, Yellowtail, Blue crab, Chum salmon **Marbled sole, Greenling, Common skete**
G5 (July 15)	Pennahia argentata, Banded dogfish **Sebastes cheni, Greenling, Common skete, Microstomus achne, Flatfish, Marbled sole**
G5 (August 11)	Ovalipes punctatus, Blue crab, Pelagic thresher, Carcharhinus **Common skete, Angel shark, Flatfish**
G5 (September 15)	Drumfish, Blue crab **Common skete, Stingray, Angel shark, Flathead (Platycephalus sp.) , Flatfish**
G5 (October 15)	Drumfish, Blue crab **Common skete, Flatfish, Banded dogfish**
G6 (March 29)	Sand eel
G6 (April 7)	Northern dogfish, Pacific cod, Shark-skin flounder **Flatfish, Marbled sole, Sea raven**
G6 (April 11)	Northern dogfish **Marbled sole, Microstomus achne, Common skete, Pacific cod**
G7 (July 15)	Sea bass, Flatfish, Blue crab, Banded dogfish, Dasyatis matsubarai **Barfin flounder, Greenling, Common skete, Microstomus achne, Marbled sole, Drumfish**
G7 (August 11)	Flatfish, Angel shark, Blue crab, Ovalipes punctatus **Common skete, Sea bass, Smooth dogfish**
G7 (September 15)	Drumfish, Carcharhinus, Blue crab **Banded dogfish, Common skete, Flatfish**
G7 (October 15)	Acanthopagrus schlegeli, Drumfish, Smooth dogfish, Dory, Blue crab **Schlegel's black rockfish, Common skete, Greenling, Flatfish**
G8 (July 23)	Smooth dogfish, Yellowtail, Northern dogfish, Dasyatis matsubarai **Common skete, Microstomus achne, Marbled sole, Flathead (Platycephalus sp.) , Flatfish, Sea robin**
G8 (August 25)	Carcharhinus, Smooth dogfish, Sea robin **Common skete, Microstomus achne, Marbled sole, Flatfish, Flathead (Platycephalus sp.)**
G8 (October 14)	Stingray, Flatfish, Drumfish, Flathead (Platycephalus sp.) , Ovalipes punctatus, Pennahia argentata, Blue crab **Common skete, Smooth dogfish**

[Additional sampling of greenling (G1)] Total number sampled: 57

August 29 - October 10 Below the guideline value: 37, Above the guideline value: 20

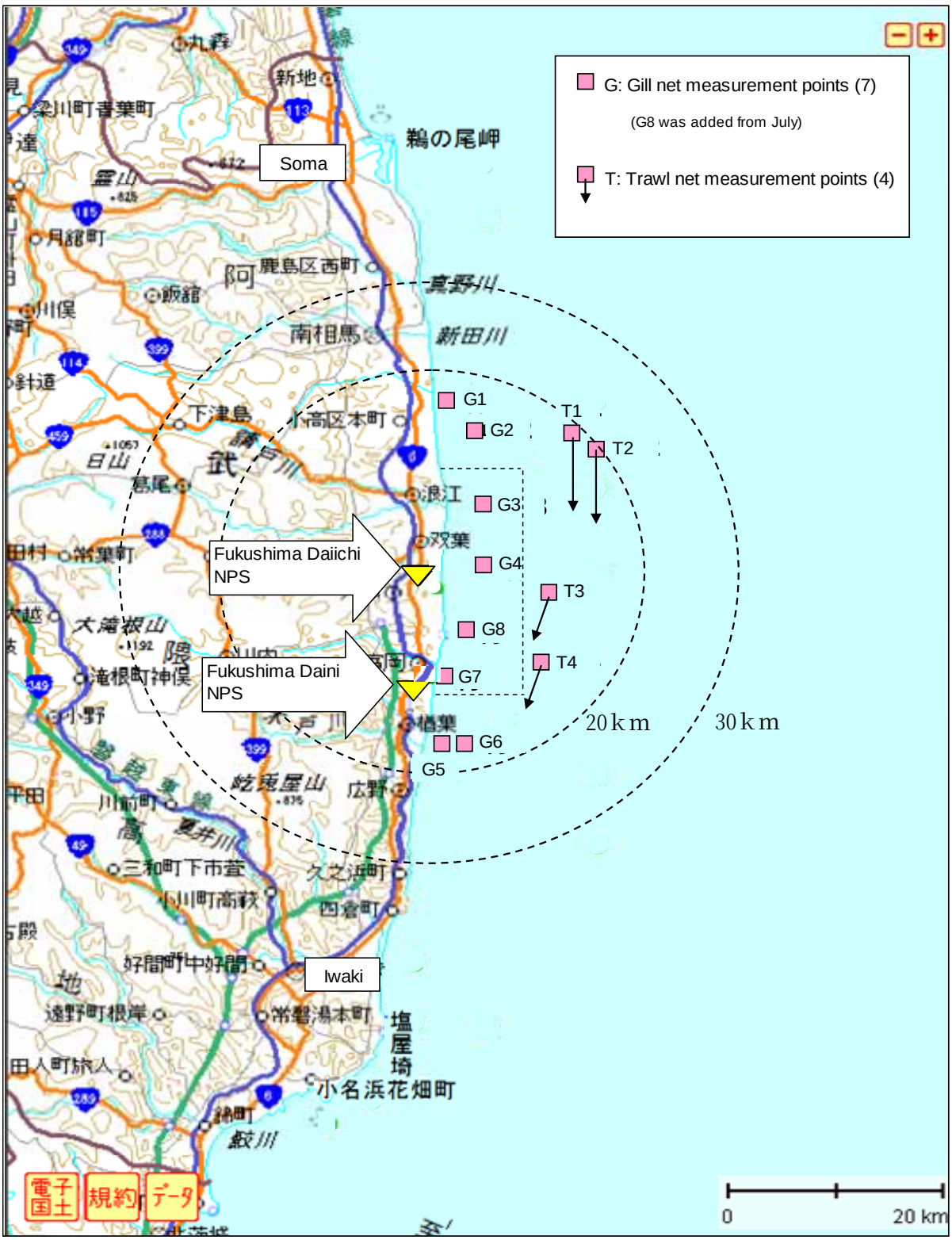


Figure 1. Fish and Shell Fish Measurement Points (As of October 2012)

Figure 2. Flatfish Measurement Results (Cs134+137, Bottom Layer Fish)

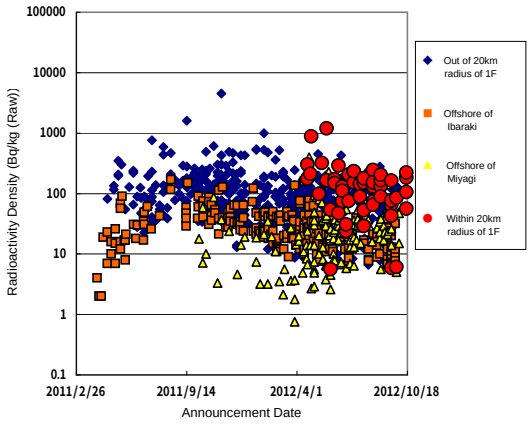


Figure 3. Microstomus Achne Measurement Results (134+137, Bottom Layer Fish)

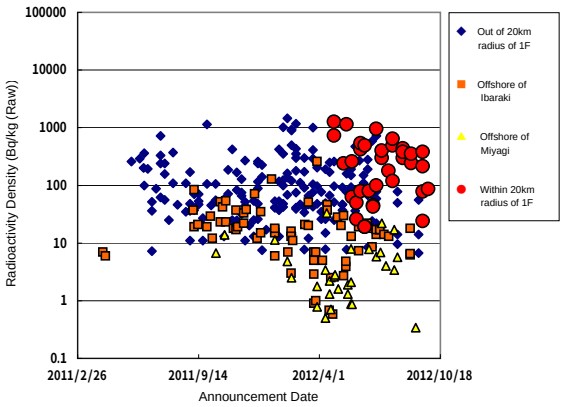


Figure 4. Greenling Measurement Results (Cs134+137, Bottom Layer Fish)

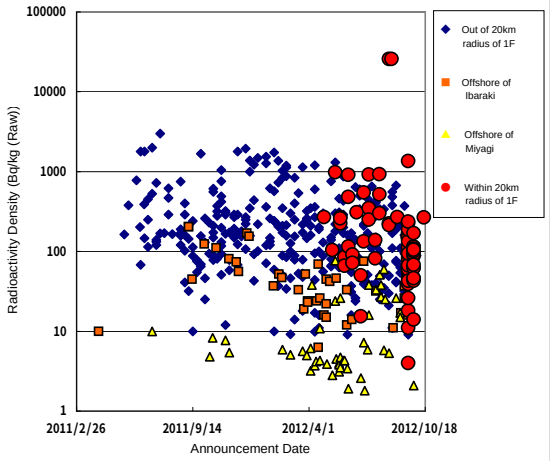


Figure 5. Sea Bass Measurement Results (Cs134+137, Middle Layer Fish)

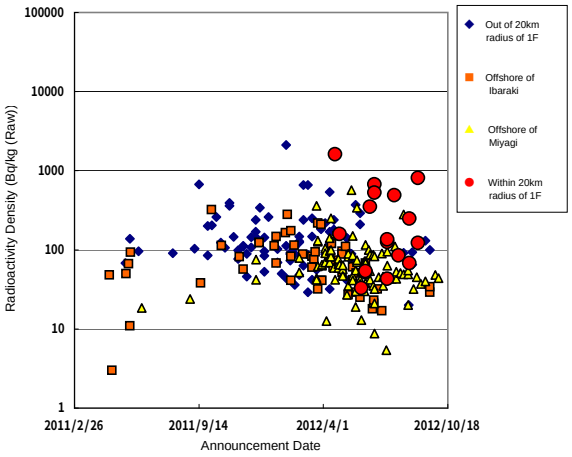


Figure 6. Common Skete Measurement Results (Cs134+137, Bottom Layer Fish)

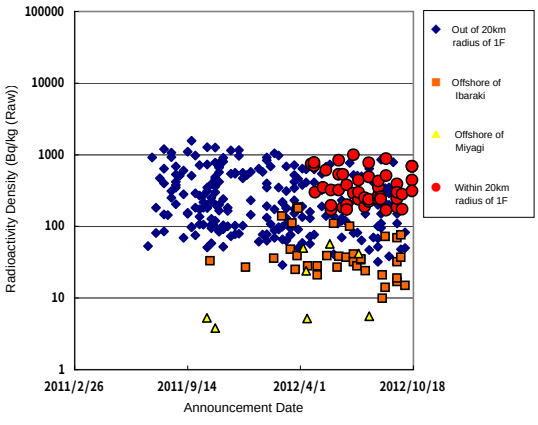
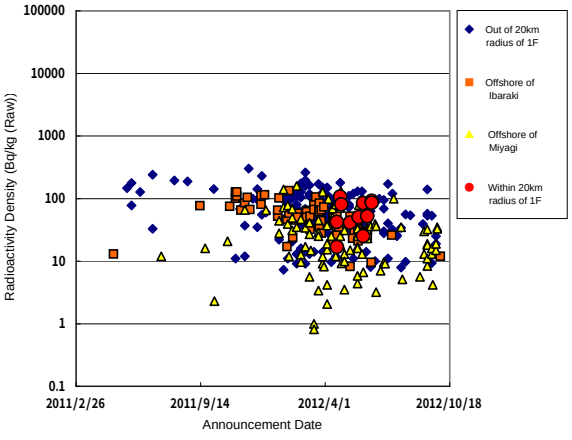


Figure 7. Pacific Cod Measurement Result (Cs134+137, Bottom Layer Fish)



(Remark) The measurement results of "Out of 20km radius of 1F (includes a part of "Within 20km radius of 1F" as the evacuation area was changed on August 10, 2012)", "Offshore of Ibaraki" and "Offshore of Miyagi" was obtained from the Japan Meteorological Agency websit

Additional survey on high-cesium-level greenling and future countermeasures

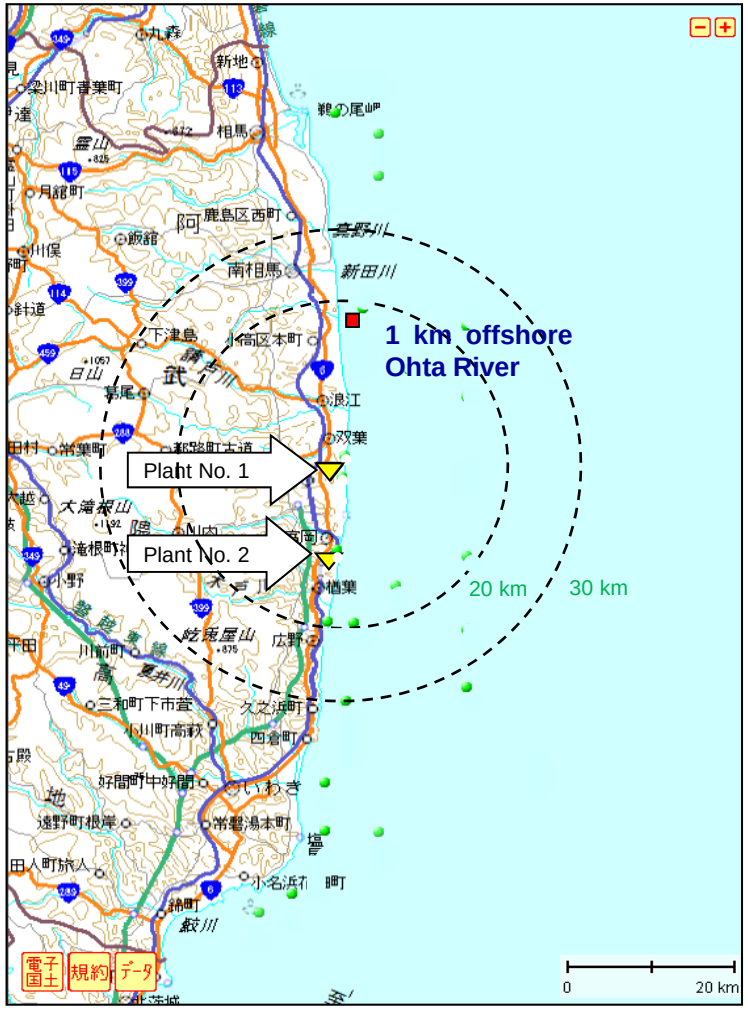
Tokyo Electric Company

November 26, 2012

東京電力 TEPCO

1. Overview of survey

- ○ Radioactive cesium of 25,800 Bq/kg was detected in the greenling collected from 1 km off the Ohta River on August 1, 2012.
- ○ To find a cause, we studied the following.
  - ・ Greenling, seawater, sea-bottom soil, and food organisms in a 2 km x 2 km sea area, 1 km off the Ohta River.
  - ・ Fish in the Fukushima No. 1 Nuclear Power Plant bay.
  - ・ Radioactivity level of river water and bottom sediment in the Ohta River area (Data obtained by the Ministry of the Environment).
- ○ We consequently detected radioactive cesium of 15,500 Bq/kg (raw) in common Japanese conger collected in the Fukushima No. 1 Nuclear Power Plant bay.
- ○ A countermeasure will be examined and taken to prevent fish in the bay from going out of the bay.



2-1. Measurement results <1 km offshore Ohta River -1>

We collected greenling, seawater, sea-bottom soil, and food organisms and measured the radioactive cesium level in the period from August 29 to October 16, 2012.

(1) Greenling

○ Total number of collected fish: 57

Collection date	8/29	8/30	9/4	9/5	9/11	9/12	10/9	10/10	Total
Number	15	8	4	10	10	5	1	4	57

○ Radioactive cesium level (Fig. 1): Varied from below detection limit to 1,350 Bq/kg

○ No specimen showed a high radioactivity level of several tens of thousands Bq/kg. Many specimens had a radioactivity level of around 100 Bq/kg.
The radioactivity level of those smaller than 30 cm was all below 100 Bq/kg.

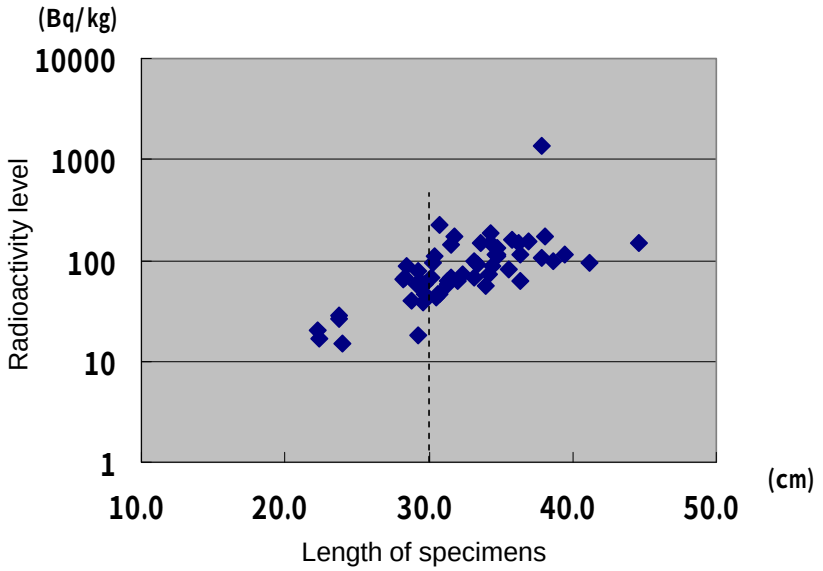


Fig. 1 Length of greenling specimens and radioactive cesium level

2-1. Measurement results <1 km offshore Ohta River -2>

(2) Seawater

- ○ Collected 4 times: **Radioactive cesium 137 level was 0.02-0.05 Bq/l.**
- ○ Relatively low level, giving little influence to greenling.

(3) Sea-bottom soil

- ○ Collected at 20 sites. (See Fig. 2) Radioactive cesium level was 18-640 Bq/kg (dry soil).
- ○ This is almost the same as the level 17-530 Bq/kg (dry soil) measured at a northern shore area of Fukushima No. 1 Nuclear Power Plant (from offshore Ukedo to offshore Soma) and no higher level was found.

(4) Food organisms

- ○ The radioactivity level of the crabs, shrimps, squids, and fish caught by the feeding-type small otter trawl fishing on October 16 was below the detection limit 17 Bq/kg.
- ○ No specimens showed a high radioactive cesium level.

Fig. 2 Radioactive cesium level distribution of sea-bottom soil

Crangon affinis

Metapenaeopsis dalei

Trachysalambria curvirostris

Dwarf squid

Philyra syndavtyla

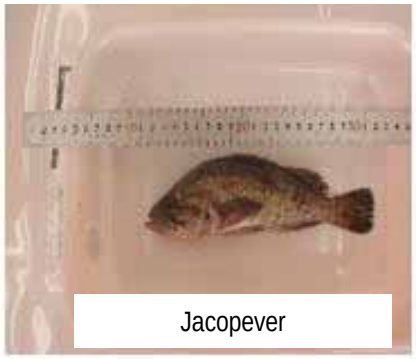
2-2. Measurement result <Fukushima No. 1 Nuclear Power Plant bay area>

We collected fish in the Fukushima No. 1 Nuclear Power Plant bay and measured its radioactive cesium level.

○ On October 10, 2012, we caught fish by basket fishing.

○ Collected fish: Jacopever: 2, black rockfish: 1, common Japanese conger: 1


Fishing basket


Jacopever


black rockfish


Common Japanese conger

○ Radioactive cesium level:

- Jacopever 1,760 and 2,230 Bq/kg (raw)
- black rockfish 4,200 Bq/kg (raw)
- Common Japanese conger 15,500 Bq/kg (raw)

○ The radioactivity level of the Jacopever and the black rockfish were almost the same as that of Japanese flounder (4,500 Bq/kg) caught off Hisanohama in November 2011 and not exceptionally high. However, the radioactivity level of the black rockfish was quite high since that of the black rockfish caught outside the bay was 100 Bq/kg or lower.

2-3. Measurement result <Ohta River area>

We studied the Ohta River environmental monitoring data obtained by the Ministry of the Environment.

(1) The radioactive cesium level of the river water (following table) was several becquerels in September 2011. But now, it is below the detection limit. (The level in July 2012 was robably influenced by the typhoon in June.)

Ohta River (Ishiwatarido Bridge) <12>			Ohta River (Kaminouchi Bridge) <13>			Ohta River (Masuda Bridge) <14>			Ohta River (JR Tekkyo Bridge) <15>			Ohta River (Maruyama Bridge) <16>		
	Cs-134	Cs137		Cs-134	Cs137		Cs-134	Cs137		Cs-134	Cs137		Cs-134	Cs137
09/16/11	1	3	09/15/11	2	2	09/16/11	1	1	09/16/11	<1	1	09/16/11	1	<1
11/28/11	<1	<1	11/29/11	<1	1	11/29/11	<1	<1	11/29/11	<1	<1	11/21/11	<1	<1
01/16/12	<1	<1	01/20/12	<1	<1	01/20/12	<1	<1	01/20/12	<1	<1	01/06/12	<1	<1
03/03/12	<1	<1	03/01/12	<1	<1	03/02/12	<1	<1	03/02/12	<1	<1	03/04/12	<1	<1
06/13/12	<1	<1	06/13/12	<1	<1	06/12/12	<1	<1	06/12/12	<1	<1	06/12/12	<1	<1
07/04/12	<1	<1	07/04/12	<1	1	07/04/12	<1	<1	07/03/12	<1	<1	07/03/12	1	2
07/25/12	<1	<1	07/25/12	<1	<1	07/24/12	<1	<1	07/24/12	<1	<1	07/24/12	<1	<1
08/22/12	<1	<1	08/22/12	<1	<1	08/22/12	<1	<1	08/22/12	<1	<1	08/21/12	<1	<1

(2) Radioactive cesium level of bottom sediment (following table) is relatively high in the mid-stream area but low in the downstream area.

Ohta River (Ishiwatarido Bridge) <12>			Ohta River (Kaminouchi Bridge) <13>			Ohta River (Masuda Bridge) <14>			Ohta River (JR Tekkyo Bridge) <15>			Ohta River (Maruyama Bridge) <16>		
	Cs-134	Cs137		Cs-134	Cs137		Cs-134	Cs137		Cs-134	Cs137		Cs-134	Cs137
09/16/11	4400	5300	09/15/11	15000	18000	09/16/11	27000	33000	09/16/11	1200	1400	09/16/11	100	130
11/28/11	6300	8100	11/29/11	10000	12000	11/29/11	1300	1600	11/29/11	1300	1700	11/21/11	32	39
01/16/12	7600	10000	01/20/12	6700	9300	01/20/12	1200	1700	01/20/12	660	850	01/06/12	20	28
03/03/12	8100	11000	03/01/12	7200	1000	03/02/12	4100	5600	03/02/12	1000	1400	03/04/12	28	44
06/13/12	5700	9000	06/13/12	4400	6900	06/12/12	7300	11000	06/12/12	490	790	06/12/12	51	70
07/04/12	24000	37000	07/04/12	3100	4900	07/04/12	1500	2300	07/03/12	650	1100	07/03/12	70	110
07/25/12	5400	8700	07/25/12	3300	5300	07/24/12	8800	14000	07/24/12	460	750	07/24/12	45	78
08/22/12	4500	7400	08/22/12	3300	5400	08/22/12	11000	18000	08/22/12	550	910	08/21/12	31	61

*: Typhoon No. 4 passed by on June 20, 2012.

*: For details of the collection sites, see <Reference>.

3-1. Estimation of causes (1)

For the following reasons, the factors (seawater, sea-bottom soil, river water quality) are unlikely to cause the high radioactive cesium level of greenling.

- ○ **The radioactive cesium 137 level of the seawater was 0.02-0.05 Bq/l** and the level of greenling estimated from the concentration coefficient (30-100*) was **1-5 Bq/kg**. Therefore, the high cesium level of greenling is not likely to be caused by the seawater.
- ○ The radioactive cesium level of the sea-bottom soil was 18-640 Bq/kg (dry soil) and not very high. It is therefore unlikely to be a cause of the high radioactivity level of greenling.
- ○ The radioactivity level of the Ohta River water was below the detection limit (1 Bq/l) . If we assume that the level was 1 Bq/l and use the concentration coefficient of the fish, the radioactive cesium level of greenling is 30-100 Bq/kg, which is unlikely to cause the high radioactivity level of greenling.
- ○ The radioactivity level of the bottom sediment was relatively high in the middle-stream area but considerably low in the downstream area. Therefore, we cannot expect that the contaminated soil flows from the river to the estuarine area and forms the sea-bottom sediment of high radioactivity level there.
- ○ The radioactive cesium level of food organisms, e.g., crustacean, which is a principal food of greenling, was around 10 Bq/kg and was unlikely to cause the high radioactivity level of greenling.

* Concentration coefficient of fish

30: Safety review guideline “Assessment guideline for target dose level around nuclear power plant facilities”

100: IAEA Technical Reports Series No. 422 (2004)

3-2. Estimation of causes (2)

From the above clarified facts, we present possible causes for the high radioactivity level of greenling

- From the cesium concentration coefficient of fish and from the fact that the radioactive level of the seawater in the Fukushima No. 1 Nuclear Power Plant bay was 1,000 Bq/l or higher for more than a month, there was the possibility that the radioactive cesium level of the fish in the bay would reach around 100,000 Bq/kg (raw).

- The ecological half-life period of radioactive substances in fish is about 50 days in an uncontaminated environment. In a contaminated environment, however, it could be longer since fish would intake and excrete the radioactive substances.

  * According to the Fisheries Research Agency, the half-life period of radioactive substances in greenling in the sea off Fukushima could be more than 300 days.

- It is about 480 days from the accident (the day when the radioactive cesium level of the seawater became high) to August 1, 2012, when the greenling of high radioactivity level was caught. Therefore, if the ecological half-life period is about 300 days, we could find fish of the radioactivity level of 25,000 Bq/kg (raw) or higher.

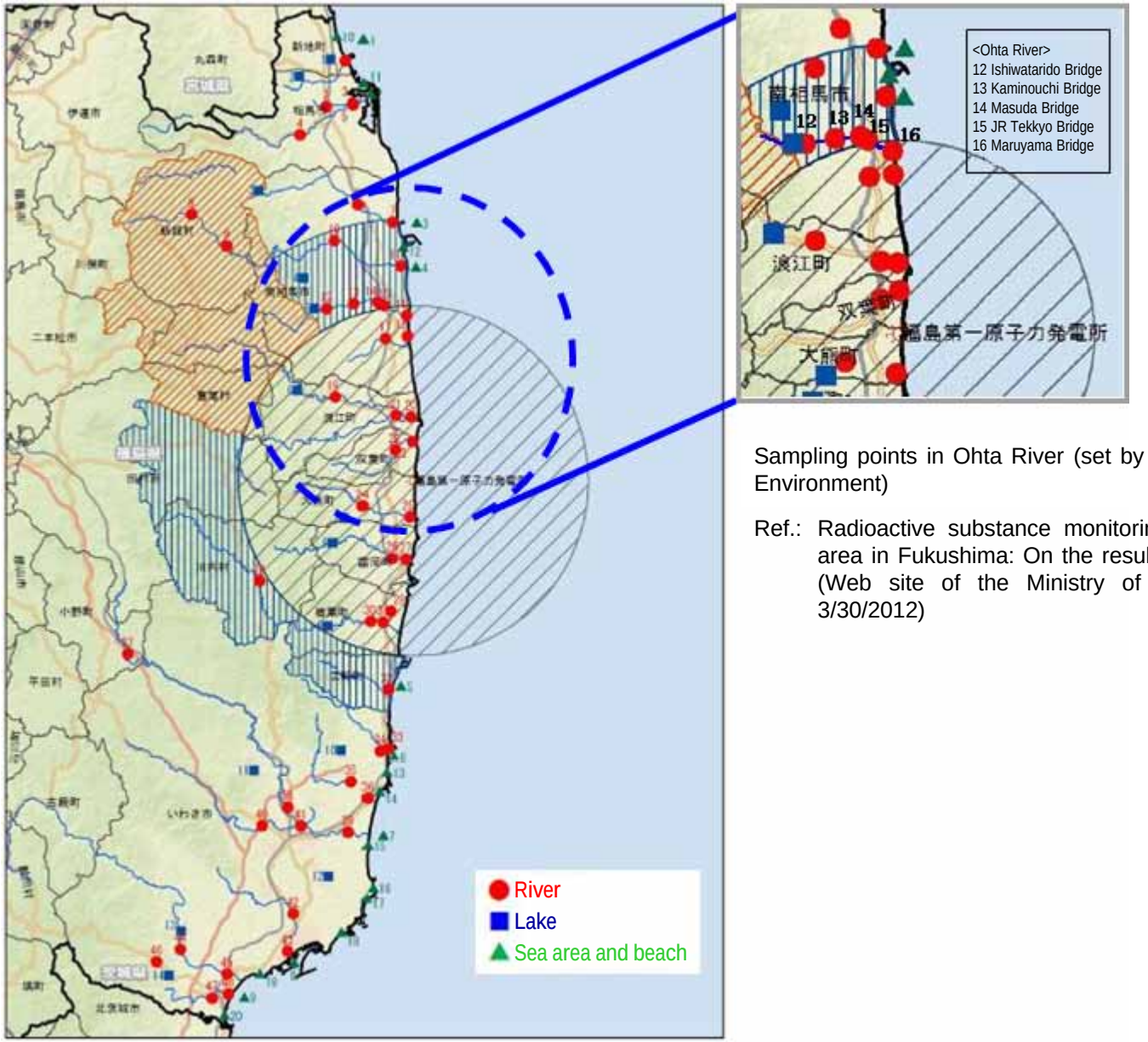
- This is just a possibility. Since further investigation is necessary, we will determine the cause in collaboration with surveys that will be conducted by the government.

4. Countermeasures (preliminary)

○ Since common Japanese congers of high radioactive cesium level were found in the bay, the following countermeasures are to be taken to prevent the fish from going out of the bay.

- Various measures to contain the fish inside the bay, including blocking up the bay entrance, are under examination.
- In the meanwhile, we will prevent the fish around the tetra pods from going out of the bay by catching the fish as much as possible inside the bay and by spreading a net along the levees of the bay.
- The environment of the anchorage basins in the bay will be improved by dredging them. (The dredged sand and soil will be moved to other places in the bay and covered with uncontaminated soil.)
- After that we will keep catching fish in and around the Fukushima No. 1 Nuclear Power Plant bay and examine the collected fish to accumulate measurement data.

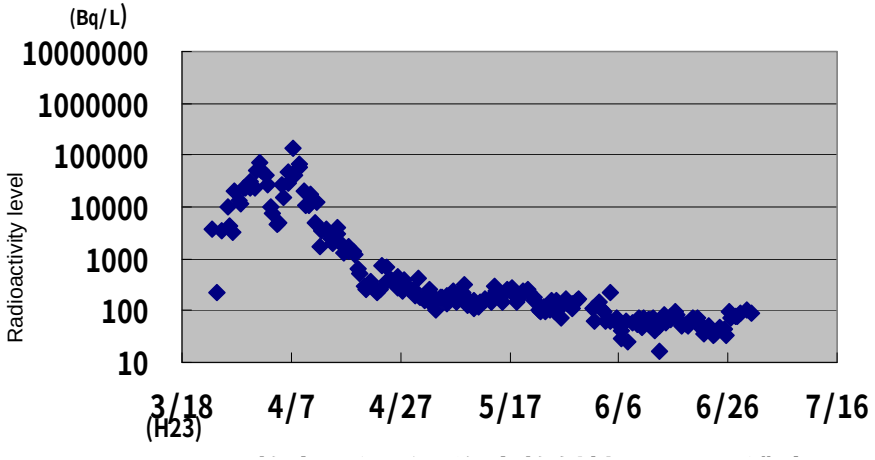
<Reference> Monitoring points around Ohta River set by the Ministry of the Environment



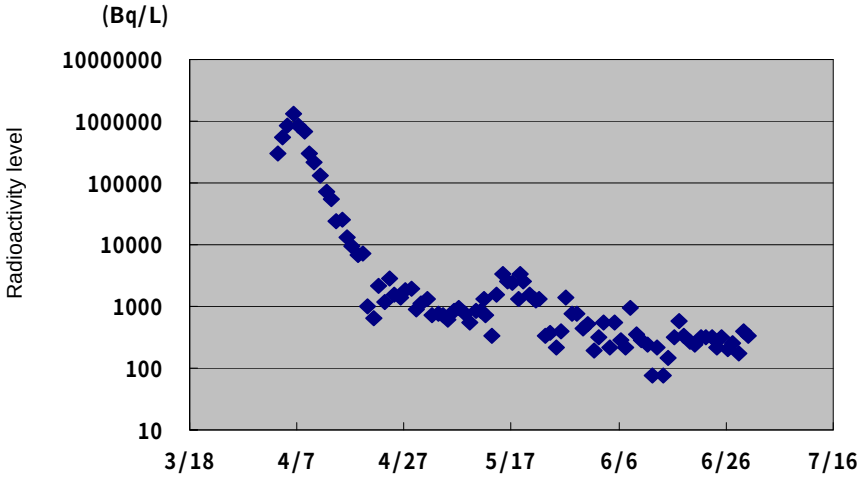
Sampling points in Ohta River (set by the Ministry of the Environment)

Ref.: Radioactive substance monitoring in public water area in Fukushima: On the result of the 4th survey (Web site of the Ministry of the Environment: 3/30/2012)

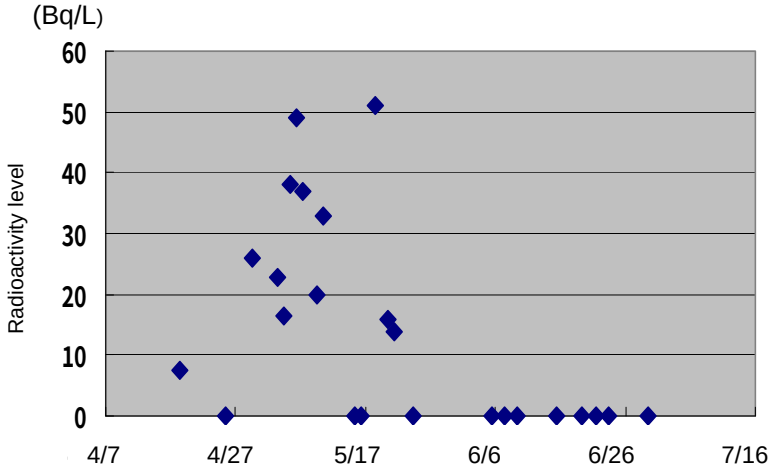
<Reference> Change in radioactive cesium level in seawater



Radioactive cesium level of seawater around 1F northern water outlet



Radioactive cesium level of seawater around the wharf



Radioactive cesium level of upper seawater around 3 km off Haramachi-ku