ISSN 0441-2516
NIRS-RSD 98

RADIOACTIVITY SURVEY DATA in Japan

Part 1
= Environmental Materials =

NUMBER 98
November 1992

National Institute of Radiological Sciences
Chiba, Japan

Radioactivity Survey Data

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Contents

Editted by National Institute of Radiological Sciences, under the supervision of Science and Technology Agency of Japanese Government.

Environmental and Dietary Materials*

(Japan Chemical Analysis Center)

1. Collection and pretreatment of samples

(1) Rain and dry fallout

Rain and dry fallout was collected monthly on a sampling tray, approximately 5000 cm^2 in area, which was filled with water to a depth of 1 cm at the beginning of every month.

Strontium and cesium carrier solutions were added after the sample was filtered. The tray was washed with 5 ℓ of distilled water and the washing was combined to the filtrate.

The sample was passed through a cation exchange column (500 mℓ of Dowex 50W X8, 50～ 100 mesh, Na form) at a rate flow of 80 mℓ/min.

(2) Airborne dust

Airborne dust was collected by an electrostatic precipitator or a filter air sampler for every three months at a rate of more than 3000 m^3 per month. The sampling was done 1 to 1.5 meters above the ground.

(3) Service water and freshwater

Service water, 100 ℓ each, was collected at the intake of the water-treatment plant and at the tap after water was left running for five minutes. Strontium and cesium carriers were added to the filtered water sample. The subsequent process was the same as that described in the section (1). Freshwater was treated in the same way as the service water.

(4) Soil

Soil was collected from the location in the spacious and flat area without past surface disturbance caused by duststorms, inflow and outflow due to precipitation, etc.. Any places located under trees in a forest, in a stony area or inside of river banks were avoided. Soil was taken from two layers of different depths, 0-5cm and 5-20cm. The soil lumps were crushed by hands and dried in a drying oven regulated 105 ℃. The soil was then passed through a 2 mm sieve to remove plant roots and pebbles.

(5) Sea water

Sea water was collected at the fixed stations where the effect of terrestrial fresh water from rivers was expected to be negligibly small. A special consideration was also given to weather conditions. The sampling was carried out when there was no rainfall for the last few days. To prevent contamination, water samples were collected at the bow of a sampling boat just before she stood still by scooping surface water using a polyethylene bucket. Immediately after the collection, the samples were acidified to a pH lower than 3 by adding concentrated hydrochloric acid in a ratio of 1mℓ to 1 ℓ of sea water, and then stored in 20ℓ polyethylene containers. The sampling equipments as well as containers were thoroughly rinsed with dilute hydrochloric acid and then with distilled water before use. Two hundred milliliters of sea water was also collected at the same stations for the determination of chlorinity.

(6) Sea sediments

Sediment was collected in the same area as that for the sea water sample, taking the following criteria into account:

a. The depth of water exceeds 1 m at low tide.
b. No significant sedimental movement is observed in the vicinity of concern.
c. Mud, silt and fine sand are preferable.

A conventional sediment sampling device was used for collecting the top few centimeters of surface sediment. Approximately 4kg of the sample in wet weight was spread on a atenless steel dish after removed of the pebbles, shells and other foreign materials, and dried in a drying oven regulated at 105℃.

(7) Total diet

A full one day ordinary diet including three meals, water, tea and other in-between snacks for five persons was collected as a sample of "total diet". The sample in a large stainless steel pan was carbonized carefully by direct application of gas flame, and was transfered to a porcelain dish and then ashed at 450 ℃ in an electric muffle furnace.

(8) Rice

Polished rice was collected in producing districts at the harvest and in consuming areas when new crops were first put on sale. The sample was carbonized and ashed in a porcelain dish.

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* Samples were sent to the Center from 46 contracted prefectures.

(9) Milk

Raw milk was collected in producing districts and commercial milk was purchased in consuming districts. Milk in a stainless steel pan or a porcelain dish was evaporated to dryness followed by carbonization and ashing.

(10) Vegetables

Spinach and Japanese radish were selected as the representatives for left vegetables and for non-starch roots, respectively. After removing soil, the edible part of vegetable sample was dried and carbonized in a stainless steel pan or a porcelain dish.

(11) Tea

Five hundred grams of manufactured green tea was collected, carbonized and ashed in a stainless steel pan or a porcelain dish.

(12) Fish, shellfish and seaweeds

a. Sea fish and freshwater fish

Fish was rinsed with water and blotted with a filter paper. Only the edible part was used in case of larger sized fish, and the whole part was used in case of smaller ones. Each sample was weighed and placed in a stainless steel pan or a porcelain dish. After carbonized, the sample was ashed in an electric muffle furnace.

b. Shellfish

Approximately 4 kg of shellfish including the shells was collected or purchased. After removing the shells, it was treated in the same way as that for the sea fish.

c. Seaweeds

Edible seaweeds were collected and rinsed with water to remove sand and other adhering matters on the surface. These were removed of excess water, weighed dried and ashed.

Table 1 shows detailes of sample collection.

Table 1 Details of sample collection

Sample	Frequency of sampling	Quantity of sample
=Environmental materials=		
(1) Rain and dry fallout		
1. For domestic program	monthly	
2. For WHO program	monthly	
(2) Airborne dust	quarterly	>3000 m^3/month
(3) Service water and freshwater		
1. Service water (source water)	semiyearly	100 ℓ
2. Service water (tap water)	semiyearly	100 ℓ
3. Freshwater	yearly (fishing season)	100 ℓ
(4) Soil		
1. 0～ 5 cm	yearly	4 kg
2. 5～ 20cm	yearly	4 kg
(5) Sea water	yearly	40 ℓ
(6) Sea sediments	yearly	4 kg
=Dietary materials=		
(7) Total diet	semiyearly	daily amount for 5 persons
(8) Rice		
1. Producing districts	yearly (harvesting season)	5 kg (polished rice)
2. Consuming districts	yaerly (harvesting season)	5 kg (polished rice)
(9) Milk		
1. Producing districts for WHO program	quarterly (February, May, August and November)	3 ℓ
2. Producing districts for domestic program	semiyearly (February and August)	3 ℓ

Sample	Frequency of sampling	Quantity of sample
3. Consuming districts	semiyearly (February and August)	3 ℓ
4. Powdered milk	semiyearly (April and October)	2～ 3 kg
(10) Vegetables		
1. Producing districts	yearly (harvesting season)	4 kg
2. Consuming districts	yearly (harvesting season)	4 kg
(11) Tea	yearly (the first harvesting season)	500g (manufactured tea)
(12) Fish, shellfish and seaweeds		
1. Sea fish	yearly (fishing season)	4 kg
2. Freshwater fish	yearly (fishing season)	4 kg
3. Shellfish	yearly (fishing season)	4 kg
4. Seaweeds	yearly (fishing season)	2～ 3 kg

2. Preparation of samples for analysis

(1) Rain, service water and freshwater

Strontium and cesium were eluted with hydrochloric acid from the cation exchange column. The residue of rain sample on the filter paper was ashed in an electric muffle furnace and the ash was dissolved in hydrochloric acid. The insoluble part was filtered and washed. The filtrate and the washings were combined to the previous eluate and used for radiochemical analysis.

(2) Soil and Sea sediment

Dried soil was crushed to smaller ones than 0.25 mm in size by a crusher. The sieved sample was ashed in an electric muffle furnace regulated at 450℃. The sample was then heated with hydrochloric acid, strontium and cesium carrier solutions and the mixture was heated. The insoluble constituent was filtered off and washed with water.

The dried sample was crushed to smaller ones than 0.25 mm by a crushing machine. The further preparation of the sample was the same as that described in the section 2-(2).

(3) Rice

The ashed sample was pulverized with a porcelain mortar and passed through a 0.35 mm sieve. The sieved sample to which both strontium and cesium carriers were added, was digested with nitric acid by heating. After the sample was heated again with nitric acid to dryness, strontium and cesium were extracted with hydrochloric acid and water. The insoluble constituent was filtered and washed. The filtrate and washings were combined for subsequent radiochemical analysis.

(4) Airborne dust, diet, milk, vegetables, fish and shellfish, seaweeds, tea and others

These ashed samples were treated with the same procedure as that described in the section 2-(4).

3. Separation of strontium-90 and cesium-137

(1) Strontium-90

Sample solutions, prepared as in the foregoing sections 2-(1) through 2-(4), were neutralized with sodium hydroxide. After sodium carbonate was added, the precipitate of strontium and calcium carbonates was separated. The supernatant solution was retained for cesium-137 determination. The carbonates were dissolved in hydrochloric acid and stroncium and calcium were precipitated as oxalates. The precipitate was dissolved in nitric acid and strontium was separated from calcium by successive fuming nitric acid separation. Iron scavenge was made after addition of ferric iron carrier followed by barium chromate separation after addition of barium carrier to remove radium, its daughters and lead. Strontium was recovered as carbonate, and the precipitate was dried and weighed to determine strontium recovery. The strontium carbonate was dissolved in hydrochloric acid and iron carrier was added. The solution was allowed to stand for two weeks for strontium-90 and yttrium-90 to attain equilibrium. Yttrium-90 was coprecipitated with ferric hydroxide and the precipitate was filtered off, washed and counted.

(2) Cesium-137

The supernatant separated from the strontium fraction was acidified with hydrochloric acid. While stirring, cesium was adsorbed on the ammonium molyb-

dophosphate added.

After filtered off and washed with hydrochlotric acid the precipitate was dissolved in 2.5N sodium hydroxide solution. The solution was adjusted to pH 8.2 with hydrochloric acid and allowed to cool. Resultant molybdenum hydroxide which separated out in the solution, was filtered off and washed with water. EDTA was added to the filtrate and washings. Cesium and rubidium were adsorbed on a cation exchange column and cesium was separated from rubidium by eluting with hydrochloric acid.

The eluate was evaporated to dryness and was dissolved. The solution was filtered. Chloroplatinic acid was added to precipitate cesium. The precipitate was filtered onto a tared paper using a demountable filter and washed with water and then ethanol. After drying, the chemical yield of cesium was determined by weighing the precipitate. Cesium-137 radioactivity was measured for this precipitate.

4. Determination of stable strontium, calcium and potassium

A weighed amount of soil or sea sediment was heated in a electric muffle furnace at 450 ℃ and then treated with hydrochloric acid for extraction. A weighed aliquot of ashed samples of total diet, vegetables, milk, fish, shellfish or seaweeds was digested with hydrofluoric acid and nitric acid.
The extract was made up to an appropriate volume with dilute hydrochloric acid. The sample solution was analyzed for calcium by titration with standard potassium permanganate solution after separating calcium as oxalate. Atomic absorption spectroscopy was applied when appropriate. Stable strontium and potassium were determined by atomic absorption and flame emission spectrometry, respectively.

5. Counting

After the radiochemical separation the mounted precipitates were counted for activity using low background beta counters normally for 60 to 90 min. Net sample counting rates were corrected for counter efficiency, recovery, self-absorption and decay to obtain the content of strontium-90 and cesium-137 per sample aliquot. From the results, concentrations of these nuclides in the original samples were calculated.

6. Results

(1)-1 Strontium-90 and Cesium-137 in Rain and Dry Fallout(for domestic program)
(from Apr. 1991 to Dec. 1991)

-continued from NO. 96 of this publication-

Table (1)-1: Strontium-90 and Cesium-137 in Rain and Dry Fallout

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
April, 1991				
Sapporo, HOKKAIDO	31	69.5	0.029 ±0.0087	0.033 ±0.018
Aomori, AOMORI	33	56.0	0.077 ±0.020	0.070 ±0.017
Onagawa-machi, MIYAGI	31	52.3	0.021 ±0.0096	0.067 ±0.019
Morioka, IWATE	31	70.7	0.028 ±0.017	0.061 ±0.019
Yamagata, YAMAGATA	31	18.2	0.018 ±0.0078	0.060 ±0.020
Ookuma-machi, FUKUSHIMA	31	59.0	0.000 ±0.015	0.068 ±0.021
Mito, IBARAKI	31	70.5	0.014 ±0.018	0.10 ±0.022
Ichihara, CHIBA	31	166.5	0.024 ±0.018	0.071 ±0.019
Shinjyuku, TOKYO	31	107.1	0.024 ±0.0089	0.020 ±0.018
Yokohama, KANAGAWA	32	181.6	0.026 ±0.019	0.14 ±0.024
Maebashi, GUNMA	31	99.5	0.000 ±0.018	0.082 ±0.021
Utsunomiya, TOCHIGI	31	75.5	0.037 ±0.0085	0.019 ±0.017
Kosugi-machi, TOYAMA	31	104.3	0.011 ±0.017	0.069 ±0.019
Fukui, FUKUI	31	122.3	0.000 ±0.085	0.13 ±0.081
Koufu, YAMANASHI	31	91.5	0.022 ±0.018	0.018 ±0.016
Shizuoka, SHIZUOKA	31	210.0	0.012 ±0.021	0.029 ±0.017
Gifu, GIFU	31	128.0	0.018 ±0.019	0.032 ±0.017
Nagoya, AICHI	31	125.0	0.011 ±0.019	0.025 ±0.017
Tsu, MIE	31	188.0	0.000 ±0.020	0.14 ±0.024
Ootsu, SHIGA	31	202.7	0.029 ±0.0089	0.044 ±0.017
Kyoto, KYOTO	30	166.0	0.052 ±0.014	0.018 ±0.017
Kobe, HYOGO	32	159.9	0.014 ±0.022	0.095 ±0.021
Nara, NARA	31	191.9	0.033 ±0.020	0.011 ±0.015
Wakayama, WAKAYAMA	32	168.1	0.022 ±0.018	0.006 ±0.016
Tottori, TOTTORI	32	140.6	0.073 ±0.026	0.045 ±0.015
Matsue, SHIMANE	31	118.7	0.028 ±0.0091	0.023 ±0.011
Hiroshima, HIROSHIMA	32	191.0	0.000 ±0.017	0.037 ±0.017
Matsuyama, EHIME	31	136.5	0.016 ±0.0078	0.012 ±0.017
Ishii-machi, TOKUSHIMA	31	225.0	0.013 ±0.021	0.018 ±0.020
Takamatsu, KAGAWA	31	190.0	0.041 ±0.0098	0.034 ±0.016
Dazaifu, FUKUOKA	31	206.2	0.004 ±0.023	0.003 ±0.013
Saga, SAGA	31	146.1	0.000 ±0.021	0.005 ±0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Nagasaki, NAGASAKI	31	138.5	0.016 ±0.024	0.030 ±0.018
Ooita, OOITA	31	180.3	0.000 ±0.029	0.014 ±0.012
Kumamoto, KUMAMOTO	31	138.2	0.000 ±0.020	0.000 ±0.013
Miyazaki, MIYAZAKI	31	227.8	0.018 ±0.018	0.032 ±0.013
Yonagusuku-mura, OKINAWA	30	136.0	0.024 ±0.0078	0.003 ±0.015
May, 1991				
Sapporo, HOKKAIDO	32	27.0	0.016 ±0.016	0.047 ±0.020
Aomori, AOMORI	32	28.0	0.010 ±0.012	0.034 ±0.015
Onagawa-machi, MIYAGI	34	64.5	0.024 ±0.018	0.10 ±0.021
Morioka, IWATE	32	68.4	0.041 ±0.018	0.056 ±0.020
Ookuma-machi, FUKUSHIMA	32	35.2	0.012 ±0.018	0.055 ±0.019
Mito, IBARAKI	32	85.0	0.009 ±0.018	0.018 ±0.016
Ichihara, CHIBA	32	75.0	0.014 ±0.014	0.025 ±0.018
Shinjyuku, TOKYO	34	79.2	0.004 ±0.021	0.000 ±0.015
Yokohama, KANAGAWA	32	41.4	0.066 ±0.0099	0.065 ±0.018
Maebashi, GUNMA	32	52.0	0.031 ±0.017	0.035 ±0.018
Utsunomiya, TOCHIGI	32	71.8	0.020 ±0.013	0.034 ±0.018
Kosugi-machi, TOYAMA	32	71.5	0.027 ±0.019	0.070 ±0.020
Fukui, FUKUI	32	71.7	0.042 ±0.099	0.11 ±0.089
Koufu, YAMANASHI	32	44.0	0.014 ±0.017	0.047 ±0.020
Shizuoka, SHIZUOKA	33	123.0	0.007 ±0.019	0.052 ±0.019
Gifu, GIFU	32	158.5	0.013 ±0.013	0.033 ±0.018
Nagoya, AICHI	32	109.5	0.000 ±0.017	0.021 ±0.015
Tsu, MIE	32	147.0	0.000 ±0.017	0.12 ±0.022
Ootsu, SHIGA	32	71.8	0.019 ±0.0090	0.039 ±0.015
Kyoto, KYOTO	32	110.5	0.024 ±0.012	0.051 ±0.019
Kobe, HYOGO	32	97.4	0.025 ±0.0089	0.075 ±0.018
Nara, NARA	32	111.1	0.000 ±0.019	0.046 ±0.021
Wakayama, WAKAYAMA	32	137.3	0.014 ±0.017	0.029 ±0.016
Tottori, TOTTORI	31	86.5	0.053 ±0.022	0.057 ±0.015
Matsue, SHIMANE	32	90.3	0.032 ±0.010	0.055 ±0.013
Hiroshima, HIROSHIMA	32	101.5	0.037 ±0.020	0.014 ±0.015
Matsuyama, EHIME	32	136.5	0.016 ±0.013	0.030 ±0.013
Ishii-machi, TOKUSHIMA	32	124.0	0.011 ±0.018	0.024 ±0.016
Takamatsu, KAGAWA	32	117.0	0.027 ±0.0083	0.012 ±0.018
Dazaifu, FUKUOKA	34	220.5	0.028 ±0.018	0.051 ±0.020
Saga, SAGA	37	257.7	0.027 ±0.0078	0.028 ±0.015
Nagasaki, NAGASAKI	32	265.0	0.019 ±0.019	0.026 ±0.014
Kumamoto, KUMAMOTO	32	240.7	0.011 ±0.0079	0.005 ±0.016
Ooita, OOITA	32	234.7	0.000 ±0.027	0.021 ±0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Miyazaki, MIYAZAKI	32	446.7	0.047 ±0.019	0.076 ±0.017
Yonagusuku-mura, OKINAWA	32	21.0	0.024 ±0.0084	0.008 ±0.016
June, 1991				
Sapporo, HOKKAIDO	31	18.5	0.027 ±0.017	0.025 ±0.019
Aomori, AOMORI	31	92.5	0.029 ±0.013	0.000 ±0.011
Onagawa-machi, MIYAGI	29	109.5	0.0020±0.0094	0.035 ±0.020
Morioka, IWATE	31	128.4	0.013 ±0.017	0.000 ±0.015
Yamagata, YAMAGATA	31	102.9	0.009 ±0.018	0.020 ±0.017
Ookuma-machi, FUKUSHIMA	31	255.8	0.013 ±0.019	0.16 ±0.025
Mito, IBARAKI	31	191.5	0.028 ±0.017	0.032 ±0.016
Ichihara, CHIBA	31	188.3	0.042 ±0.015	0.002 ±0.017
Shinjyuku, TOKYO	29	140.5	0.016 ±0.014	0.000 ±0.011
Yokohama, KANAGAWA	32	159.6	0.036 ±0.0094	0.11 ±0.022
Maebashi, GUNMA	31	111.5	0.0000±0.0067	0.037 ±0.018
Utsunomiya, TOCHIGI	31	226.8	0.012 ±0.017	0.046 ±0.019
Kosugi-machi, TOYAMA	31	371.7	0.008 ±0.018	0.041 ±0.017
Fukui, FUKUI	31	276.4	0.027 ±0.064	0.12 ±0.080
Koufu, YAMANASHI	31	130.5	0.000 ±0.016	0.000 ±0.015
Shizuoka, SHIZUOKA	29	313.5	0.018 ±0.0076	0.000 ±0.016
Gifu, GIFU	31	357.5	0.031 ±0.015	0.015 ±0.019
Nagoya, AICHI	31	285.2	0.020 ±0.0082	0.021 ±0.012
Tsu, MIE	31	274.0	0.001 ±0.022	0.053 ±0.018
Ootsu, SHIGA	31	363.2	0.018 ±0.012	0.000 ±0.011
Kyoto, KYOTO	29	218.0	0.036 ±0.013	0.041 ±0.018
Kobe, HYOGO	29	185.3	0.011 ±0.0079	0.021 ±0.016
Nara, NARA	31	344.9	0.027 ±0.020	0.003 ±0.011
Wakayama, WAKAYAMA	31	254.7	0.027 ±0.020	0.087 ±0.022
Tottori, TOTTORI	31	204.0	0.10 ±0.026	0.028 ±0.012
Matsue, SHIMANE	31	274.7	0.032 ±0.010	0.037 ±0.012
Hiroshima, HIROSHIMA	32	241.8	0.000 ±0.018	0.008 ±0.018
Matsuyama, EHIME	31	270.5	0.017 ±0.014	0.000 ±0.016
Ishii-machi, TOKUSHIMA	31	171.0	0.015 ±0.024	0.069 ±0.020
Takamatsu, KAGAWA	31	151.5	0.015 ±0.014	0.0000±0.0096
Dazaifu, FUKUOKA	29	423.5	0.002 ±0.017	0.000 ±0.016
Saga, SAGA	26	503.4	0.000 ±0.018	0.008 ±0.016
Nagasaki, NAGASAKI	31	377.0	0.060 ±0.028	0.013 ±0.014
Kumamoto, KUMAMOTO	31	700.6	0.11 ±0.029	0.38 ±0.034
Ooita, OOITA	31	423.6	0.000 ±0.027	0.0000±0.0095
Miyazaki, MIYAZAKI	31	425.6	0.061 ±0.022	0.021 ±0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Yonagusuku-mura, OKINAWA	32	41.0	0.000 ±0.018	0.000 ±0.015
July, 1991				
Sapporo, HOKKAIDO	32	89.5	0.000 ±0.017	0.025 ±0.017
Aomori, AOMORI	32	180.0	0.044 ±0.0094	0.054 ±0.020
Onagawa-machi, MIYAGI	32	215.0	0.012 ±0.0095	0.037 ±0.019
Morioka, IWATE	32	332.1	0.029 ±0.018	0.023 ±0.011
Yamagata, YAMAGATA	32	312.8	0.025 ±0.0089	0.000 ±0.015
Ookuma-machi, FUKUSHIMA	32	307.9	0.017 ±0.016	0.13 ±0.024
Mito, IBARAKI	32	89.0	0.043 ±0.020	0.004 ±0.015
Ichihara, CHIBA	32	102.3	0.001 ±0.013	0.034 ±0.018
Shinjyuku, TOKYO	32	102.2	0.036 ±0.015	0.010 ±0.012
Yokohama, KANAGAWA	31	111.2	0.033 ±0.019	0.095 ±0.022
Maebashi, GUNMA	32	119.0	0.017 ±0.0085	0.028 ±0.018
Utsunomiya, TOCHIGI	32	207.6	0.0097±0.0073	0.005 ±0.012
Kosugi-machi, TOYAMA	32	325.7	0.019 ±0.016	0.047 ±0.018
Fukui, FUKUI	32	308.8	0.000 ±0.089	0.000 ±0.083
Koufu, YAMANASHI	32	80.5	0.016 ±0.017	0.006 ±0.016
Shizuoka, SHIZUOKA	32	219.0	0.016 ±0.0075	0.027 ±0.018
Gifu, GIFU	32	280.4	0.010 ±0.014	0.016 ±0.018
Nagoya, AICHI	32	282.4	0.015 ±0.0074	0.001 ±0.017
Tsu, MIE	32	231.5	0.023 ±0.019	0.17 ±0.027
Ootsu, SHIGA	32	315.7	0.037 ±0.035	0.000 ±0.011
Kobe, HYOGO	34	138.8	0.008 ±0.018	0.000 ±0.017
Nara, NARA	32	209.0	0.016 ±0.014	0.000 ±0.017
Wakayama, WAKAYAMA	32	134.5	0.000 ±0.017	0.010 ±0.018
Tottori, TOTTORI	32	194.5	0.096 ±0.019	0.20 ±0.028
Hiroshima, HIROSHIMA	31	392.3	0.000 ±0.017	0.000 ±0.018
Matsuyama, EHIME	32	242.5	0.046 ±0.016	0.021 ±0.013
Ishii-machi, TOKUSHIMA	33	103.0	0.020 ±0.013	0.009 ±0.017
Takamatsu, KAGAWA	32	166.0	0.008 ±0.013	0.011 ±0.012
Dazaifu, FUKUOKA	32	624.6	0.000 ±0.017	0.039 ±0.020
Saga, SAGA	32	435.7	0.000 ±0.015	0.028 ±0.016
Nagasaki, NAGASAKI	32	338.0	0.000 ±0.018	0.000 ±0.012
Kumamoto, KUMAMOTO	32	269.0	0.004 ±0.017	0.030 ±0.017
Ooita, OOITA	32	212.6	0.000 ±0.027	0.000 ±0.012
Yonagusuku-mura, OKINAWA	31	316.5	0.0061±0.0071	0.000 ±0.010
August, 1991				
Sapporo, HOKKAIDO	33	102.5	0.000 ±0.028	0.000 ±0.011
Aomori, AOMORI	33	120.0	0.030 ±0.0095	0.022 ±0.017

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Onagawa-machi, MIYAGI	33	210.5	0.0000±0.0075	0.019 ±0.017
Morioka, IWATE	33	232.4	0.018 ±0.018	0.002 ±0.011
Yamagata, YAMAGATA	33	192.6	0.005 ±0.012	0.005 ±0.013
Ookuma-machi, FUKUSHIMA	33	503.6	0.000 ±0.016	0.028 ±0.018
Mito, IBARAKI	33	185.0	0.0095±0.0071	0.018 ±0.012
Ichihara, CHIBA	33	193.1	0.055 ±0.017	0.024 ±0.017
Shinjyuku, TOKYO	33	289.4	0.023 ±0.021	0.000 ±0.015
Yokohama, KANAGAWA	34	229.9	0.036 ±0.0089	0.007 ±0.012
Maebashi, GUNMA	33	316.5	0.013 ±0.0069	0.022 ±0.017
Utsunomiya, TOCHIGI	33	325.1	0.008 ±0.030	0.023 ±0.011
Kosugi-machi, TOYAMA	33	185.4	0.000 ±0.016	0.001 ±0.016
Fukui, FUKUI	33	150.0	0.06 ±0.11	0.000 ±0.078
Koufu, YAMANASHI	33	329.0	0.0064±0.0076	0.003 ±0.011
Shizuoka, SHIZUOKA	33	176.0	0.006 ±0.015	0.027 ±0.017
Gifu, GIFU	33	158.5	0.024 ±0.028	0.019 ±0.016
Nagoya, AICHI	33	187.2	0.015 ±0.0081	0.016 ±0.017
Tsu, MIE	33	144.5	0.020 ±0.017	0.13 ±0.025
Ootsu, SHIGA	32	8.4	0.000 ±0.014	0.000 ±0.010
Kobe, HYOGO	32	24.6	0.022 ±0.014	0.000 ±0.011
Nara, NARA	33	56.0	0.012 ±0.015	0.000 ±0.016
Wakayama, WAKAYAMA	32	95.0	0.000 ±0.018	0.000 ±0.018
Tottori, TOTTORI	33	69.0	0.059 ±0.015	0.006 ±0.015
Hiroshima, HIROSHIMA	32	48.6	0.0028±0.0075	0.012 ±0.012
Matsuyama, EHIME	33	39.0	0.004 ±0.028	0.000 ±0.016
Ishii-machi, TOKUSHIMA	32	52.0	0.047 ±0.049	0.006 ±0.016
Takamatsu, KAGAWA	32	51.0	0.020 ±0.013	0.001 ±0.012
Dazaifu, FUKUOKA	33	148.6	0.019 ±0.014	0.002 ±0.010
Saga, SAGA	33	202.5	0.026 ±0.015	0.032 ±0.013
Kumamoto, KUMAMOTO	33	128.1	0.0000±0.0079	0.010 ±0.016
Yonagusuku-mura, OKINAWA	34	89.5	0.018 ±0.0087	0.013 ±0.013
September, 1991				
Sapporo, HOKKAIDO	30	58.5	0.007 ±0.029	0.025 ±0.014
Aomori, AOMORI	29	89.5	0.034 ±0.012	0.051 ±0.019
Morioka, IWATE	30	136.0	0.023 ±0.0086	0.014 ±0.012
Yamagata, YAMAGATA	30	108.2	0.008 ±0.031	0.000 ±0.011
Ookuma-machi, FUKUSHIMA	30	550.0	0.013 ±0.0079	0.043 ±0.019
Ichihara, CHIBA	30	360.2	0.000 ±0.014	0.000 ±0.016
Shinjyuku, TOKYO	30	513.4	0.014 ±0.0091	0.007 ±0.016
Yokohama, KANAGAWA	29	567.2	0.039 ±0.015	0.031 ±0.012
Maebashi, GUNMA	30	205.0	0.012 ±0.0065	0.017 ±0.017

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Kosugi-machi, TOYAMA	30	172.8	0.010 ±0.018	0.099 ±0.022
Fukui, FUKUI	36	200.0	0.082 ±0.077	0.000 ±0.057
Koufu, YAMANASHI	30	306.0	0.0000±0.0068	0.006 ±0.010
Shizuoka, SHIZUOKA	30	577.0	0.000 ±0.014	0.022 ±0.017
Gifu, GIFU	30	202.0	0.013 ±0.017	0.011 ±0.016
Nagoya, AICHI	30	370.8	0.007 ±0.013	0.013 ±0.016
Tsu, MIE	30	321.0	0.057 ±0.016	0.057 ±0.022
Kobe, HYOGO	31	79.9	0.013 ±0.016	0.001 ±0.018
Nara, NARA	30	144.9	0.009 ±0.016	0.021 ±0.018
Wakayama, WAKAYAMA	31	174.8	0.001 ±0.017	0.040 ±0.023
Tottori, TOTTORI	30	103.8	0.18 ±0.023	0.013 ±0.016
Hiroshima, HIROSHIMA	31	64.1	0.037 ±0.014	0.024 ±0.017
Matsuyama, EHIME	30	94.5	0.023 ±0.027	0.029 ±0.019
Ishii-machi, TOKUSHIMA	30	280.0	0.042 ±0.028	0.027 ±0.017
Takamatsu, KAGAWA	31	112.0	0.001 ±0.017	0.044 ±0.019
Dazaifu, FUKUOKA	30	135.9	0.042 ±0.015	0.11 ±0.023
Saga, SAGA	30	121.2	0.000 ±0.026	0.051 ±0.015
Kumamoto, KUMAMOTO	30	153.2	0.030 ±0.0093	0.049 ±0.019
Yonagusuku-mura, OKINAWA	29	332.5	0.025 ±0.0086	0.038 ±0.014
October, 1991				
Sapporo, HOKKAIDO	32	83.5	0.027 ±0.0090	0.007 ±0.011
Morioka, IWATE	32	174.0	0.011 ±0.0078	0.008 ±0.011
Yamagata, YAMAGATA	32	273.2	0.0082±0.0074	0.032 ±0.016
Ookuma-machi, FUKUSHIMA	36	586.6	0.035 ±0.0097	0.000 ±0.017
Mito, IBARAKI	32	440.0	0.019 ±0.012	0.047 ±0.018
Ichihara, CHIBA	32	729.2	0.021 ±0.015	0.016 ±0.017
Yokohama, KANAGAWA	32	576.0	0.033 ±0.0091	0.034 ±0.014
Kosugi-machi, TOYAMA	32	193.4	0.017 ±0.018	0.021 ±0.017
Fukui, FUKUI	26	83.6	0.035 ±0.040	0.007 ±0.060
Koufu, YAMANASHI	32	335.0	0.013 ±0.0083	0.027 ±0.012
Shizuoka, SHIZUOKA	32	428.2	0.015 ±0.0085	0.009 ±0.012
Gifu, GIFU	32	244.0	0.0000±0.0090	0.000 ±0.015
Nagoya, AICHI	32	194.2	0.005 ±0.014	0.034 ±0.018
Tsu, MIE	32	225.0	0.017 ±0.0082	0.013 ±0.012
Kobe, HYOGO	32	174.4	0.0039±0.0076	0.001 ±0.012
Nara, NARA	32	364.5	0.000 ±0.017	0.000 ±0.015
Wakayama, WAKAYAMA	32	196.0	0.026 ±0.018	0.093 ±0.024
Hiroshima, HIROSHIMA	33	55.1	0.013 ±0.0073	0.021 ±0.019
Takamatsu, KAGAWA	32	49.5	0.000 ±0.015	0.007 ±0.015
Dazaifu, FUKUOKA	32	75.5	0.023 ±0.0093	0.014 ±0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Saga, SAGA	32	4.2	0.0088±0.0079	0.000 ±0.010
Kumamoto, KUMAMOTO	32	21.0	0.0000±0.0075	0.000 ±0.011
Yonagusuku-mura, OKINAWA	32	88.5	0.0044±0.0077	0.000 ±0.012
November, 1991				
Morioka, IWATE	32	79.2	0.035 ±0.012	0.016 ±0.016
Yamagata, YAMAGATA	32	76.9	0.011 ±0.0078	0.000 ±0.015
Ookuma-machi, FUKUSHIMA	27	59.1	0.026 ±0.0072	0.041 ±0.018
Mito, IBARAKI	32	101.0	0.027 ±0.018	0.023 ±0.018
Yokohama, KANAGAWA	31	138.0	0.017 ±0.0073	0.022 ±0.013
Kosugi-machi, TOYAMA	32	215.6	0.054 ±0.022	0.044 ±0.018
Fukui, FUKUI	32	211.3	0.096 ±0.041	0.056 ±0.056
Shizuoka, SHIZUOKA	32	125.0	0.027 ±0.0086	0.013 ±0.016
Gifu, GIFU	32	96.0	0.031 ±0.025	0.014 ±0.018
Nagoya, AICHI	32	122.2	0.016 ±0.022	0.000 ±0.019
Tsu, MIE	32	118.0	0.000 ±0.012	0.051 ±0.019
Kobe, HYOGO	31	75.5	0.001 ±0.013	0.000 ±0.015
Nara, NARA	32	158.2	0.041 ±0.020	0.052 ±0.020
Wakayama, WAKAYAMA	32	37.5	0.027 ±0.021	0.11 ±0.026
Takamatsu, KAGAWA	32	42.0	0.004 ±0.017	0.037 ±0.017
Dazaifu, FUKUOKA	32	76.0	0.011 ±0.019	0.047 ±0.017
Saga, SAGA	32	28.1	0.019 ±0.0091	0.000 ±0.011
Kumamoto, KUMAMOTO	32	94.5	0.011 ±0.018	0.013 ±0.015
December, 1991				
Morioka, IWATE	34	74.9	0.028 ±0.012	0.011 ±0.016
Yamagata, YAMAGATA	34	28.1	0.024 ±0.013	0.058 ±0.019
Mito, IBARAKI	36	28.0	0.020 ±0.018	0.006 ±0.016
Yokohama, KANAGAWA	28	33.8	0.050 ±0.023	0.036 ±0.019
Kosugi-machi, TOYAMA	36	180.3	0.011 ±0.020	0.059 ±0.020
Gifu, GIFU	34	84.0	0.046 ±0.051	0.000 ±0.014
Saga, SAGA	36	16.8	0.0071±0.0071	0.028 ±0.016

(1)-2 Strontium-90 and Cesium-137 in Rain and Dry Fallout(for WHO program)
(from Apr. 1991 to Dec. 1991)

-continued from NO. 96 of this publication-

Table (1)-2: Strontium-90 and Cesium-137 in Rain and Dry Fallout

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
April, 1991				
Akita, AKITA	31	122.2	0.030 ± 0.0085	0.026 ± 0.017
Chiba, CHIBA	37	109.7	0.040 ± 0.028	0.084 ± 0.016
Nigata, NIIGATA	31	58.3	0.20 ± 0.022	0.010 ± 0.018
Kanazawa, ISHIKAWA	31	127.0	0.020 ± 0.014	0.056 ± 0.017
Nagano, NAGANO	31	85.6	0.018 ± 0.0076	0.006 ± 0.016
Osaka, OSAKA	33	173.2	0.038 ± 0.025	0.018 ± 0.016
Okayama, OKAYAMA	31	181.7	0.019 ± 0.025	0.056 ± 0.019
Yamaguchi, YAMAGUCHI	31	200.0	0.016 ± 0.0083	0.018 ± 0.017
Kochi, KOCHI	30	328.5	0.073 ± 0.019	0.060 ± 0.019
Kagoshima, KAGOSHIMA	33	111.0	0.049 ± 0.018	0.053 ± 0.020
May, 1991				
Akita, AKITA	32	126.3	0.031 ± 0.018	0.040 ± 0.017
Chiba, CHIBA	25	67.1	0.017 ± 0.022	0.027 ± 0.010
Niigata, NIIGATA	32	66.5	0.38 ± 0.029	0.086 ± 0.021
Kanazawa, ISHIKAWA	32	90.0	0.054 ± 0.016	0.036 ± 0.014
Nagano, NAGANO	32	15.4	0.017 ± 0.081	0.028 ± 0.015
Osaka, OSAKA	32	97.7	0.033 ± 0.0085	0.014 ± 0.015
Okayama, OKAYAMA	32	101.9	0.014 ± 0.0068	0.020 ± 0.017
Yamaguchi, YAMAGUCHI	33	163.5	0.031 ± 0.023	0.032 ± 0.017
Kochi, KOCHI	32	293.4	0.077 ± 0.025	0.051 ± 0.018
Kagoshima, KAGOSHIMA	33	246.0	0.085 ± 0.020	0.066 ± 0.021
June, 1991				
Akita, AKITA	31	174.0	0.000 ± 0.028	0.000 ± 0.013
Chiba, CHIBA	29	133.8	0.044 ± 0.024	0.050 ± 0.013
Kanazawa, ISHIKAWA	31	353.0	0.052 ± 0.016	0.008 ± 0.010
Nagano, NAGANO	31	127.6	0.037 ± 0.021	0.045 ± 0.019
Osaka, OSAKA	32	288.8	0.034 ± 0.026	0.033 ± 0.016
Okayama, OKAYAMA	31	197.9	0.017 ± 0.0079	0.000 ± 0.017
Yamaguchi, YAMAGUCHI	31	224.5	0.056 ± 0.025	0.002 ± 0.011
Kochi, KOCHI	31	404.3	0.063 ± 0.020	0.082 ± 0.019
Kagoshima, KAGOSHIMA	29	394.5	0.024 ± 0.021	0.019 ± 0.018
July, 1991				
Akita, AKITA	32	451.9	0.011 ± 0.030	0.005 ± 0.013
Chiba, CHIBA	36	98.6	0.000 ± 0.026	0.018 ± 0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Kanazawa, ISHIKAWA	32	296.0	0.003 ± 0.015	0.022 ± 0.013
Nagano, NAGANO	32	150.5	0.000 ± 0.017	0.000 ± 0.018
Osaka, OSAKA	31	170.6	0.0038 ± 0.0081	0.000 ± 0.016
Okayama, OKAYAMA	32	167.9	0.008 ± 0.017	0.049 ± 0.019
Yamaguchi, YAMAGUCHI	32	414.5	0.015 ± 0.0088	0.000 ± 0.011
Kochi, KOCHI	31	259.6	0.066 ± 0.021	0.010 ± 0.013
Kagoshima, KAGOSHIMA	33	248.0	0.0035 ± 0.0076	0.000 ± 0.018
August, 1991				
Akita, AKITA	33	164.8	0.011 ± 0.0078	0.000 ± 0.011
Chiba, CHIBA	32	110.6	0.0038 ± 0.0084	0.000 ± 0.014
Kanazawa, ISHIKAWA	33	176.5	0.012 ± 0.015	0.020 ± 0.012
Nagano, NAGANO	33	99.1	0.000 ± 0.013	0.000 ± 0.011
Osaka, OSAKA	34	41.7	0.044 ± 0.015	0.023 ± 0.013
Okayama, OKAYAMA	33	61.9	0.023 ± 0.013	0.022 ± 0.014
Yamaguchi, YAMAGUCHI	33	150.0	0.058 ± 0.021	0.000 ± 0.015
Kochi, KOCHI	34	199.0	0.057 ± 0.019	0.011 ± 0.021
Kagoshima, KAGOSHIMA	31	256.0	0.046 ± 0.011	0.053 ± 0.021
Sptember, 1991				
Akita, AKITA	30	157.4	0.044 ± 0.010	0.080 ± 0.018
Chiba, CHIBA	29	368.1	0.014 ± 0.0092	0.016 ± 0.014
Nagano, NAGANO	30	143.5	0.019 ± 0.0077	0.000 ± 0.015
Osaka, OSAKA	29	103.2	0.0006 ± 0.0075	0.000 ± 0.011
Okayama, OKAYAMA	30	86.9	0.035 ± 0.013	0.073 ± 0.021
Yamaguchi, YAMAGUCHI	30	259.0	0.043 ± 0.0099	0.064 ± 0.019
Kochi, KOCHI	30	461.8	0.069 ± 0.012	0.016 ± 0.013
Kagoshima, KAGOSHIMA	33	256.0	0.042 ± 0.0093	0.036 ± 0.019
October, 1991				
Akita, AKITA	32	239.4	0.0076 ± 0.0078	0.030 ± 0.013
Chiba, CHIBA	33	625.5	0.012 ± 0.011	0.009 ± 0.013
Nagano, NAGANO	32	215.0	0.016 ± 0.0081	0.000 ± 0.015
Osaka, OSAKA	32	333.3	0.015 ± 0.0080	0.010 ± 0.016
Okayama, OKAYAMA	32	19.8	0.029 ± 0.0082	0.022 ± 0.016
Yamaguchi, YAMAGUCHI	32	6.0	0.0000 ± 0.0079	0.000 ± 0.010
Kochi, KOCHI	32	59.2	0.069 ± 0.013	0.014 ± 0.013
Kagoshima, KAGOSHIMA	31	50.0	0.027 ± 0.0083	0.026 ± 0.018
November, 1991				
Akita, AKITA	32	260.2	0.045 ± 0.010	0.056 ± 0.019
Chiba, CHIBA	32	134.2	0.020 ± 0.0094	0.006 ± 0.014
Nagano, NAGANO	32	45.2	0.032 ± 0.0091	0.016 ± 0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Osaka, OSAKA	33	110.7	0.021 ± 0.0085	0.000 ± 0.013
Okayama, OKAYAMA	32	49.7	0.0039 ± 0.0068	0.020 ± 0.012
Kochi, KOCHI	32	88.9	0.11 ± 0.013	0.034 ± 0.018
December, 1991				
Okayama, OKAYAMA	38	54.0	0.029 ± 0.0082	0.006 ± 0.017

(2) Strontium-90 and Cesium-137 in Airborne Dust
(from Apr. 1991 to Dec. 1991)

-continued from NO. 96 of this publication-

Table (2): Strontium-90 and Cesium-137 in Airborne Dust

Location	Sampling period	Absorption volume (m3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
April～July, 1991				
Morioka, IWATE	4～6	10,845.0	0.00000± 0.00085	0.00036± 0.00054
Yamagata, YAMAGATA	4～6	12,960.0	0.00054± 0.00064	0.00003± 0.00029
Itihara, CHIBA	4～6	12,960.0	0.0011 ± 0.00069	0.00000± 0.00029
Yokohamashi, KANAGAWA	4～6	11,915.0	0.00000± 0.00066	0.00000± 0.00028
Maebashi, GUNMA	4～6	13,381.0	0.00071± 0.00030	0.00081± 0.00047
Utumoniya, TOTIGI	4～6	15,468.0	0.00037± 0.00021	0.00000± 0.00036
Niigata, NIIGATA	4～6	12,839.0	0.00043± 0.00030	0.00014± 0.00050
Kosugi-machi, TOYAMA	4～6	18,468.0	0.00047± 0.00053	0.00057± 0.00035
Fukui, FUKUI	4～6	12,240.0	0.0012 ± 0.00076	0.00000± 0.00034
Nagano, NAGANO	4～6	14,486.0	0.00000± 0.00058	0.00000± 0.00030
Koufu, YAMANASHI	4～6	15,457.0	0.00045± 0.00025	0.00082± 0.00043
Hamaoka, SHIZUOKA	4～6	12,300.0	0.00013± 0.00072	0.00047± 0.00032
Gifu, GIFU	4～6	9,040.0	0.00060± 0.00049	0.00009± 0.00040
Nagoya, AICHI	4～6	10,388.0	0.00047± 0.00088	0.00000± 0.00055
Tsu, MIE	4～6	14,179.0	0.0011 ± 0.00063	0.00032± 0.00029
Otsu, SHIGA	4～6	11,055.0	0.00000± 0.00079	0.00000± 0.00049
Kyoto, KYOTO	4～6	9,031.0	0.00096± 0.00075	0.00019± 0.00059
Osaka, OSAKA	4～6	17,060.0	0.00000± 0.00044	0.00014± 0.00024
Hyogo, KOBE	4～6	10,183.0	0.00016± 0.00088	0.00017± 0.00055
Nara, NARA	4～6	10,213.0	0.0014 ± 0.00072	0.0017 ± 0.00065
Wakayama, WAKAYAMA	4～6	25,492.8	0.00000± 0.00035	0.00049± 0.00027
Tottori, TOTTORI	4～6	14,795.0	0.0011 ± 0.00050	0.00000± 0.00043
Hiroshima, HIROSHIMA	4～6	11,988.0	0.00004± 0.00071	0.00044± 0.00039
Yamaguchi, YAMAGUCHI	4～6	19,152.0	0.00000± 0.00045	0.00065± 0.00034
Tokushima, TOKUSHIMA	4～6	13,740.0	0.00004± 0.00049	0.00085± 0.00044
Takamatsu, KAGAWA	4～6	16,305.0	0.00032± 0.00059	0.00005± 0.00035
Saga, SAGA	4～6	10,903.5	0.00018± 0.00073	0.00067± 0.00041
Nagasaki, NAGASAKI	4～6	14,172.0	0.00002± 0.00024	0.00033± 0.00041
Kumamoto, KUMAMOTO	4～6	8,378.0	0.0006 ± 0.0011	0.00031± 0.00070
Oita, OITA	4～6	10,223.0	0.00000± 0.00088	0.00058± 0.00058
Miyazaki, MIYAZAKI	4～6	13,475.0	0.00056± 0.00030	0.00014± 0.00041
June～July, 1991				
Okuma-machi, FUKUSHIMA	6～7	11,704.0	0.00063± 0.00034	0.00007± 0.00031

Location	Sampling period	Absorption volume (m3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
July～September, 1991				
Morioka, IWATE	7～9	11,176.0	0.00015±0.00053	0.00000±0.00055
Yamagata, YAMAGATA	7～9	12,960.0	0.00015±0.00028	0.00000±0.00041
Ichihara, CHIBA	7～9	12,960.0	0.00000±0.00038	0.00076±0.00047
Yokohama, KANAGAWA	7～9	11,636.0	0.00000±0.00030	0.00004±0.00031
Maebashi, GUNMA	7～9	12,975.0	0.00024±0.00060	0.00025±0.00030
Utunomiya, TOCHIGI	7～9	15,568.0	0.00021±0.00039	0.00000±0.00035
Kosugi-machi, TOYAMA	7～9	18,442.0	0.00000±0.00021	0.00050±0.00025
Fukui, FUKUI	7～9	11,987.0	0.00022±0.00036	0.00000±0.00031
Nagano, NAGANO	7～9	13,872.0	0.00016±0.00044	0.00006±0.00041
Koufu, YAMANASHI	7～9	10,410.0	0.0012 ±0.00069	0.00000±0.00053
Hamaoka, SHIZUOKA	7～9	11,787.0	0.00004±0.00072	0.00040±0.00045
Gifu, GIFU	7～9	10,070.0	0.00000±0.00039	0.00008±0.00037
Nagoya, AICHI	7～9	8,788.0	0.00083±0.00075	0.00055±0.00057
Tu, MIE	7～9	14,301.0	0.00018±0.00064	0.00012±0.00037
Otsu, SHIGA	7～9	11,154.0	0.00014±0.00082	0.00004±0.00049
Kyoto, KYOTO	7～9	9,147.0	0.00000±0.00061	0.00000±0.00056
Osaka, OSAKA	7～9	16,835.0	0.00003±0.00022	0.00008±0.00033
Kobe, HYOGO	7～9	10,073.0	0.00016±0.00093	0.00000±0.00052
Nara, NARA	7～9	10,036.0	0.00043±0.00081	0.00000±0.00037
Tottori, TOTTORI	7～9	17,443.0	0.00000±0.00047	0.00000±0.00029
Hiroshima, HIROSHIMA	7～9	11,488.0	0.00000±0.00034	0.0014 ±0.00051
Yamaguchi, YAMAGUCHI	7～9	20,232.0	0.00027±0.00031	0.00006±0.00027
Tokushima, TOKUSHIMA	7～9	12,720.0	0.00000±0.00064	0.00048±0.00046
Takamatsu, KAGAWA	7～9	16,362.0	0.00002±0.00020	0.00000±0.00021
Saga, SAGA	7～9	10,337.4	0.00072±0.00037	0.00000±0.00036
Kumamoto, KUMAMOTO	7～9	10,038.0	0.00024±0.00036	0.00000±0.00040
Oita, OITA	7～9	9,994.0	0.00000±0.0011	0.00009±0.00054
July～October, 1991				
Moito, IBARAKI	7～10	7,736.2	0.00014±0.00079	0.00011±0.00081
September, 1991				
Okuma-machi, FUKUSHIMA	9	7,255.0	0.00012±0.00051	0.00000±0.00045
October～December, 1991				
Morioka, IWATE	10～12	10,106.0	0.0010 ±0.00062	0.00031±0.00062
Yamagata, YAMAGATA	10～12	12,960.0	0.0018 ±0.00071	0.00030±0.00034
Yokomama, KANAGAWA	10～12	11,783.0	0.00039±0.00053	0.00043±0.00054
Kosugi-machi, TOYAMA	10～12	18,550.0	0.00023±0.00031	0.00000±0.00028
Fukui, FUKUI	10～12	11,247.0	0.00085±0.00060	0.00016±0.00048

Location	Sampling period	Absorption volume (m3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Hamaoka-machi, SHIZUOKA	10～12	11,406.0	0.00000±0.00064	0.00090±0.00039
Gifu, GIFU	10～12	9,734.6	0.00085±0.00067	0.00005±0.00048
Nagoya, AICHI	10～12	7,997.0	0.00000±0.00072	0.00000±0.00063
Tsu, MIE	10～12	14,480.0	0.00048±0.00039	0.00000±0.00037
Osaka, OSAKA	10～12	15,476.0	0.0013 ±0.00055	0.00031±0.00027
Kobe, HYOGO	10～12	9,819.0	0.00000±0.00076	0.00000±0.00039
Hiroshima, HIROSHIMA	10～12	10,096.0	0.0012 ±0.00072	0.00000±0.00053
Takamatu, KAGAWA	10～12	15,320.0	0.00036±0.00055	0.00008±0.00027
Saga, SAGA	10～12	11,069.9	0.00059±0.00061	0.00031±0.00052
Kumamoto, KUMAMOTO	10～12	9,828.0	0.00000±0.00076	0.00012±0.00044

(3) Strontium-90 and Cesium-137 in Service Water
(from May. 1991 to Dec. 1991)

-continued from NO. 96 of this publication-

Table (3): Strontium-90 and Cesium-137 in Service Water

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
(Source Water)			
June, 1991			
Kisarazu, CHIBA	7.5	2.7 ±0.14	0.07 ±0.11
Katsushika, TOKYO	7.3	1.5 ±0.21	0.24 ±0.10
Tsukui-machi, KANAGAWA	7.3	0.44 ±0.090	0.20 ±0.82
Nagano, NAGANO	7.1	1.4 ±0.18	0.20 ±0.088
Nagoya, AICHI	6.8	2.5 ±0.18	0.27 ±0.12
Mamoriguti, OSAKA	7.1	3.9 ±0.22	0.098±0.084
Fukuoka, FUKUOKA	7.2	2.3 ±0.18	0.25 ±0.097
July, 1991			
Sapporo, HOKKAIDO	6.9	1.8 ±0.12	0.25 ±0.091
August, 1991			
Kyoto, KYOTO	6.10	4.1 ±0.15	0.041±0.060
December, 1991			
Tsukui-machi, KANAGAWA	8.3	0.36 ±0.060	0.00 ±0.10
Mamoriguti, OSAKA	7.0	3.4 ±0.14	0.000±0.055
Fukuoka, FUKUOKA	6.8	2.4 ±0.13	0.10 ±0.085
(Tap Water)			
May, 1991			
Yamagata, YAMAGATA	6.9	1.8 ±0.16	0.014±0.083
Hiroshima, HIROSHIMA	6.72	2.2 ±0.16	0.12 ±0.092
June, 1991			
Wakkanai, HOKKAIDO	6.8	1.7 ±0.16	0.013±0.072
Aomori, AOMORI	7.3	1.4 ±0.13	0.45 ±0.12
Morioka, IWATE	7.1	1.4 ±0.15	0.000±0.076
Fukushima, FUKUSHIMA	7.01	3.6 ±0.22	0.26 ±0.12
Mito, IBARAKI	7.6	1.5 ±0.15	0.00 ±0.10
Itihara, CHIBA	7.19	2.5 ±0.12	0.000±0.071
Katsushika, TOKYO	7.3	2.5 ±0.23	0.36 ±0.11
Yokohama, KANAGAWA	6.9	0.86 ±0.13	0.026±0.079
Maebashi, GUNMA	6.9	1.9 ±0.15	0.27 ±0.097
Utsunomiya, TOCHIGI	7.1	0.70 ±0.10	0.024±0.080
Kosugi-machi, TOYAMA	7.1	1.7 ±0.15	0.000±0.074

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
Kanazawa, ISHIKAWA	6.62	2.3 ±0.12	0.11 ±0.059
Fukui, FUKUI	7.07	0.66 ±0.13	0.079±0.087
Nagano, NAGANO	7.1	0.73 ±0.15	0.18 ±0.087
Koufu, YAMANASHI	7.3	1.1 ±0.12	0.17 ±0.086
Shizuoka, SHIZUOKA	7.83	1.2 ±0.23	0.000±0.076
Gifu, GIFU	6.58	2.0 ±0.18	0.06 ±0.11
Nagoya, AICHI	6.6	2.1 ±0.17	0.00 ±0.11
Tsu, MIE	6.6	2.5 ±0.21	0.18 ±0.089
Ootsu, SHIGA	6.47	4.6 ±0.23	0.10 ±0.11
Osaka, OSAKA	7.1	3.2 ±0.25	0.12 ±0.084
Kobe, HYOGO	7.27	3.0 ±0.22	0.000±0.072
Nara, NARA	6.4	2.8 ±0.14	0.098±0.088
Tottori, TOTTORI	7.2	2.4 ±0.18	0.000±0.074
Matsue, SHIMANE	-	3.3 ±0.22	0.20 ±0.12
Okayama, OKAYAMA	6.7	2.8 ±0.18	0.10 ±0.083
Ube, YAMAGUTCHI	7.2	1.9 ±0.14	0.23 ±0.096
Matsuyama, EHIME	7.6	1.4 ±0.15	0.22 ±0.13
Kochi, KOCHI	6.9	1.5 ±0.18	0.000±0.062
Tokushima, TOKUSHIMA	6.5	2.0 ±0.13	0.000±0.093
Takamatsu, KAGAWA	7.8	2.1 ±0.18	0.000±0.069
Fukuoka, FUKUOKA	6.5	2.8 ±0.19	0.14 ±0.088
Saga, SAGA	7.47	2.3 ±0.17	0.21 ±0.096
Nagasaki, NAGASAKI	7.4	0.98 ±0.18	0.055±0.081
Kumamoto, KUMAMOTO	7.3	0.28 ±0.070	0.000±0.076
Ooita, OOITA	7.5	0.83 ±0.081	0.16 ±0.068
Miyazaki, MIYAZAKI	6.90	1.3 ±0.15	0.061±0.083
Kagoshima, KAGOSHIMA	7.2	0.93 ±0.15	0.000±0.084
Naha, OKINAWA	7.49	4.6 ±0.17	0.10 ±0.081
July, 1991			
Shinguu, WAKAYAMA	6.5	1.9 ±0.16	0.24 ±0.12
August, 1991			
Kyoto, KYOTO	6.50	3.5 ±0.14	0.046±0.058
September, 1991			
Akita, AKITA	7.23	3.4 ±0.16	0.080±0.072
October, 1991			
Sendai, MIYAGI	-	1.6 ±0.11	0.27 ±0.097

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
November, 1991			
Nagano, NAGANO	6.81	0.72 ±0.079	0.03 ±0.11
December, 1991			
Morioka, IWATE	7.18	1.2 ±0.09	0.15 ±0.083
Yamagata, YAMAGATA	7.0	2.6 ±0.13	0.04 ±0.10
Yokohama, KANAGAWA	6.9	0.54 ±0.068	0.11 ±0.11
Kosugi-machi, TOYAMA	7.1	2.2 ±0.12	0.000±0.076
Fukui, FUKUI	6.9	0.71 ±0.080	0.000±0.076
Shizuoka, SHIZUOKA	7.5	1.1 ±0.09	0.04 ±0.11
Gifu, GIFU	7.11	1.7 ±0.12	0.000±0.085
Osaka, OSAKA	7.0	2.9 ±0.14	0.000±0.055
Kobe, HYOGO	6.69	3.0 ±0.14	0.01 ±0.10
Okayama, OKAYAMA	6.9	2.5 ±0.12	0.032±0.077
Ube, YAMAGUTCHI	6.8	2.2 ±0.15	0.000±0.077
Saga, SAGA	7.65	1.7 ±0.12	0.07 ±0.10

(4) Strontium-90 and Cesium-137 in Freshwater
(from May. 1991 to Nov. 1991)

-continued from NO. 96 of this publication-

Table (4): Strontium-90 and Cesium-137 in Freshwater

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
(Freshwater)			
May, 1991			
Kasumigaura, IBARAKI	8.5	3.1 ±0.16	0.61 ±0.12
July, 1991			
Barato-lake, HOKKAIDO	7.5	3.7 ±0.15	0.34 ±0.11
August, 1991			
Akita, AKITA	6.76	4.1 ±0.18	0.74 ±0.11
September, 1991			
Fukushima, FUKUSHIMA	6.7	1.9 ±0.10	0.79 ±0.11
Tsuruga, FUKUI	7.30	5.9 ±0.30	2.9 ±0.21
November, 1991			
Syouhara, HIROSHIMA	6.60	1.6 ±0.11	0.05 ±0.11

(5) Strontium-90 and Cesium-137 in Sea Water
(from Jul. 1991 to Aug. 1991)

-continued from NO. 96 of this publication-

Table (6): Strontium-90 and Cesium-137 in Sea Water

Location	Sample volume analyzed (ℓ)	Cl (‰)	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
July, 1991				
Yoichi-bay, HOKKAIDO	40.0	-	2.6 ±0.22	3.8 ±0.35
Nigata-bay, NIIGATA	40.0	17.40	2.3 ±0.20	3.5 ±0.34
Tokoname, AICHI	40.0	6.93	2.2 ±0.20	1.2 ±0.23
Asuna-machi, YAMAGUCHI	40.0	15.9	2.6 ±0.23	3.5 ±0.35
Monji-bay, FUKUOKA	40.0	16.94	2.7 ±0.23	3.4 ±0.34
August, 1991				
Mutsu-bay, AOMORI	40.0	17.8	2.1 ±0.20	3.9 ±0.35
Matsukawaura, FUKUSHIMA	38.1	17.1	2.2 ±0.21	3.0 ±0.34
Itihara, CHIBA	20.0	18.31	2.8 ±0.35	2.9 ±0.49
Odawa-bay, KANAGAWA	40.0	17.5	2.3 ±0.21	3.6 ±0.34
Kaseda, KAGOSHIMA	40.0	17.9	2.1 ±0.20	3.5 ±0.35

* * * Rain and Dry Fallout (for domestic program) * * *

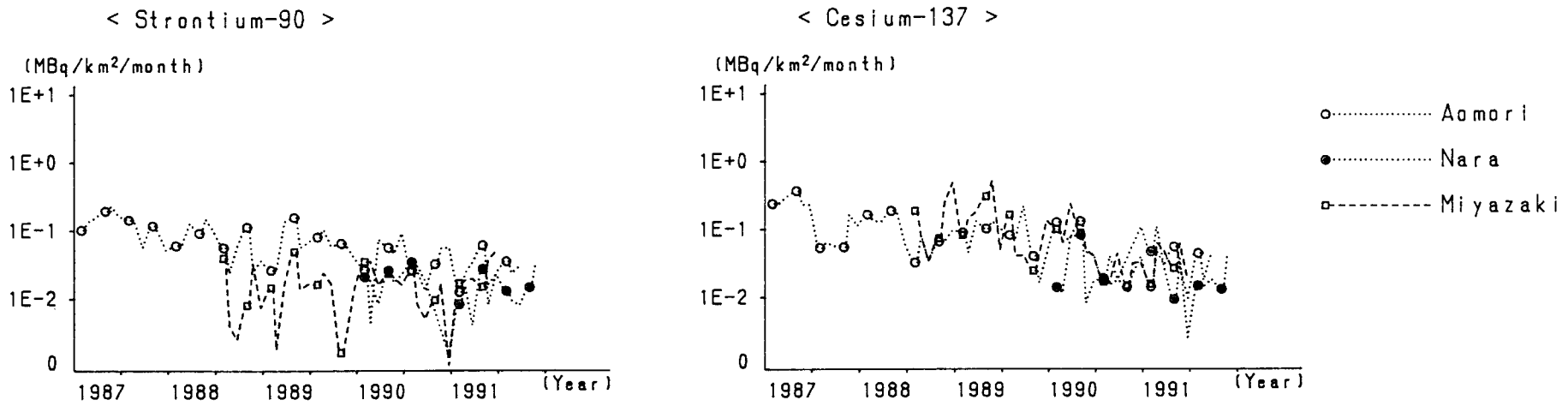

Fig. 1-1

* * * Rain and Dry Fallout (for WHO program) * * *

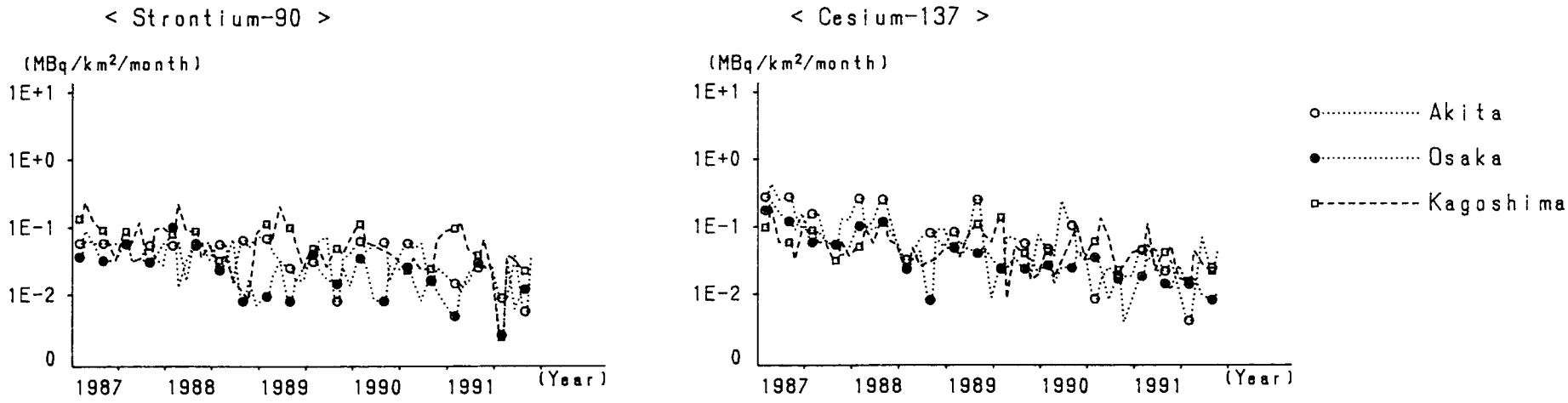

Fig. 1-2

* * * Airborne Dust * * *

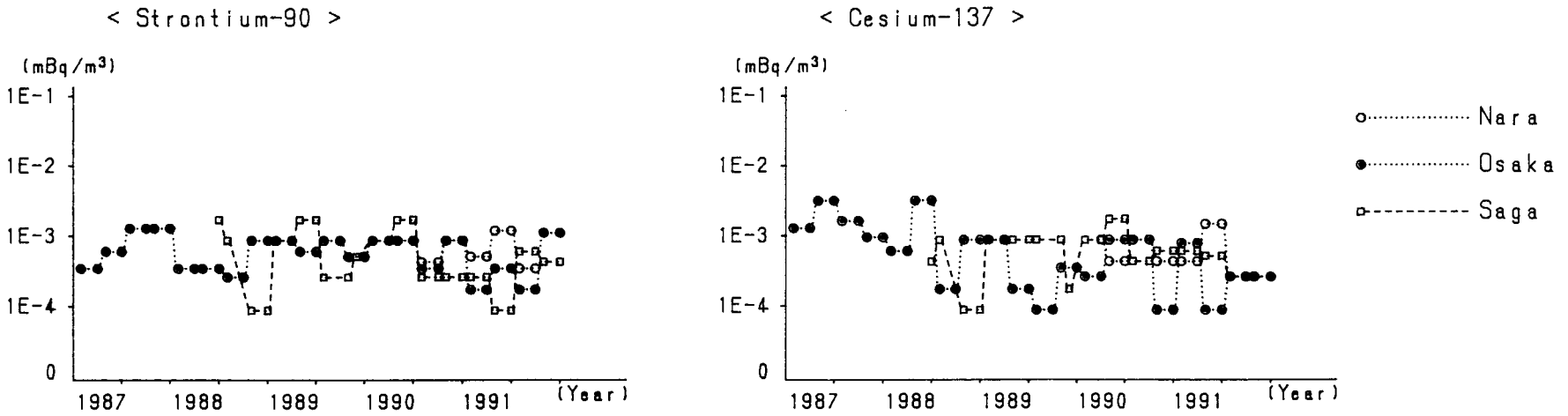

Fig. 2

* * * Tap water * * *

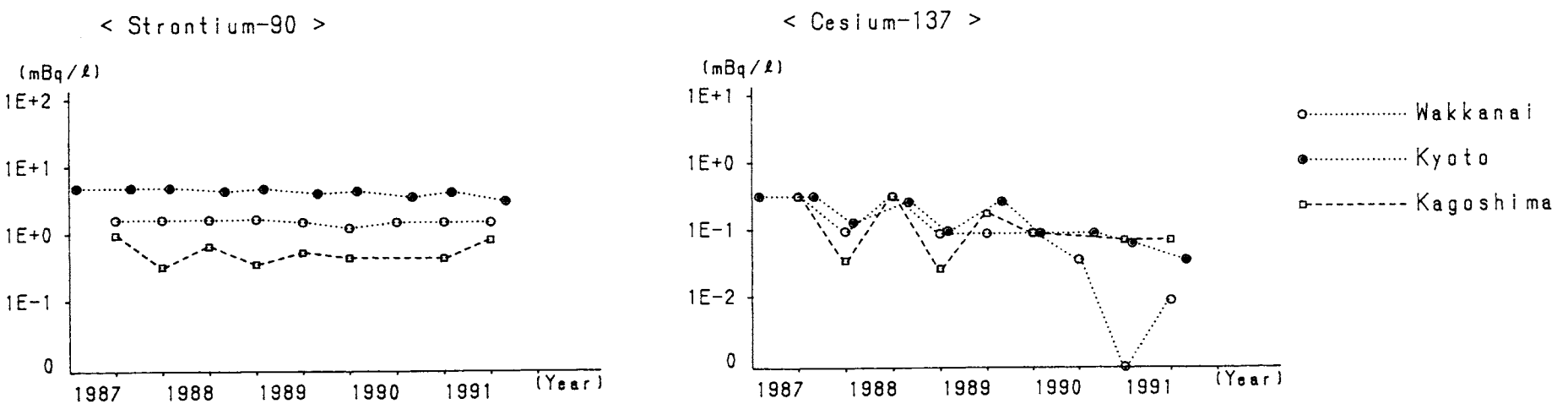

Fig.3

＊＊＊　Source water　＊＊＊

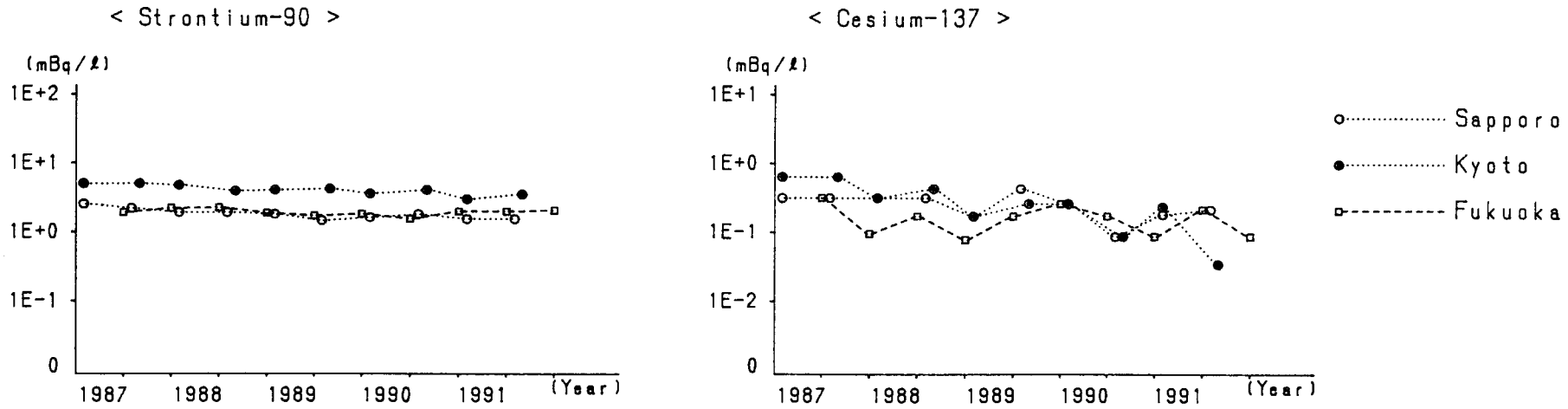

Fig.3

* * * Freshwater * * *

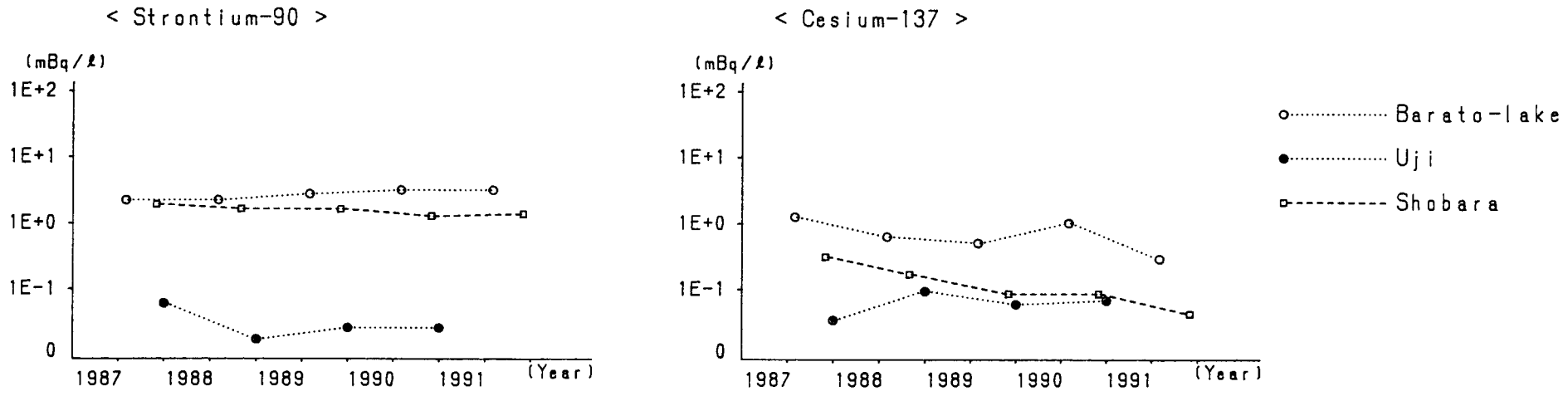

Fig. 4

* * * Sea Water * * *

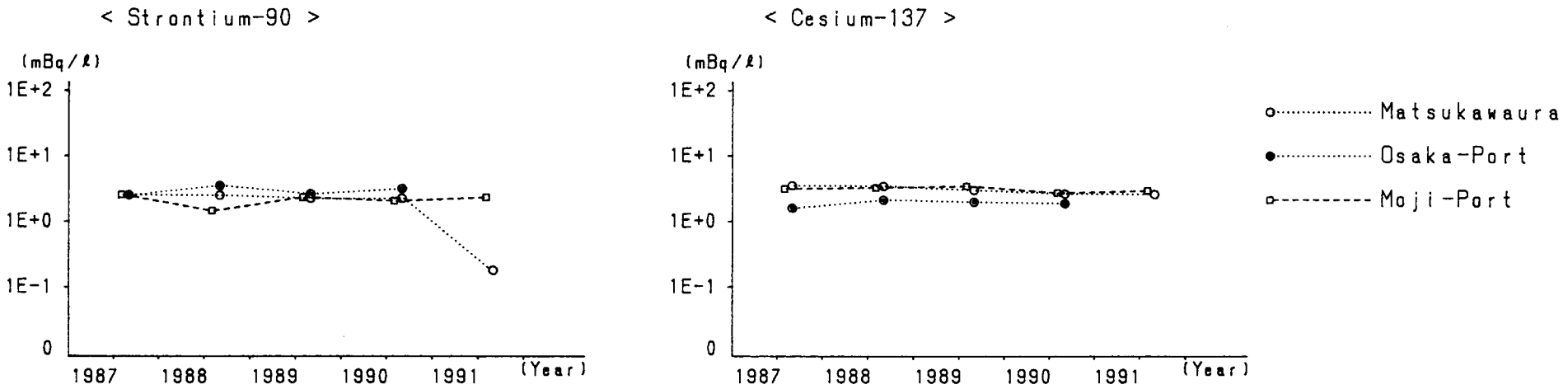

Fig.5

** Sampling Locations in Japan **

1 : Sapporo
2 : Aomori
3 : Morioka
4 : Akita
5 : Sendai
6 : Yamagata
7 : Fukushima
8 : Niigata
9 : Mito
10 : Utsunomiya
11 : Chiba
12 : Urawa
13 : Shinjuku
14 : Nagano
15 : Yokohama
16 : Kouhu
17 : Toyama
18 : Kanazawa
19 : Shizuoka
20 : Fukui
21 : Nagoya
22 : Ootsu
23 : Tsu
24 : Kyoto
25 : Osaka
26 : Tottori
27 : Kobe
28 : Wakayama
29 : Okayama
30 : Matsue
31 : Takamatsu
32 : Hiroshima
33 : Kochi
34 : Matsuyama
35 : Yamaguchi
36 : Ooita
37 : Fukuoka
38 : Saga
39 : Miyazaki
40 : Nagasaki
41 : Kagoshima
42 : Naha