

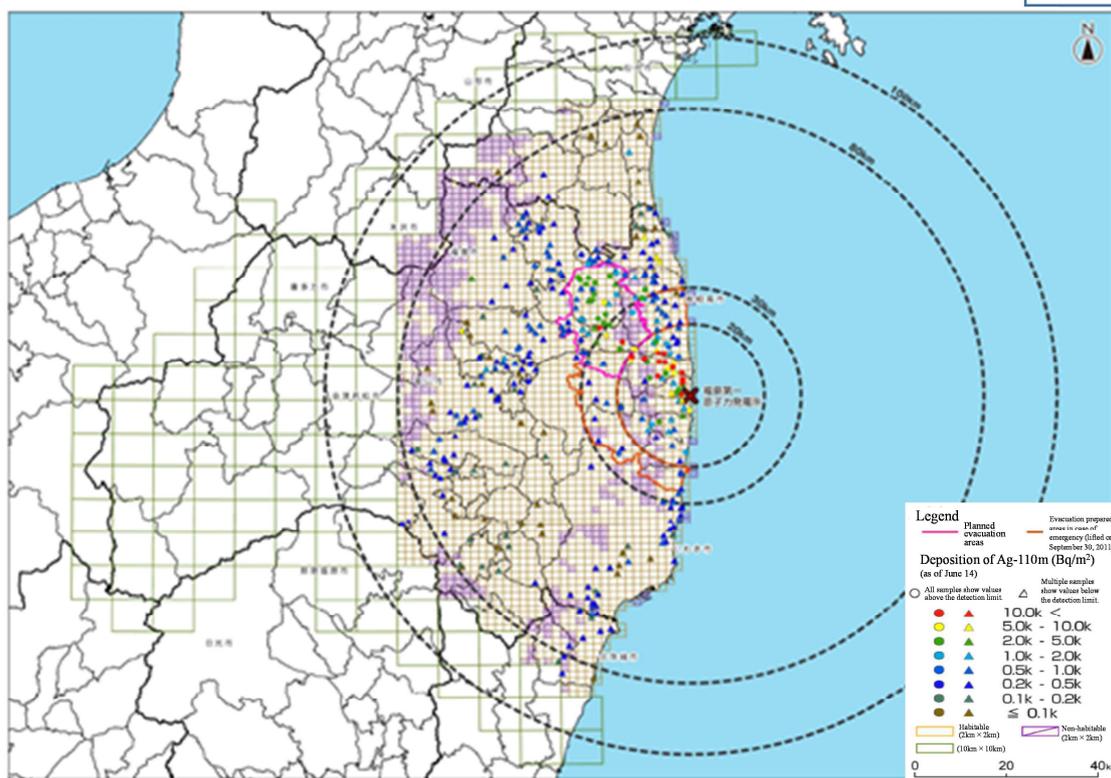
The two types of detected artificial radionuclides (Ag-110m and Sb-125) were not included in the publicized reference materials concerning the amount of radioactive materials discharged due to the Fukushima NPS Accident,¹² but the Distribution Maps of Radiation Doses, etc. prepared in October 2011 include a detailed map showing activity concentrations in soil which contains data for Ag-110m (see Figure 5.3-1). Sb-125 was also detected in Niigata after the accident.¹³

The monitoring results revealed that Ag-110m was frequently detected in FY2012 at locations northwest of the Fukushima Daiichi NPS, which coincides with the distribution of Ag-110m as observed in the map showing activity concentrations in soil (Figure 5.3-1). Ag-110m was detected at high concentration levels at two locations (Joroku and Sori-daiichi (both are agricultural reservoirs)) within 10 km northwest of the power station. Sb-125 was detected only at Joroku (agricultural reservoir).

Ag-110m is produced as a result of activation of Ag-109 in a reactor, while Sb-125 is a radioisotope produced as a result of nuclear fission.

Therefore, in light of the distribution of the detected artificial radionuclides and their production processes, they are considered to have been derived from the Fukushima NPS Accident.

Annex 2-2

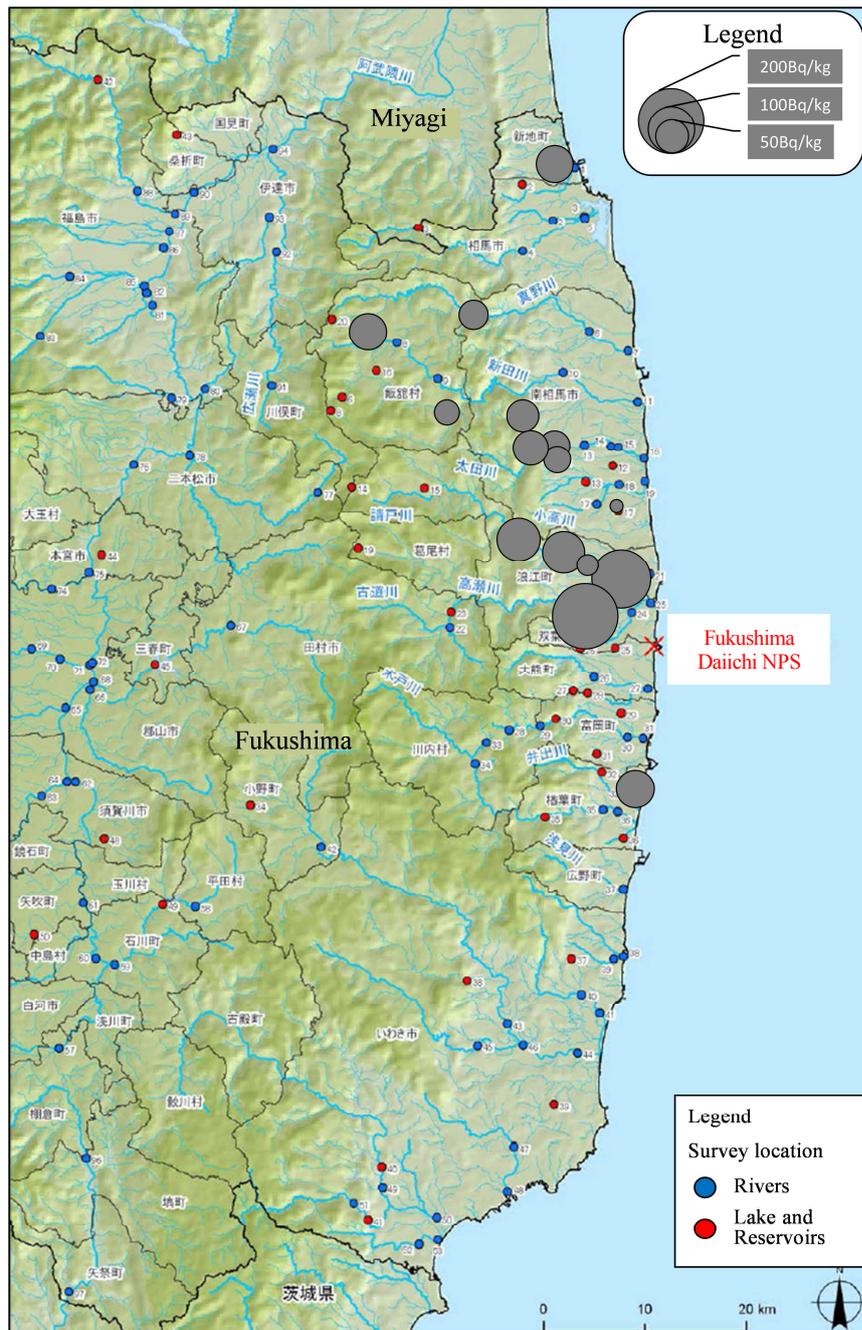


(*) Reference: Website of the Ministry of Education, Culture, Sports, Science and Technology¹⁴
 Figure 5.3-1 Map showing concentrations of Ag-110m in soil

¹² Errors in the Released Data on the Amount of Radioactive Materials (October 20, 2011; Nuclear and Industrial Safety Agency) <http://www.meti.go.jp/press/2011/10/20111020001/20111020001.pdf>

¹³ Artificial Radionuclides Detected in Niigata Prefecture After the Accident at the Fukushima Daiichi NPS, by Ono, et al.; Annual Report of the Niigata Prefectural Institute of Environmental Radiation Monitoring, vol. 9, 19-29.

¹⁴ Preparation of Distribution Maps of Radiation Doses, etc. (Te-129m and Ag-110m) by MEXT: http://radioactivity.nsr.go.jp/ja/contents/6000/5050/24/5600_111031_rev130701.pdf



(*) Average of detected values; Ag-110m was not detectable at any other time, or at any unmarked locations.

(*) Sb-125 was detected only at Joroku (agricultural reservoir) (approx. 10 km northwest of the Fukushima Daiichi NPS) at levels of 140 to 420 Bq/kg during the period from July to November 2012.

Figure 5.3-2 Detection of Ag-110m in sediment samples from public water areas (average of data from September 2011 to March 2013)

Part 3: Other Radioactive Material Monitoring Conducted Nationwide (FY2014)

1. Outline of the Monitoring

1.1 Covered monitoring

As other radioactive material monitoring activity conducted nationwide, the results of the Monitoring of Environmental Radioactivity Levels, which has been conducted by the Nuclear Regulation Authority for the purpose of clarifying the existence or nonexistence of the influence of nuclear facilities, etc. nationwide, are compiled here.

Monitoring locations are as shown in Table 1.1-1 and Figure 1.1-1. See the relevant website for more details. (<http://www.env.go.jp/air/rmcm/result/nsr.html>)

1.2 Compilation methods

Measurement data are available on the website¹⁵ of the Japan Chemical Analysis Center.

Data for this report were collected from this website under the following search criteria.

- i. Period: April 2014 to March 2015 (Accessed February 8, 2016)
- ii. Coverage: Nationwide
- iii. Targets: All radionuclides
- iv. Targeted samples: Inland water (river water, lake water, freshwater), seawater, sediments (river sediments, lake sediments, sea sediments)

¹⁵ <http://search.kankyo-hoshano.go.jp/servlet/search.top> [Accessed February 8, 2016]

Table 1.1-1 Locations for the Monitoring of Environmental Radioactivity Levels (30 in total)

No.	Prefecture	Property	Sampling locations	Water	Sediments
1	Hokkaido	Lake	Oyafuru, Ishikari City (Lake Barato)	○	—
2		Coastal area	Yoichi Town, Yoichi County (Yoichi Bay)	○	○
3	Aomori	Coastal area	Fukaura Town, Nishitsugaru County (off Kasose)	○	○
4		Coastal area	Hiranai Town, Higashitsugaru County (Mutsu Bay)	○	○
5	Iwate	Coastal area	Hirono Town, Kunohe County (off Taneichi)	○	○
6	Akita	River	Asahikawa, Akita City	○	—
7	Fukushima	Coastal area	Soma City (off Haragama Beach)	○	○
8		River	Zainiwasaka, Fukushima City	○	—
9	Ibaraki	Lake	Kasumigaura	○	—
10		Coastal area	Tokai Village, Naka County (off the NPS)	○	○
11	Chiba	Coastal area	Tokyo Bay (off Sodegaura City)	○	○
12	Kanagawa	Coastal area	Yokosuka City (Odawa Bay)	○	○
13	Niigata	Lake	Shichikuyama, Chuo Ward, Niigata City	○	—
14		Coastal area	off Niigata Port	○	○
15	Fukui	Lake	Inogaike Pond, Tsuruga City	○	—
16	Nagano	Lake	Lake Suwa	○	—
17	Aichi	Coastal area	Tokoname City (off Kosugaya)	○	○
18	Mie	River	Seki Town, Kameyama City (Suzuka River)	○	—
19	Kyoto	Freshwater	Tenno, Ogura Town, Uji City	○	—
20	Osaka	Coastal area	Osaka City (Entrance to Osaka Port)	○	○
21	Tottori	River	Katamo (Katamo River System)	○	○
22		River	Kawakami (Kawakami River System)	○	○
23		River	Hotani (Iwakura River System)	○	○
24		River	Bessho (Katamo River System)	○	—
25		River	Kannokura (Oshika River System)	○	○
26	Hiroshima	River	Kawate Town, Shobara City (Saijo River)	○	—
27	Yamaguchi	Coastal area	Ajisu, Yamaguchi City (Yamaguchi Bay)	○	○
28	Fukuoka	Coastal area	Higashiminato Town, Moji Ward, Kitakyushu City (off Chichisaki)	○	○
29	Kagoshima	Coastal area	Minamisatsuma City (off the mouth of Manose River)	○	○
30	Okinawa	Coastal area	Katsuren White Beach, Uruma City	○	○

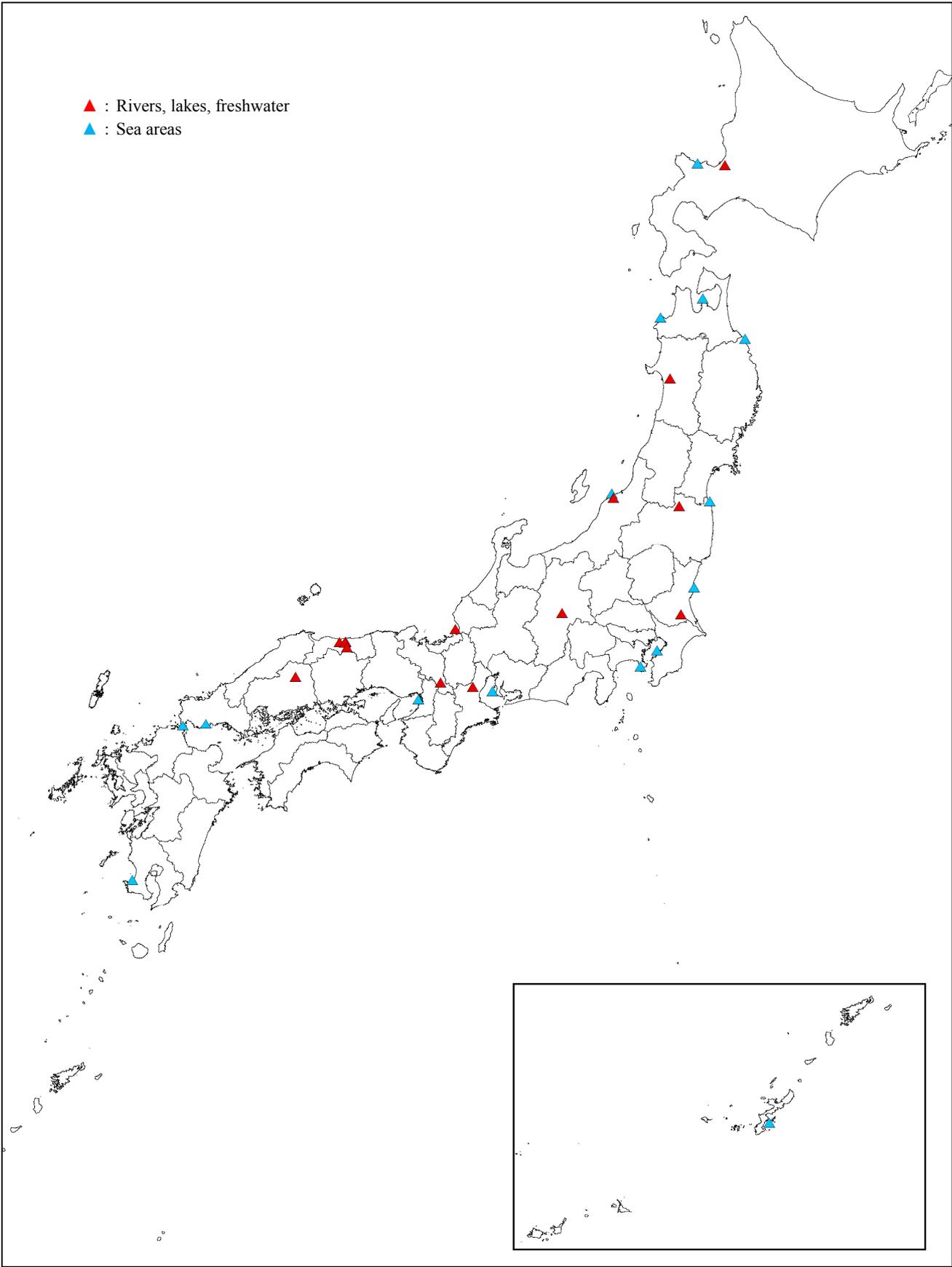


Figure 1.1-1 Locations for the Monitoring of Environmental Radioactivity Levels

2. Results

2.1 Water

(1) Inland water¹⁶

The Monitoring of Environmental Radioactivity Levels surveyed nine types of radionuclides in inland water samples in FY2014. As a result, eight types of radionuclides as shown in Table 2.1-1 were detected.

A comparison with the results of the Monitoring of Environmental Radioactivity Levels for the last twenty years (excluding data for March 11, 2011 to March 10, 2012) revealed that detected values for all these radionuclides were within the past measurement trends (see Figure 2.1-1).

Table 2.1-1 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [inland water]

Nuclides		Number of samples [A]	Number of detections [B]	Detection rate (B/A) (%)	Range of measured values [Bq/L]	Range of past measurement records (*1) [Bq/L]
Naturally occurring radionuclides	Be-7	7	5	71.4	ND - 0.017	ND - 0.021
	K-40	10	10	100.0	0.013 - 0.18	0.0067 - 0.30
	U-234	10	10	100.0	0.0015 - 0.0056	ND - 0.015
	U-238	10	10	100.0	0.00071 - 0.0036	ND - 0.013
Artificial radionuclides	Cs-134	9	2	22.2	ND - 0.015	ND - 0.041
	Cs-137	9	4	44.4	ND - 0.041	ND - 0.084
	I-131	7	1	14.3	ND - 0.0078	ND - 0.016
	Sr-90	10	8	80.0	ND - 0.0028	ND - 0.0050

ND = Not detectable

(*1) Results of the Monitoring of Environmental Radioactivity Levels from FY1994 to FY2013 (excluding data for March 11, 2011 to March 10, 2012)

* ● : Detected value
 ● : Average (arithmetic average; calculated by assuming ND to be zero)
 | : Range of past measurement records

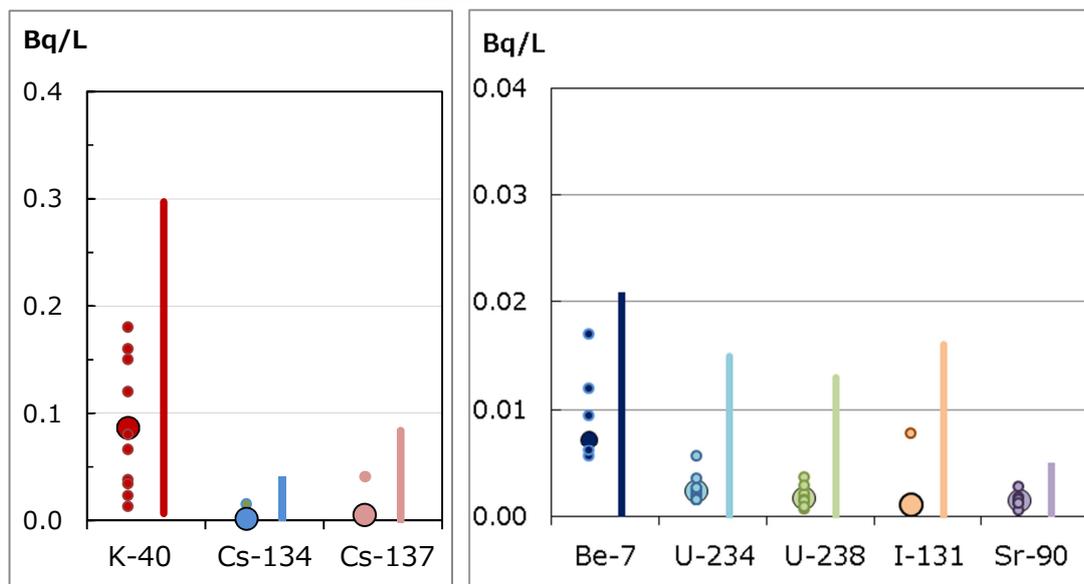


Figure 2.1-1 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [inland water]

¹⁶ This report only covers data for river water, lake water, and freshwater in the Monitoring of Environmental Radioactivity Levels.

(2) Seawater

The Monitoring of Environmental Radioactivity Levels surveyed six types of radionuclides in seawater samples in FY2014. As a result, two types of radionuclides as shown in Table 2.1-2 were detected.

A comparison with the results of the Monitoring of Environmental Radioactivity Levels for the last twenty years (excluding data for March 11, 2011 to March 10, 2012) revealed that detected values for both of these radionuclides were within the past measurement trends (see Figure 2.1-2).

Nuclides		Number of samples [A]	Number of detections [B]	Detection rate (B/A) (%)	Range of measured values [Bq/L]	The range of past measurement records [Bq/L] (*1)
Naturally occurring radionuclides	K-40	16	16	100.0	0.86 - 13	0.078 - 14
Artificial radionuclides	Sr-90	15	15	100.0	0.00055 - 0.0014	ND - 0.0084

Table 2.1-2 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [seawater]

ND = Not detectable

(*1) Results of the Monitoring of Environmental Radioactivity Levels from FY1994 to FY2013 (excluding data for March 11, 2011 to March 10, 2012)

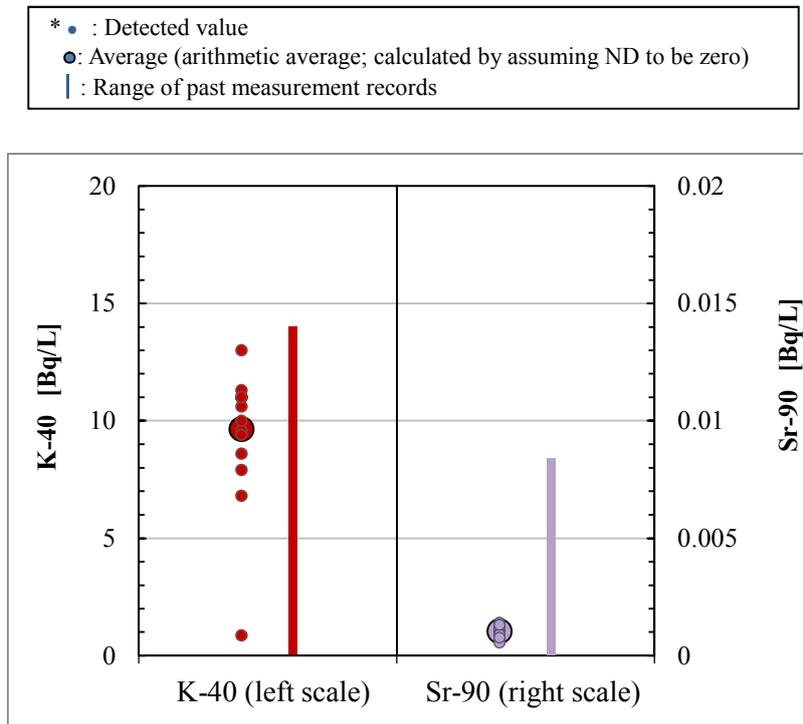


Figure 2.1-2 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [seawater]

2.2 Sediments

(1) Inland water sediments (river sediments and lake sediments)

The Monitoring of Environmental Radioactivity Levels surveyed three types of radionuclides in inland water sediment samples (river and lake sediments) in FY2014. As a result, three types of radionuclides as shown in Table 2.2-1 were detected.

A comparison with the results of the Monitoring of Environmental Radioactivity Levels for the last twenty years (excluding data for March 11, 2011 to March 10, 2012) revealed that detected values for all these radionuclides were within the past measurement trends (see Figure 2.2-1).

Table 2.2-1 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [Inland water sediments (river and lake sediments)]

Nuclides		Number of samples [A]	Number of detections [B]	Detection rate (B/A) (%)	Range of measured values [Bq/kg (dry)]	The range of past measurement records [Bq/kg (dry)](*1)
Naturally occurring radionuclides	U-234	5	5	100.0	13 - 35	6.5 - 76
	U-235	5	5	100.0	0.42 - 1.4	0.20 - 3.4
	U-238	5	5	100.0	14 - 41	0.50 - 94

(*1) Results of the Monitoring of Environmental Radioactivity Levels from FY1994 to FY2013 (excluding data for March 11, 2011 to March 10, 2012)

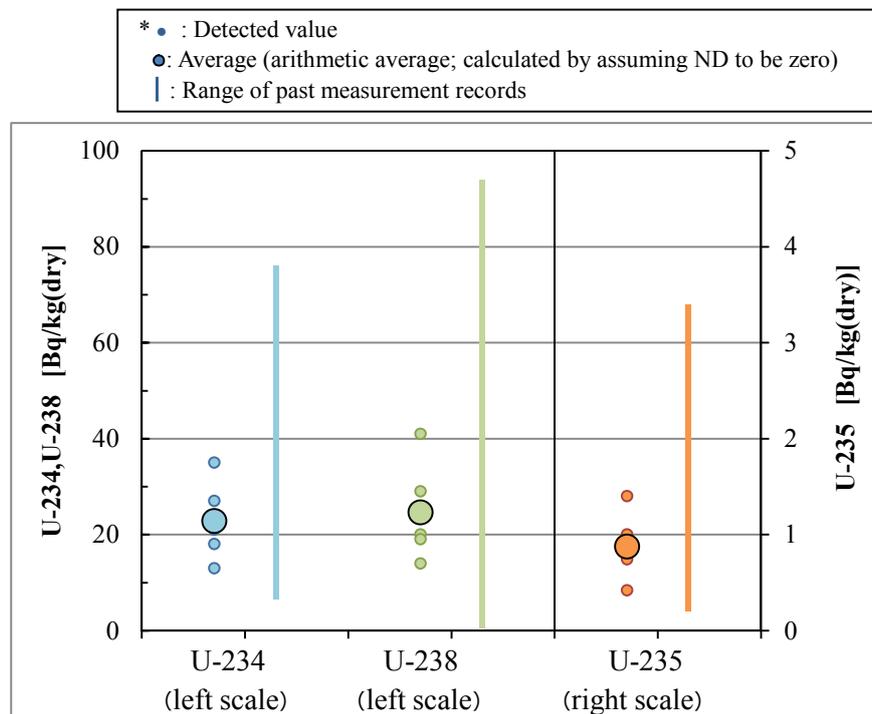


Figure 2.2-1 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [Inland water sediments (river and lake sediments)]

(2) Sea sediments

The Monitoring of Environmental Radioactivity Levels surveyed eight types of radionuclides in sea sediments in FY2014. As a result, five types of radionuclides as shown in Table 2.2-2 were detected.

A comparison with the results of the Monitoring of Environmental Radioactivity Levels for the last twenty years (excluding data for March 11, 2011 to March 10, 2012) revealed that detected values for all these radionuclides were within the past measurement trends (see Figure 2.2-2).

Table 2.2-2 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [Sea sediments]

Nuclides		Number of samples [A]	Number of detections [B]	Detection rate (B/A) (%)	Range of measured values [Bq/kg (dry)]	The range of past measurement records [Bq/kg (dry)] (*1)
Naturally occurring radionuclides	Ac-228	1	1	100.0	42 - 42	20 - 53
	Bi-214	1	1	100.0	26 - 26	4.8 - 31
	K-40	15	15	100.0	97 - 700	33 - 720
Artificial radionuclides	Cs-134	15	3	20.0	ND - 4.4	ND - 35
	Cs-137	15	9	60.0	ND - 13	ND - 76

ND = Not detectable

(*1) Results of the Monitoring of Environmental Radioactivity Levels from FY1994 to FY2013 (excluding data for March 11, 2011 to March 10, 2012)

<ul style="list-style-type: none"> * : Detected value ● : Average (arithmetic average; calculated by assuming ND to be zero) : Range of past measurement records

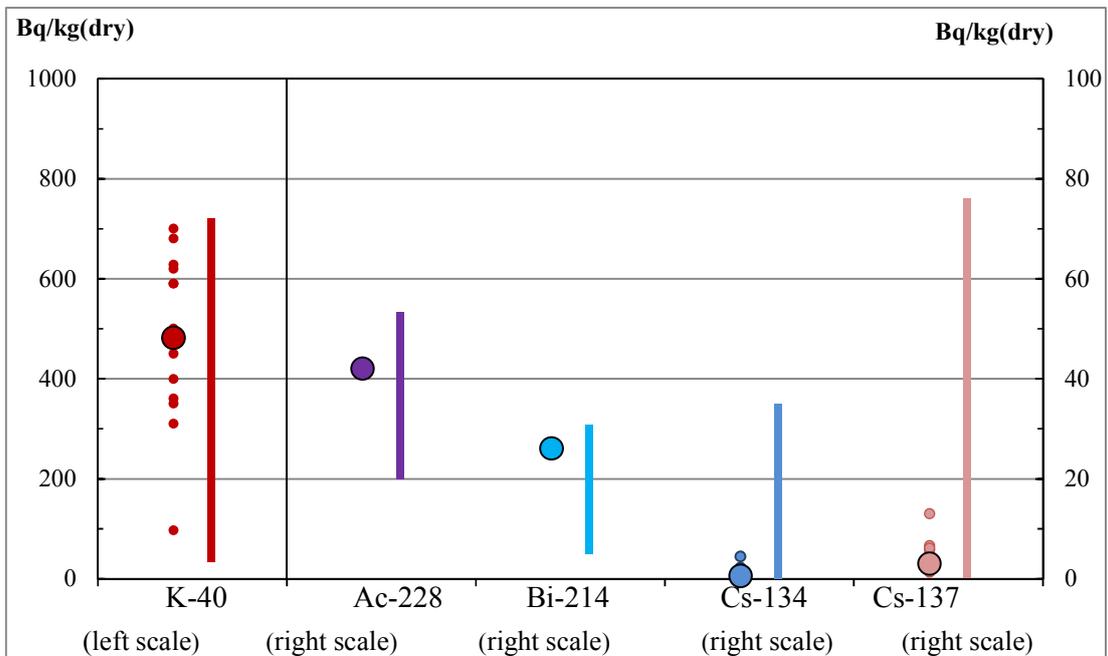


Figure 2.2-2 Detection of radionuclides in the Monitoring of Environmental Radioactivity Levels [Sea sediments]