ISSN 0441-2516
NIRS-RSD-104

RADIOACTIVITY SURVEY DATA in Japan

Part 1
= Environmental Materials =

NUMBER 104
December 1994

National Institute of Radiological Sciences
Chiba, Japan

Radioactivity Survey Data

in Japan

Number 104

September 1994 part 1 = Environmental Materials =

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 asampling 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 threemonths 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 andcesium carriers were added to the filtered water sample. The subsequent process was the same as that describedin the section (1). Freshwater was treated inthe 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 out flow due to precipitation, etc.. Any places located under trees in a forest, in astony 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 driedin 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 1ℓ of sea water, and then stored in 20 ℓ 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 stainless 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 otherin-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.

---

* 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 p
ersons		
(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 washeated. 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 sievedsample 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 retainedfor cesium-137 determination. The carbonates weredissolved in hydrochloric acid and strontium 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 molybdophosphate added.

After filtered off and washed with hydrochlotric acid the precipitate was dissolved in 2.5 N 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 cesiumwas 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 andpotassium were determined by atomic absorption andflame 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 Oct. 1992 to Mar. 1993)

-continued from NO. 102 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)
October, 1992				
Sapporo, HOKKAIDO	33	112.0	0.013 ± 0.0078	0.042 ± 0.019
Aomori, AOMORI	33	36.0	0.0083 ± 0.0072	0.000 ± 0.016
Morioka, IWATE	33	68.9	0.016 ± 0.0075	0.000 ± 0.014
Onagawa-machi, MIYAGI	34	121.5	0.019 ± 0.011	0.065 ± 0.022
Yamagata, YAMAGATA	33	72.3	0.003 ± 0.022	0.032 ± 0.017
Ookuma-machi, FUKUSHIMA	33	230.8	0.0056 ± 0.0068	0.000 ± 0.015
Mito, IBARAKI	33	195.5	0.000 ± 0.022	0.021 ± 0.018
Utsunomiya, TOCHIGI	33	199.0	0.000 ± 0.014	0.032 ± 0.019
Maebashi, GUNMA	33	178.5	0.0066 ± 0.0084	0.0000 ± 0.0098
Urawa, SAITAMA	33	220.7	0.022 ± 0.0064	0.017 ± 0.012
Chiba, CHIBA	30	299.0	0.000 ± 0.016	0.000 ± 0.013
Shinjuku, TOKYO	33	323.0	0.000 ± 0.016	0.000 ± 0.016
Yokohama, KANAGAWA	31	316.8	0.019 ± 0.021	0.040 ± 0.019
Kosugi-machi, TOYAMA	33	215.8	0.001 ± 0.016	0.021 ± 0.014
Fukui, FUKUI	33	224.6	0.064 ± 0.097	0.000 ± 0.079
Koufu, YAMANASHI	33	208.5	0.030 ± 0.022	0.001 ± 0.016
Gifu, GIFU	33	188.0	0.012 ± 0.021	0.000 ± 0.015
Shizuoka, SHIZUOKA	33	240.5	0.032 ± 0.018	0.000 ± 0.015
Nagoya, AICHI	33	160.4	0.019 ± 0.020	0.008 ± 0.013
Tsu, MIE	33	141.0	0.050 ± 0.021	0.036 ± 0.018
Ootsu, SHIGA	33	149.6	0.000 ± 0.023	0.009 ± 0.017
Kyoto, KYOTO	30	99.0	0.000 ± 0.019	0.035 ± 0.012
Kobe, HYOGO	32	99.4	0.038 ± 0.019	0.000 ± 0.015
Nara, NARA	33	121.7	0.000 ± 0.018	0.016 ± 0.013
Wakayama, WAKAYAMA	34	113.0	0.019 ± 0.0087	0.000 ± 0.015
Tottori, TOTTORI	33	263.7	0.070 ± 0.011	0.035 ± 0.018
Matsue, SHIMANE	33	109.9	0.012 ± 0.0073	0.10 ± 0.028
Hiroshima, HIROSHIMA	31	61.6	0.000 ± 0.021	0.001 ± 0.016
Ishii-machi, TOKUSHIMA	33	99.5	0.017 ± 0.0086	0.001 ± 0.013
Takamatsu, KAGAWA	33	75.0	0.009 ± 0.019	0.017 ± 0.016
Matsuyama, EHIME	33	56.0	0.019 ± 0.0077	0.000 ± 0.014
Dazaifu, FUKUOKA	33	61.8	0.000 ± 0.019	0.028 ± 0.016

Saga, SAGA	33	13.0	0.007 ± 0.015	0.040 ± 0.021
Nagasaki, NAGASAKI	33	15.5	0.004 ± 0.021	0.018 ± 0.013
Kumamoto, KUMAMOTO	33	13.0	0.000 ± 0.015	0.029 ± 0.021
Ooita, OOITA	33	37.2	0.0000 ± 0.0067	0.008 ± 0.016
Miyazaki, MIYAZAKI	33	52.9	0.009 ± 0.016	0.022 ± 0.016
Yonagusuku-mura, OKINAWA	31	111.0	0.0059 ± 0.0079	0.025 ± 0.016
November, 1992				
Sapporo, HOKKAIDO	30	71.5	0.0092 ± 0.0069	0.019 ± 0.017
Aomori, AOMORI	30	119.0	0.024 ± 0.011	0.028 ± 0.015
Morioka, IWATE	30	88.0	0.013 ± 0.0075	0.028 ± 0.017
Onagawa-machi, MIYAGI	28	40.5	0.044 ± 0.014	0.042 ± 0.022
Yamagata, YAMAGATA	30	41.4	0.016 ± 0.021	0.068 ± 0.023
Ookuma-machi, FUKUSHIMA	31	61.8	0.011 ± 0.0084	0.017 ± 0.016
Mito, IBARAKI	30	89.5	0.023 ± 0.0074	0.006 ± 0.016
Utsunomiya, TOCHIGI	30	59.8	0.0015 ± 0.0062	0.002 ± 0.015
Maebashi, GUNMA	30	22.5	0.002 ± 0.010	0.024 ± 0.017
Urawa, SAITAMA	30	92.7	0.017 ± 0.0062	0.000 ± 0.012
Chiba, CHIBA	33	107.4	0.007 ± 0.018	0.034 ± 0.015
Shinjyuku, TOKYO	30	170.1	0.004 ± 0.010	0.000 ± 0.016
Yokohama, KANAGAWA	32	195.5	0.049 ± 0.019	0.000 ± 0.023
Kosugi-machi, TOYAMA	30	152.6	0.034 ± 0.018	0.064 ± 0.017
Fukui, FUKUI	30	144.3	0.000 ± 0.094	0.034 ± 0.067
Koufu, YAMANASHI	30	82.5	0.010 ± 0.021	0.000 ± 0.016
Gifu, GIFU	30	63.5	0.000 ± 0.025	0.010 ± 0.015
Shizuoka, SHIZUOKA	30	219.0	0.021 ± 0.018	0.015 ± 0.016
Nagoya, AICHI	30	90.7	0.000 ± 0.018	0.017 ± 0.014
Tsu, MIE	30	57.0	0.013 ± 0.0072	0.030 ± 0.013
Ootsu, SHIGA	30	32.9	0.033 ± 0.028	0.000 ± 0.013
Kyoto, KYOTO	32	64.0	0.000 ± 0.036	0.000 ± 0.010
Kobe, HYOGO	31	37.2	0.017 ± 0.016	0.000 ± 0.021
Nara, NARA	30	76.0	0.000 ± 0.019	0.000 ± 0.011
Wakayama, WAKAYAMA	31	100.5	0.0057 ± 0.0093	0.000 ± 0.017
Tottori, TOTTORI	30	132.7	0.070 ± 0.011	0.015 ± 0.017
Matsue, SHIMANE	30	86.9	0.0033 ± 0.0055	0.048 ± 0.012
Hiroshima, HIROSHIMA	32	46.8	0.000 ± 0.018	0.018 ± 0.013
Ishii-machi, TOKUSHIMA	31	78.5	0.019 ± 0.0079	0.000 ± 0.013
Takamatsu, KAGAWA	30	19.0	0.048 ± 0.019	0.015 ± 0.015
Matsuyama, EHIME	30	54.5	0.018 ± 0.0075	0.026 ± 0.017
Dazaifu, FUKUOKA	30	74.7	0.033 ± 0.019	0.008 ± 0.016
Saga, SAGA	30	37.0	0.000 ± 0.015	0.045 ± 0.020
Nagasaki, NAGASAKI	30	76.5	0.003 ± 0.017	0.005 ± 0.015
Kumamoto, KUMAMOTO	30	58.9	0.037 ± 0.019	0.003 ± 0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Ooita, OOITA	30	53.3	0.000 ± 0.012	0.022 ± 0.016
Miyazaki, MIYAZAKI	30	37.3	0.000 ± 0.018	0.000 ± 0.015
Yonagusuku-mura, OKINAWA	31	160.5	0.026 ± 0.0088	0.000 ± 0.014
December, 1992				
Sapporo, HOKKAIDO	28	47.5	0.019 ± 0.0084	0.001 ± 0.017
Aomori, AOMORI	35	63.5	0.0038 ± 0.0084	0.009 ± 0.017
Morioka, IWATE	35	55.8	0.017 ± 0.0083	0.039 ± 0.018
Onagawa-machi, MIYAGI	36	34.0	0.002 ± 0.026	0.020 ± 0.019
Yamagata, YAMAGATA	35	104.4	0.031 ± 0.012	0.000 ± 0.017
Ookuma-machi, FUKUSHIMA	35	37.3	0.006 ± 0.017	0.037 ± 0.021
Mito, IBARAKI	36	39.5	0.030 ± 0.0081	0.049 ± 0.018
Utsunomiya, TOCHIGI	35	42.0	0.000 ± 0.020	0.13 ± 0.024
Maebashi, GUNMA	35	19.0	0.014 ± 0.0090	0.040 ± 0.018
Urawa, SAITAMA	35	47.6	0.036 ± 0.022	0.0008 ± 0.0087
Chiba, CHIBA	35	38.6	0.0085 ± 0.0081	0.033 ± 0.014
Shinjuku, TOKYO	35	88.2	0.071 ± 0.025	0.010 ± 0.017
Yokohama, KANAGAWA	29	63.6	0.027 ± 0.0091	0.027 ± 0.015
Kosugi-machi, TOYAMA	35	291.4	0.065 ± 0.020	0.019 ± 0.013
Fukui, FUKUI	35	402.9	0.20 ± 0.12	0.11 ± 0.064
Koufu, YAMANASHI	35	38.5	0.005 ± 0.020	0.012 ± 0.018
Gifu, GIFU	35	97.5	0.036 ± 0.021	0.0000 ± 0.0097
Shizuoka, SHIZUOKA	36	129.5	0.018 ± 0.0076	0.000 ± 0.015
Nagoya, AICHI	35	96.6	0.032 ± 0.034	0.043 ± 0.023
Tsu, MIE	35	60.5	0.040 ± 0.011	0.011 ± 0.016
Ootsu, SHIGA	35	66.8	0.000 ± 0.033	0.012 ± 0.013
Kyoto, KYOTO	29	67.5	0.000 ± 0.024	0.009 ± 0.012
Kobe, HYOGO	29	101.4	0.022 ± 0.020	0.020 ± 0.018
Nara, NARA	36	98.6	0.014 ± 0.012	0.043 ± 0.025
Wakayama, WAKAYAMA	37	53.0	0.030 ± 0.014	0.000 ± 0.017
Tottori, TOTTORI	36	226.3	0.046 ± 0.010	0.002 ± 0.015
Matsue, SHIMANE	29	130.4	0.012 ± 0.014	0.036 ± 0.010
Hiroshima, HIROSHIMA	29	62.8	0.029 ± 0.012	0.007 ± 0.015
Ishii-machi, TOKUSHIMA	36	60.5	0.000 ± 0.021	0.004 ± 0.013
Takamatsu, KAGAWA	31	29.0	0.012 ± 0.0082	0.017 ± 0.016
Matsuyama, EHIME	35	57.0	0.018 ± 0.0071	0.042 ± 0.018
Dazaifu, FUKUOKA	35	61.9	0.000 ± 0.026	0.001 ± 0.013
Saga, SAGA	35	45.4	0.044 ± 0.018	0.020 ± 0.017
Nagasaki, NAGASAKI	35	69.0	0.0021 ± 0.0078	0.015 ± 0.017
Kumamoto, KUMAMOTO	35	66.2	0.020 ± 0.0089	0.000 ± 0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Ooita, OOITA	35	50.6	0.0028±0.0095	0.005 ±0.015
Miyazaki, MIYAZAKI	35	118.2	0.0007±0.0087	0.004 ±0.015
Yonagusuku-mura, OKINAWA	23	54.5	0.000 ±0.017	0.067 ±0.022
January, 1993				
Sapporo, HOKKAIDO	36	58.0	0.023 ±0.020	0.008 ±0.017
Aomori, AOMORI	29	35.5	0.0084±0.0083	0.046 ±0.017
Morioka, IWATE	29	30.7	0.0048±0.0086	0.019 ±0.016
Onagawa-machi, MIYAGI	28	60.0	0.028 ±0.023	0.028 ±0.016
Yamagata, YAMAGATA	29	53.7	0.005 ±0.012	0.023 ±0.017
Ookuma-machi, FUKUSHIMA	28	162.9	0.001 ±0.018	0.041 ±0.019
Mito, IBARAKI	28	98.5	0.006 ±0.019	0.010 ±0.017
Utsunomiya, TOCHIGI	29	67.7	0.044 ±0.018	0.38 ±0.033
Maebashi, GUNMA	29	69.0	0.013 ±0.0095	0.017 ±0.015
Urawa, SAITAMA	29	99.0	0.011 ±0.0099	0.026 ±0.012
Chiba, CHIBA	29	137.3	0.012 ±0.0077	0.038 ±0.016
Shinjuku, TOKYO	29	119.6	0.000 ±0.022	0.032 ±0.017
Yokohama, KANAGAWA	36	152.0	0.0035±0.0079	0.039 ±0.017
Kosugi-machi, TOYAMA	29	224.4	0.028 ±0.0090	0.031 ±0.017
Fukui, FUKUI	29	238.7	0.045 ±0.045	0.000 ±0.074
Koufu, YAMANASHI	29	65.5	0.002 ±0.020	0.001 ±0.016
Gifu, GIFU	29	70.0	0.028 ±0.022	0.009 ±0.014
Shizuoka, SHIZUOKA	28	97.5	0.0050±0.0073	0.009 ±0.016
Nagoya, AICHI	29	65.8	0.0000±0.0078	0.033 ±0.017
Tsu, MIE	29	33.0	0.039 ±0.023	0.000 ±0.015
Ootsu, SHIGA	29	79.6	0.040 ±0.017	0.044 ±0.018
Kyoto, KYOTO	33	56.0	0.018 ±0.025	0.023 ±0.013
Kobe, HYOGO	33	41.8	0.000 ±0.011	0.031 ±0.016
Nara, NARA	28	120.8	0.000 ±0.011	0.030 ±0.018
Wakayama, WAKAYAMA	34	42.0	0.000 ±0.027	0.025 ±0.042
Tottori, TOTTORI	28	147.7	0.049 ±0.028	0.000 ±0.016
Matsue, SHIMANE	35	145.2	0.010 ±0.017	0.044 ±0.011
Hiroshima, HIROSHIMA	33	53.6	0.0050±0.0073	0.000 ±0.015
Ishii-machi, TOKUSHIMA	28	16.5	0.0081±0.0081	0.012 ±0.016
Takamatsu, KAGAWA	33	30.5	0.028 ±0.0075	0.033 ±0.018
Matsuyama, EHIME	29	34.0	0.019 ±0.0071	0.053 ±0.018
Dazaifu, FUKUOKA	29	89.8	0.0079±0.0073	0.001 ±0.017
Saga, SAGA	29	29.0	0.019 ±0.0082	0.004 ±0.014
Nagasaki, NAGASAKI	29	53.0	0.012 ±0.018	0.000 ±0.018
Kumamoto, KUMAMOTO	29	57.7	0.011 ±0.0077	0.002 ±0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Ooita, OOITA	29	37.0	0.011 ± 0.0078	0.000 ± 0.013
Miyazaki, MIYAZAKI	29	74.0	0.033 ± 0.023	0.012 ± 0.015
Yonagusuku-mura, OKINAWA	28	53.5	0.011 ± 0.022	0.025 ± 0.019
February, 1993				
Sapporo, HOKKAIDO	30	71.0	0.032 ± 0.0098	0.032 ± 0.016
Aomori, AOMORI	30	87.0	0.022 ± 0.014	0.052 ± 0.019
Morioka, IWATE	30	116.1	0.008 ± 0.024	0.041 ± 0.014
Onagawa-machi, MIYAGI	30	79.5	0.008 ± 0.021	0.029 ± 0.017
Yamagata, YAMAGATA	30	80.0	0.000 ± 0.022	0.042 ± 0.019
Ookuma-machi, FUKUSHIMA	30	92.4	0.017 ± 0.0076	0.013 ± 0.016
Mito, IBARAKI	30	92.5	0.015 ± 0.020	0.050 ± 0.018
Utsunomiya, TOCHIGI	30	82.6	0.022 ± 0.018	0.13 ± 0.022
Maebashi, GUNMA	30	32.0	0.019 ± 0.010	0.036 ± 0.018
Urawa, SAITAMA	30	54.5	0.012 ± 0.010	0.086 ± 0.016
Chiba, CHIBA	30	68.2	0.018 ± 0.0080	0.071 ± 0.019
Shinjuku, TOKYO	30	63.4	0.0000 ± 0.0098	0.004 ± 0.016
Yokohama, KANAGAWA	30	67.7	0.026 ± 0.019	0.038 ± 0.017
Kosugi-machi, TOYAMA	30	155.5	0.032 ± 0.010	0.062 ± 0.020
Fukui, FUKUI	30	209.4	0.000 ± 0.040	0.000 ± 0.080
Koufu, YAMANASHI	30	51.0	0.0065 ± 0.0065	0.014 ± 0.017
Gifu, GIFU	30	115.0	0.012 ± 0.024	0.020 ± 0.016
Shizuoka, SHIZUOKA	30	146.0	0.038 ± 0.0091	0.063 ± 0.019
Nagoya, AICHI	30	112.4	0.0030 ± 0.0083	0.037 ± 0.016
Tsu, MIE	30	75.0	0.025 ± 0.0079	0.052 ± 0.020
Ootsu, SHIGA	30	73.7	0.024 ± 0.013	0.000 ± 0.017
Kyoto, KYOTO	33	76.0	0.002 ± 0.020	0.012 ± 0.017
Kobe, HYOGO	29	63.9	0.046 ± 0.024	0.017 ± 0.016
Wakayama, WAKAYAMA	31	77.2	0.026 ± 0.053	0.000 ± 0.017
Tottori, TOTTORI	30	129.9	0.065 ± 0.012	0.071 ± 0.021
Hiroshima, HIROSHIMA	29	63.0	0.021 ± 0.0077	0.021 ± 0.016
Ishii-machi, TOKUSHIMA	29	46.5	0.018 ± 0.0088	0.016 ± 0.015
Takamatsu, KAGAWA	30	20.5	0.037 ± 0.0082	0.020 ± 0.017
Matsuyama, EHIME	30	53.5	0.023 ± 0.0089	0.001 ± 0.018
Dazaifu, FUKUOKA	30	58.0	0.030 ± 0.0095	0.014 ± 0.016
Saga, SAGA	30	100.9	0.022 ± 0.0084	0.089 ± 0.019
Nagasaki, NAGASAKI	30	94.0	0.028 ± 0.019	0.000 ± 0.017
Kumamoto, KUMAMOTO	30	49.9	0.0000 ± 0.0087	0.000 ± 0.015
Ooita, OOITA	30	37.2	0.0040 ± 0.0073	0.000 ± 0.014
Miyazaki, MIYAZAKI	30	37.3	0.008 ± 0.021	0.025 ± 0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Yonagusuku-mura, OKINAWA	30	71.3	0.021 ± 0.024	0.023 ± 0.017
March, 1993				
Sapporo, HOKKAIDO	32	20.0	0.0061 ± 0.0072	0.006 ± 0.015
Aomori, AOMORI	32	12.5	0.029 ± 0.0091	0.010 ± 0.016
Morioka, IWATE	32	23.5	0.054 ± 0.022	0.014 ± 0.012
Onagawa-machi, MIYAGI	32	96.5	0.043 ± 0.022	0.022 ± 0.015
Yamagata, YAMAGATA	32	51.8	0.030 ± 0.021	0.037 ± 0.017
Ookuma-machi, FUKUSHIMA	32	43.6	0.028 ± 0.0081	0.035 ± 0.018
Mito, IBARAKI	32	58.5	0.025 ± 0.010	0.064 ± 0.017
Utsunomiya, TOCHIGI	32	44.6	0.070 ± 0.012	1.1 ± 0.05
Maebashi, GUNMA	32	21.5	0.021 ± 0.0089	0.037 ± 0.017
Urawa, SAITAMA	32	51.0	0.026 ± 0.0084	0.031 ± 0.012
Chiba, CHIBA	32	81.0	0.022 ± 0.0090	0.010 ± 0.014
Shinjuku, TOKYO	32	65.2	0.020 ± 0.010	0.056 ± 0.018
Yokohama, KANAGAWA	31	88.5	0.032 ± 0.018	0.080 ± 0.020
Kosugi-machi, TOYAMA	32	126.9	0.008 ± 0.023	0.024 ± 0.018
Fukui, FUKUI	32	117.8	0.056 ± 0.039	0.019 ± 0.080
Koufu, YAMANASHI	32	40.0	0.013 ± 0.0065	0.000 ± 0.015
Gifu, GIFU	32	56.5	0.024 ± 0.011	0.028 ± 0.016
Shizuoka, SHIZUOKA	32	90.5	0.035 ± 0.021	0.042 ± 0.017
Nagoya, AICHI	32	67.3	0.034 ± 0.010	0.012 ± 0.015
Ootsu, SHIGA	32	67.4	0.018 ± 0.012	0.013 ± 0.015
Kyoto, KYOTO	32	79.5	0.003 ± 0.021	0.000 ± 0.016
Kobe, HYOGO	35	85.2	0.019 ± 0.0083	0.020 ± 0.017
Nara, NARA	28	144.0	0.021 ± 0.012	0.038 ± 0.017
Wakayama, WAKAYAMA	32	68.2	0.057 ± 0.033	0.015 ± 0.016
Tottori, TOTTORI	32	104.1	0.049 ± 0.012	0.052 ± 0.018
Matsue, SHIMANE	32	54.4	0.018 ± 0.016	0.018 ± 0.086
Hiroshima, HIROSHIMA	35	107.0	0.014 ± 0.0083	0.001 ± 0.015
Ishii-machi, TOKUSHIMA	32	55.5	0.030 ± 0.0094	0.000 ± 0.018
Takamatsu, KAGAWA	32	71.0	0.034 ± 0.028	0.038 ± 0.019
Matsuyama, EHIME	32	114.5	0.013 ± 0.0092	0.019 ± 0.016
Dazaifu, FUKUOKA	32	101.1	0.016 ± 0.026	0.018 ± 0.016
Saga, SAGA	32	101.8	0.013 ± 0.0067	0.033 ± 0.017
Nagasaki, NAGASAKI	30	135.0	0.014 ± 0.0087	0.019 ± 0.016
Kumamoto, KUMAMOTO	32	160.7	0.0066 ± 0.0094	0.013 ± 0.016
Ooita, OOITA	32	100.3	0.014 ± 0.0090	0.000 ± 0.016
Miyazaki, MIYAZAKI	32	206.3	0.000 ± 0.018	0.022 ± 0.017
Yonagusuku-mura, OKINAWA	32	88.5	0.0088 ± 0.0087	0.007 ± 0.018

(1)-2 Strontium-90 and Cesium-137 in Rain and Dry Fallout(for WHO program)
(from Oct. 1992 to Mar. 1993)

-continued from NO.102 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)
October, 1992				
Akita, AKITA	33	91.7	0.0000±0.0078	0.000 ±0.014
Ichihara, CHIBA	33	320.9	0.007 ±0.027	0.013 ±0.016
Niigata, NIIGATA	33	116.4	0.26 ±0.019	0.040 ±0.019
Kanazawa, ISHIKAWA	31	92.0	0.002 ±0.018	0.008 ±0.018
Nagano, NAGANO	33	128.8	0.049 ±0.024	0.000 ±0.012
Osaka, OSAKA	31	143.4	0.075 ±0.023	0.007 ±0.016
Okayama, OKAYAMA	33	114.2	0.026 ±0.013	0.018 ±0.017
Yamaguchi, YAMAGUCHI	33	35.0	0.011 ±0.019	0.029 ±0.017
Kochi, KOCHI	33	181.8	0.013 ±0.024	0.006 ±0.015
Kagoshima, KAGOSHIMA	32	35.5	0.097 ±0.016	0.072 ±0.019
November, 1992				
Akita, AKITA	30	224.4	0.049 ±0.023	0.039 ±0.020
Niigata, NIIGATA	30	110.5	0.30 ±0.024	0.022 ±0.018
Kanazawa, ISHIKAWA	32	55.0	0.041 ±0.020	0.041 ±0.015
Nagano, NAGANO	29	36.2	0.000 ±0.018	0.017 ±0.014
Osaka, OSAKA	32	88.9	0.019 ±0.024	0.000 ±0.014
Okayamashi, OKAYAMA	30	25.8	0.025 ±0.0098	0.029 ±0.025
Yamaguchi, YAMAGUCHI	30	47.0	0.011 ±0.0073	0.015 ±0.013
Kohchi, KOHCHI	31	66.4	0.056 ±0.019	0.011 ±0.016
Kagoshima, KAGOSHIMA	31	40.5	0.069 ±0.013	0.031 ±0.017
December, 1992				
Akita, AKITA	31	170.7	0.021 ±0.0097	0.019 ±0.019
Ichihara, CHIBA	35	48.4	0.000 ±0.029	0.010 ±0.016
Niigata, NIIGATA	36	170.7	0.17 ±0.019	0.072 ±0.018
Kanazawa, ISHIKAWA	29	273.0	0.037 ±0.019	0.040 ±0.016
Nagano, NAGANO	36	45.6	0.002 ±0.018	0.026 ±0.018
Osaka, OSAKA	37	84.7	0.024 ±0.020	0.023 ±0.016
Okayama, OKAYAMA	30	42.8	0.004 ±0.011	0.023 ±0.016
Yamaguchi, YAMAGUCHI	35	72.0	0.005 ±0.022	0.011 ±0.013
Kochi, KOCHI	35	144.6	0.090 ±0.015	0.060 ±0.019
Kagoshima, KAGOSHIMA	26	97.5	0.095 ±0.014	0.039 ±0.019
January, 1993				
Akita, AKITA	33	113.5	0.009 ±0.017	0.037 ±0.017
Ichihara, CHIBA	29	148.2	0.000 ±0.022	0.015 ±0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Niigata, NIIGATA	28	81.8	0.18 ± 0.026	0.050 ± 0.018
Kanazawa, ISHIKAWA	33	280.0	0.000 ± 0.018	0.023 ± 0.016
Nagano, NAGANO	26	53.0	0.0053 ± 0.0088	0.015 ± 0.017
Osaka, OSAKA	28	53.3	0.010 ± 0.019	0.009 ± 0.016
Okayamashi, OKAYAMA	28	55.3	0.015 ± 0.014	0.000 ± 0.014
Yamaguchi, YAMAGUCHI	29	86.5	0.013 ± 0.0081	0.007 ± 0.016
Kohchi, KOHCHI	28	50.6	0.050 ± 0.024	0.022 ± 0.017
Kagoshima, KAGOSHIMA	36	96.5	0.043 ± 0.011	0.000 ± 0.015
February, 1993				
Akita, AKITA	30	197.6	0.000 ± 0.021	0.025 ± 0.017
Ichihara, CHIBA	30	72.4	0.023 ± 0.023	0.029 ± 0.017
Niigata, NIIGATA	30	126.5	0.14 ± 0.024	0.11 ± 0.021
Kanazawa, ISHIKAWA	33	306.0	0.015 ± 0.0089	0.058 ± 0.019
Nagano, NAGANO	33	68.6	0.0028 ± 0.0090	0.001 ± 0.017
Osaka, OSAKA	30	72.7	0.008 ± 0.021	0.038 ± 0.017
Okayamashi, OKAYAMA	30	36.8	0.027 ± 0.011	0.026 ± 0.016
Yamaguchi, YAMAGUCHI	30	98.0	0.025 ± 0.0082	0.025 ± 0.016
Kohchi, KOHCHI	30	204.5	0.070 ± 0.011	0.043 ± 0.018
Kagoshima, KAGOSHIMA	29	91.0	0.077 ± 0.012	0.019 ± 0.017
March, 1993				
Akita, AKITA	32	66.1	0.018 ± 0.022	0.045 ± 0.016
Ichihara, CHIBA	32	86.2	0.046 ± 0.029	0.048 ± 0.019
Niigata, NIIGATA	32	120.5	0.18 ± 0.029	0.061 ± 0.019
Nagano, NAGANO	32	40.3	0.0032 ± 0.0081	0.000 ± 0.014
Osaka, OSAKA	31	85.9	0.010 ± 0.0071	0.017 ± 0.014
Okayamashi, OKAYAMA	32	68.7	0.013 ± 0.011	0.000 ± 0.015
Yamaguchi, YAMAGUCHI	32	99.0	0.012 ± 0.012	0.007 ± 0.015
Kohchi, KOHCHI	32	101.8	0.087 ± 0.016	0.020 ± 0.017
Kagoshima, KAGOSHIMA	35	191.0	0.052 ± 0.011	0.008 ± 0.014

(2) Strontium-90 and Cesium-137 in Airborne Dust
(from Oct. 1992 to Mar. 1993)

-continued from NO.102 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)
October～December, 1992				
Morioka, IWATE	10～12	11,111.0	0.00021± 0.00035	0.00007± 0.00033
Akita, AKITA	10～12	13,350.0	0.00066± 0.00054	0.00050± 0.00042
Yamagata, YAMAGATA	10～12	12,960.0	0.00000± 0.00037	0.00000± 0.00043
Ookuma-machi, FUKUSHIMA	10～12	9,156.0	0.00074± 0.00042	0.00000± 0.00040
Mito, IBARAKI	10～12	8,969.7	0.00044± 0.00041	0.00000± 0.00060
Utsunomiya, TOCHIGI	10～12	14,405.0	0.00097± 0.00035	0.00030± 0.00026
Maebashi, GUNMA	10～12	13,191.6	0.00055± 0.00070	0.00019± 0.00038
Ichihara, CHIBA	10～12	12,960.0	0.0012 ± 0.00079	0.00000± 0.00039
Yokohama, KANAGAWA	10～12	10,976.0	0.00029± 0.00036	0.0013 ± 0.00060
Niigata, NIIGATA	10～12	10,665.0	0.0000 ± 0.0010	0.00042± 0.00048
Kosugi-machi, TOYAMA	10～12	18,461.0	0.00056± 0.00026	0.00002± 0.00031
Fukui, FUKUI	10～12	11,433.0	0.00068± 0.00043	0.00083± 0.00061
Koufu, YAMANASHI	10～12	12,964.0	0.00058± 0.00075	0.00000± 0.00041
Nagano, NAGANO	10～12	15,633.0	0.00000± 0.00023	0.00008± 0.00023
Gifu, GIFU	10～12	10,568.0	0.00045± 0.00036	0.00030± 0.00058
Hamaoka-machi, SHIZUOKA	10～12	11,583.0	0.00023± 0.00035	0.00039± 0.00051
Nagoya, AICHI	10～12	7,530.0	0.0012 ± 0.00051	0.0013 ± 0.00080
Tsu, MIE	10～12	13,040.0	0.00071± 0.00062	0.00000± 0.00028
Ootsu, SHIGA	10～12	11,616.0	0.00024± 0.00032	0.00000± 0.00050
Kyoto, KYOTO	10～12	10,361.0	0.0013 ± 0.0010	0.00000± 0.00049
Osaka, OSAKA	10～12	15,742.0	0.00046± 0.00030	0.00079± 0.00041
Koube, HYOGO	10～12	9,699.0	0.00029± 0.00047	0.00064± 0.00064
Nara, NARA	10～12	11,579.5	0.00077± 0.00043	0.00000± 0.00042
Wakayama, WAKAYAMA	10～12	12,607.2	0.00000± 0.00053	0.00009± 0.00028
Tottori, TOTTORI	10～12	15,641.0	0.00071± 0.00030	0.00057± 0.00026
Okayama, OKAYAMA	10～12	12,364.0	0.00072± 0.00035	0.00000± 0.00028
Hiroshima, HIROSHIMA	10～12	10,260.0	0.0015 ± 0.00046	0.00000± 0.00054
Yamaguchi, YAMAGUCHI	10～12	18,902.0	0.00021± 0.00023	0.00026± 0.00031
Tokushima, TOKUSHIMA	10～12	12,960.0	0.00003± 0.00031	0.00000± 0.00038
Takamatsu, KAGAWA	10～12	15,782.0	0.00000± 0.00025	0.00037± 0.00038
Saga, SAGA	10～12	13,546.0	0.00052± 0.00049	0.00038± 0.00045
Nagasaki, NAGASAKI	10～12	10,067.0	0.00013± 0.00050	0.00019± 0.00037
Kumamoto, KUMAMOTO	10～12	10,758.0	0.00000± 0.00030	0.00000± 0.00052
Ooita, OOITA	10～12	10,419.0	0.00081± 0.00080	0.00000± 0.00030

Location	Sampling period	Absorption volume (m3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Miyazaki, MIYAZAKI	10～12	13,499.0	0.00031±0.00063	0.00000±0.00023
January～March, 1993				
Morioka, IWATE	1～3	10,589.0	0.0000 ±0.0010	0.00000±0.00053
Akita, AKITA	1～3	11,940.0	0.0012 ±0.00079	0.00000±0.00029
Yamagata, YAMAGATA	1～3	12,960.0	0.00000±0.00079	0.00029±0.00033
Ookuma-machi, FUKUSHIMA	1～3	7,968.0	0.0027 ±0.0013	0.00000±0.00068
Mito, IBARAKI	1～3	8,786.8	0.00000±0.00096	0.00029±0.00061
Utsunomiya, TOCHIGI	1～3	13,925.0	0.00000±0.00026	0.00000±0.00028
Maebashi, GUNMA	1～3	13,252.6	0.00000±0.00073	0.00025±0.00045
Ichihara, CHIBA	1～3	12,960.0	0.00000±0.00077	0.00000±0.00035
Yokohama, KANAGAWA	1～3	11,219.0	0.00000±0.00033	0.00000±0.00042
Niigata, NIIGATA	1～3	10,826.0	0.00081±0.00045	0.00004±0.00042
Kosugi-machi, TOYAMA	1～3	18,366.0	0.00000±0.00055	0.00002±0.00029
Fukui, FUKUI	1～3	10,258.0	0.0000 ±0.0010	0.00000±0.00033
Koufu, YAMANASHI	1～3	15,201.0	0.0018 ±0.00074	0.00074±0.00039
Nagano, NAGANO	1～3	13,122.0	0.0014 ±0.00072	0.00000±0.00024
Gifu, GIFU	1～3	11,066.4	0.00057±0.00076	0.00021±0.00032
Hamaoka-machi, SHIZUOKA	1～3	12,222.0	0.00017±0.00029	0.00016±0.00033
Nagoya, AICHI	1～3	9,769.0	0.0005 ±0.0011	0.00059±0.00057
Tsu, MIE	1～3	14,070.0	0.00035±0.00027	0.00000±0.00026
Ootsu, SHIGA	1～3	12,012.0	0.00000±0.00026	0.00019±0.00032
Kyoto, KYOTO	1～3	10,386.0	0.0016 ±0.0010	0.00000±0.00051
Osaka, OSAKA	1～3	17,766.0	0.00003±0.00036	0.00000±0.00021
Koube, HYOGO	1～3	9,844.0	0.00054±0.00091	0.00000±0.00031
Nara, NARA	1～3	11,482.9	0.00000±0.00084	0.00062±0.00044
Wakayama, WAKAYAMA	1～3	12,945.0	0.00069±0.00090	0.00000±0.00040
Tottori, TOTTORI	1～3	12,891.0	0.00006±0.00090	0.00000±0.00040
Okayama, OKAYAMA	1～3	10,634.0	0.00000±0.00094	0.00000±0.00050
Hiroshima, HIROSHIMA	1～3	10,439.0	0.00033±0.00032	0.00070±0.00039
Yamaguchi, YAMAGUCHI	1～3	18,749.0	0.00034±0.00053	0.00000±0.00029
Tokushima, TOKUSHIMA	1～3	10,080.0	0.0012 ±0.00099	0.00050±0.00055
Takamatsu, KAGAWA	1～3	15,490.0	0.00008±0.00059	0.00056±0.00036
Saga, SAGA	1～3	12,455.5	0.00000±0.00070	0.00031±0.00032
Nagasaki, NAGASAKI	1～3	9,940.0	0.00000±0.00038	0.00000±0.00039
Kumamoto, KUMAMOTO	1～3	10,029.0	0.00036±0.00090	0.00000±0.00052
Ooita, OOITA	1～3	10,717.0	0.0010 ±0.00091	0.00093±0.00050
Miyazaki, MIYAZAKI	1～3	13,490.0	0.00028±0.00071	0.00012±0.00038

(3) Strontium-90 and Cesium-137 in Service Water
(from Oct. 1992 to Feb. 1993)

-continued from NO.102 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)			
December, 1992			
Urawa, SAITAMA	7.8	0.00 ± 0.14	0.015 ± 0.096
Kisarazu, CHIBA	7.7	1.5 ± 0.11	0.000 ± 0.080
Katsushika, TOKYO	7.3	1.4 ± 0.12	0.16 ± 0.091
Tsukui-machi, KANAGAWA	8.4	0.41 ± 0.099	0.000 ± 0.077
Nagano, NAGANO	7.4	1.2 ± 0.09	0.15 ± 0.085
Inuyama, AICHI	6.7	2.2 ± 0.12	0.074 ± 0.094
Moriguchi, OSAKA	7.2	3.5 ± 0.21	0.000 ± 0.083
Fukuoka, FUKUOKA	7.6	2.3 ± 0.13	0.019 ± 0.084
January, 1993			
Sapporo, HOKKIDO	6.9	1.6 ± 0.10	0.026 ± 0.085
Kyoto, KYOTO	7.4	3.8 ± 0.16	0.078 ± 0.083
(Tap Water)			
October, 1992			
Sendai, MIYAGI	-	2.2 ± 0.15	0.22 ± 0.097
November, 1992			
Nagano, NAGANO	7.2	0.84 ± 0.094	0.000 ± 0.078
December, 1991			
Wakkanai, HOKKAIDO	6.8	1.6 ± 0.10	0.19 ± 0.096
Aomori, AOMORI	6.9	1.1 ± 0.10	0.12 ± 0.080
Morioka, IWATE	6.9	1.1 ± 0.09	0.12 ± 0.083
Akita, AKITA	6.50	2.8 ± 0.14	0.078 ± 0.084
Yamagata, YAMAGATA	7.2	2.6 ± 0.23	0.14 ± 0.097
Fukushima, FUKUSHIMA	6.9	2.7 ± 0.13	0.013 ± 0.077
Mito, IBARAKI	7.35	1.5 ± 0.16	0.071 ± 0.086
Urawa, SAITAMA	6.9	1.5 ± 0.16	0.20 ± 0.097
Kisarazu, CHIBA	6.76	1.9 ± 0.11	0.000 ± 0.071
Katsushika, TOKYO	7.3	1.3 ± 0.13	0.16 ± 0.11
Tsukui-machi, KANAGAWA	7.3	0.56 ± 0.11	0.000 ± 0.076
Niigata, NIIGATA	7.36	3.0 ± 0.14	0.25 ± 0.088
Kosugi-machi, TOYAMA	7.1	2.4 ± 0.20	0.11 ± 0.080
Kanazawa, ISHIKAWA	7.52	2.8 ± 0.20	0.11 ± 0.088
Fukui, FUKUI	6.77	0.80 ± 0.14	0.000 ± 0.071

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
Gifu, GIFU	6.74	1.4 ± 0.21	0.035 ± 0.093
Shizuoka, SHIZUOKA	7.5	1.0 ± 0.14	0.000 ± 0.080
Nagoya, AICHI	6.7	2.3 ± 0.12	0.095 ± 0.084
Tsu, MIE	6.9	2.4 ± 0.12	0.000 ± 0.078
Ootsu, SHIGA	6.5	4.4 ± 0.41	0.13 ± 0.10
Osaka, OSAKA	7.0	3.3 ± 0.14	0.000 ± 0.082
Koube, HYOGO	7.43	3.4 ± 0.24	0.000 ± 0.094
Nara, NARA	6.9	2.9 ± 0.22	0.007 ± 0.091
Matsue, SHIMANE	-	3.7 ± 0.16	0.000 ± 0.086
Okayama, OKAYAMA	7.2	2.7 ± 0.19	0.012 ± 0.076
Ube, YAMAGUCHI	7.0	3.3 ± 0.25	0.033 ± 0.074
Takamatsu, KAGAWA	7.6	2.6 ± 0.20	0.11 ± 0.073
Matsuyama, EHIME	7.4	1.3 ± 0.10	0.000 ± 0.084
Kochi, KOCHI	7.4	1.7 ± 0.13	0.13 ± 0.083
Fukuoka, FUKUOKA	7.2	3.4 ± 0.15	0.056 ± 0.081
Saga, SAGA	7.8	2.2 ± 0.20	0.000 ± 0.086
Kumamoto, KUMAMOTO	7.5	0.019 ± 0.037	0.000 ± 0.085
Ooita, OOITA	8.00	0.81 ± 0.13	0.13 ± 0.085
Miyazaki, MIYAZAKI	7.08	1.4 ± 0.09	0.014 ± 0.079
Kagoshima, KAGOSHIMA	7.1	0.37 ± 0.055	0.024 ± 0.077
January, 1993			
Maebashi, GUNMA	7.0	1.4 ± 0.12	0.15 ± 0.092
Koufu, YAMANASHI	6.6	1.2 ± 0.11	0.000 ± 0.082
Kyoto, KYOTO	7.2	0.025 ± 0.045	0.000 ± 0.066
Shinguu, WAKAYAMA	7.0	1.4 ± 0.18	0.000 ± 0.085
Hiroshima, HIROSHIMA	6.85	2.5 ± 0.19	0.17 ± 0.076
Tokushima, TOKUSHIMA	7.0	1.3 ± 0.13	0.01 ± 0.11
February, 1993			
Tottori, TOTTORI	7.5	1.9 ± 0.11	0.018 ± 0.078

(4) Strontium-90 and Cesium-137 in Freshwater
(from Nov. 1992 to Dec. 1993)

-continued from NO.102 of this publication-

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

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
(Freshwater)			
November, 1992			
Niigata, NIIGATA	7.68	4.9 ± 0.18	0.23 ± 0.099
December, 1992			
Suwa, NAGANO	8.7	0.95 ± 0.079	0.25 ± 0.097
Uji, KYOTO	7.0	3.3 ± 0.15	0.000 ± 0.070
Shohara, HIROSHIMA	6.80	1.9 ± 0.18	0.000 ± 0.081

(5) Strontium-90 and Cesium-137 in Sea Water
(Dec. 1992)

-continued from NO.102 of this publication-

Table (5): Strontium-90 and Cesium-137 in Sea Water

Location	Sample volume analyzed (ℓ)	Cl (‰)	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
December, 1992 Kaseta, KAGOSHIMA	40.0	18.9	2.3 ± 0.20	3.5 ± 0.39

(6) Strontium-90 and Cesium-137 in Sea Sediments
(Dec. 1992)

-continued from NO. 102 of this publication-

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

Location	Depth (m)	^{90}Sr (Bq/kg·dried Soil)	^{137}Cs (Bq/kg·dried Soil)
December, 1992 Kaseta, KAGOSHIMA	14	0.037 ± 0.049	0.29 ± 0.082

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

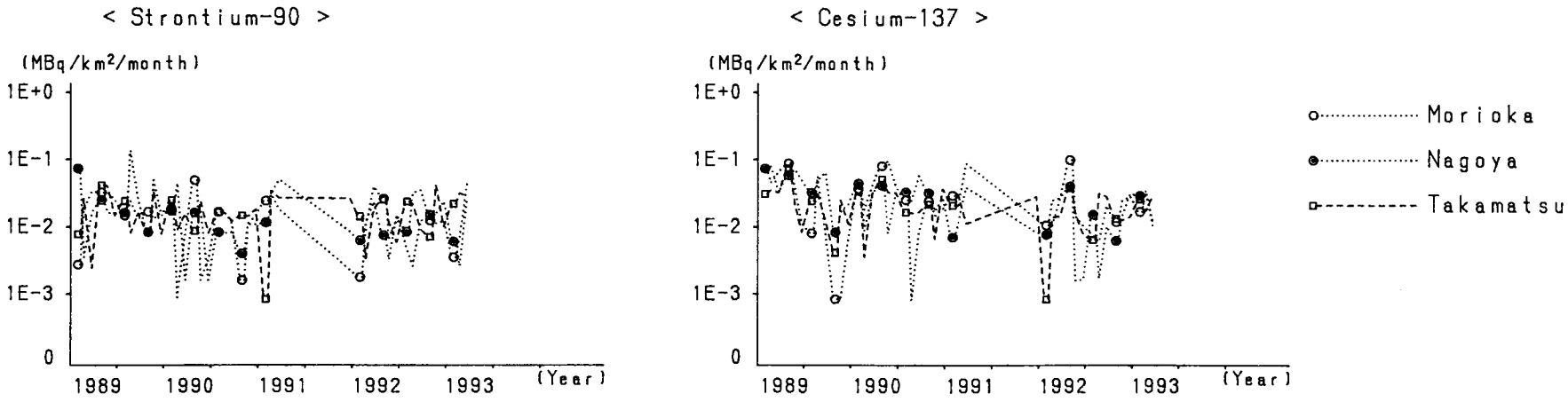


Fig. 1-1

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

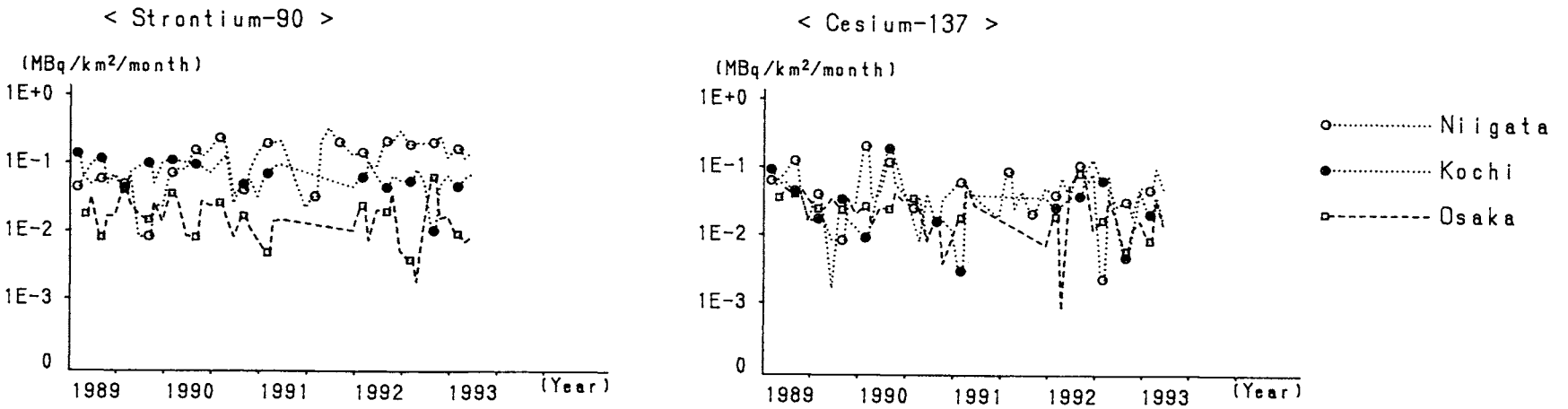


Fig. 1-2

* * * Airborne Dust * * *

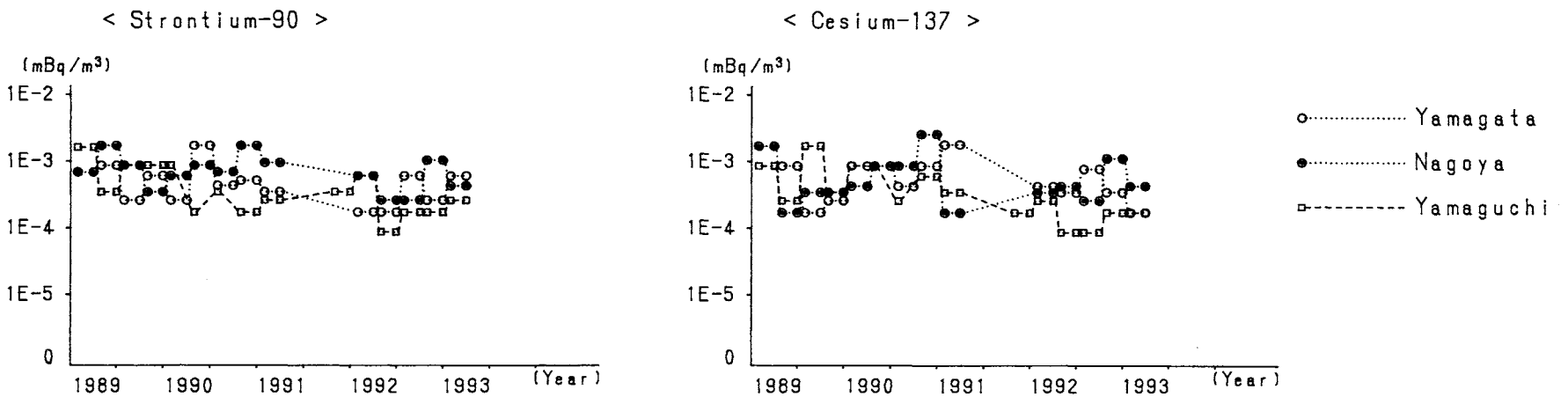


Fig. 2

* * * Airborne Dust * * *

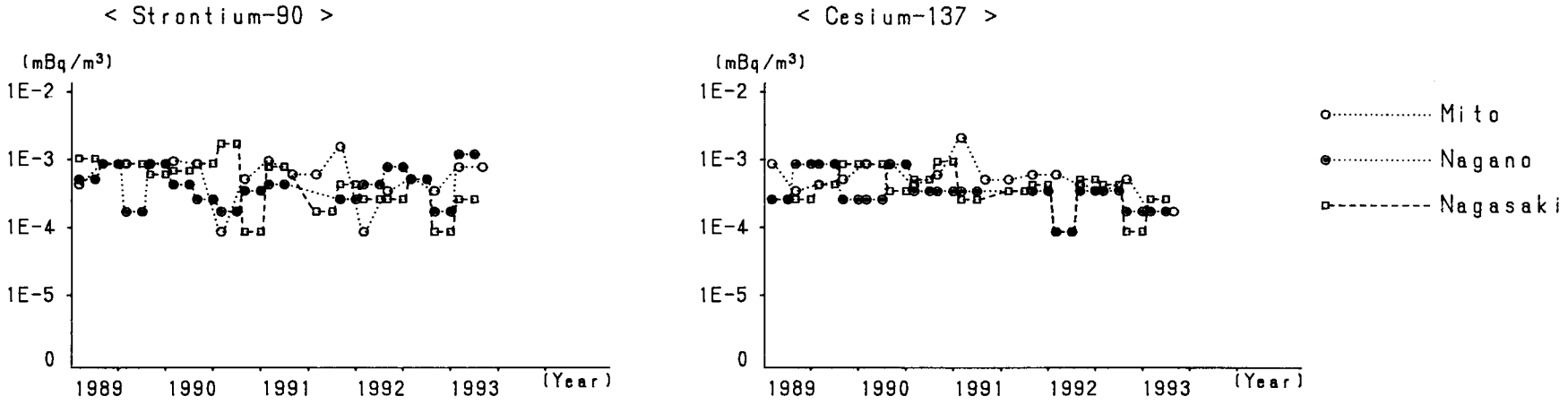


Fig. 2

* * * Source water * * *

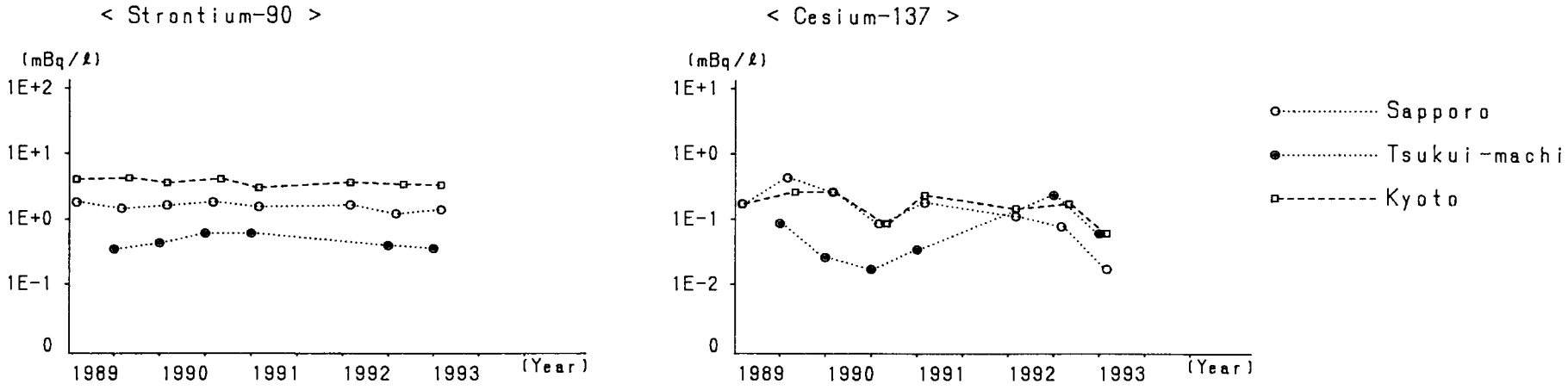


Fig.3-1

* * * Tap water * * *

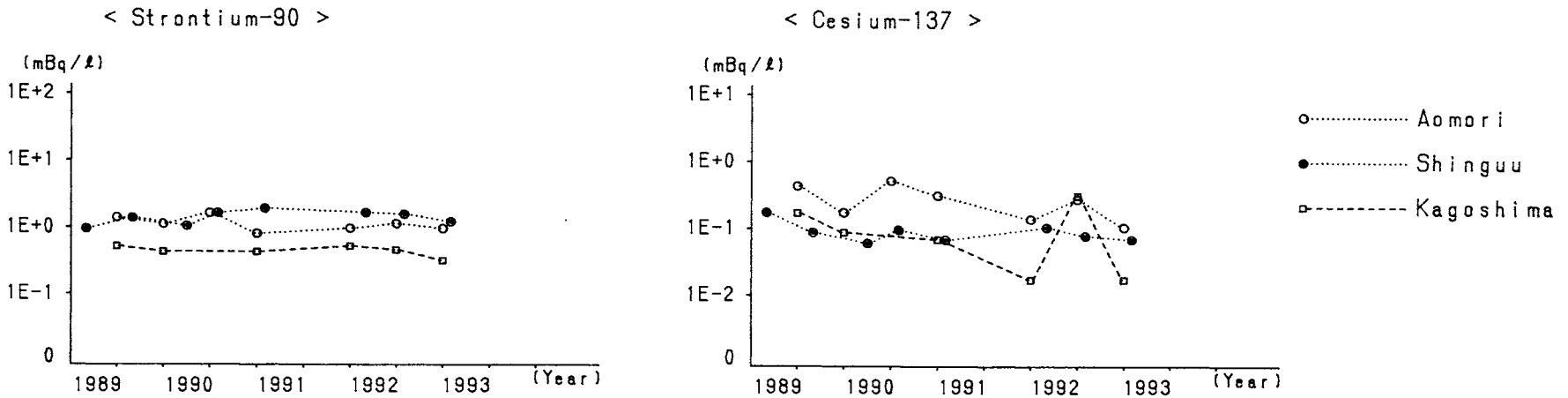


Fig.3-2

* * * Freshwater * * *

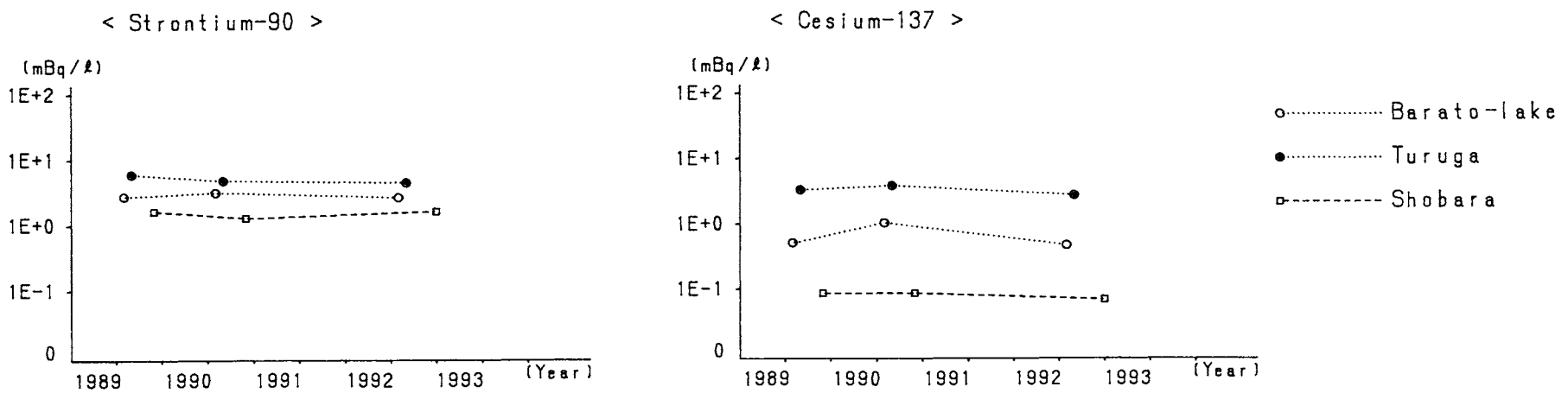


Fig. 4

* * *　Soil　* * *

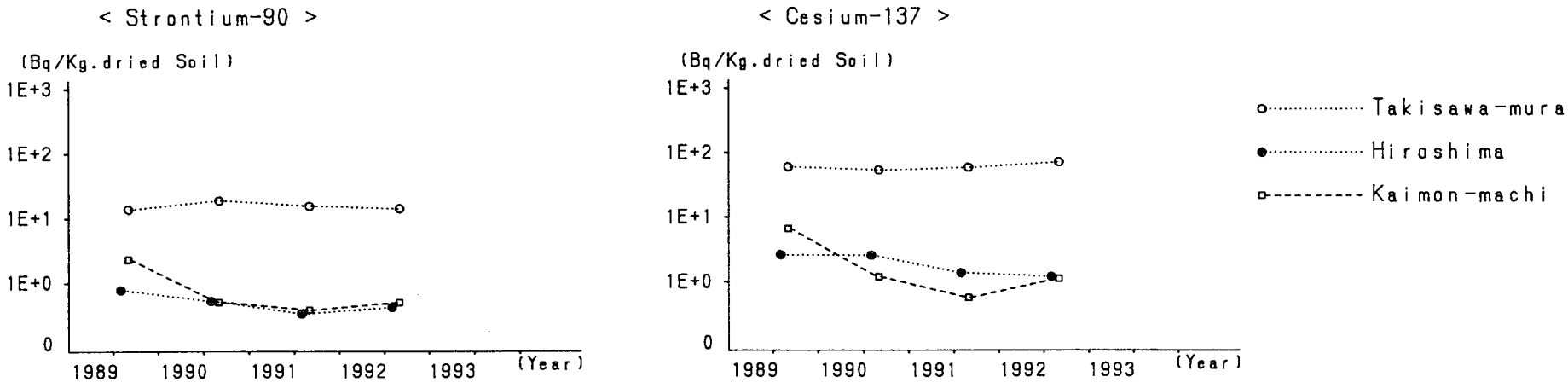

< Strontium-90 >
(Bq/Kg.dried Soil)
1E+3
1E+2
1E+1
1E+0
0
1989
1990
1991
1992
1993
(Year)
< Cesium-137 >
(Bq/Kg.dried Soil)
1E+3
1E+2
1E+1
1E+0
0
1989
1990
1991
1992
1993
(Year)
Takisawa-mura
Hiroshima
Kaimon-machi

Fig.5

* * * Sea Water * * *

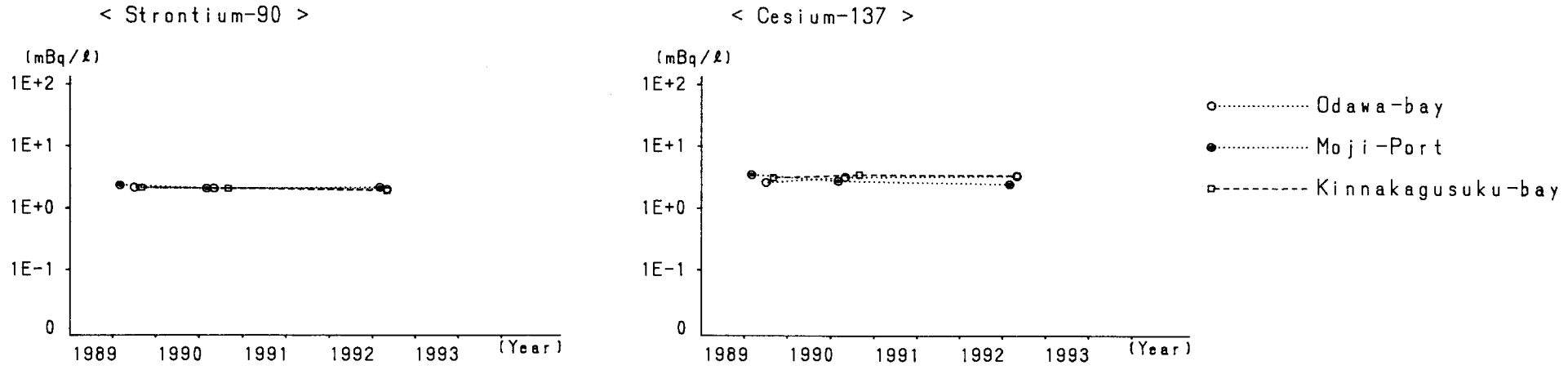


Fig.6

* * * Sea Sediments * * *

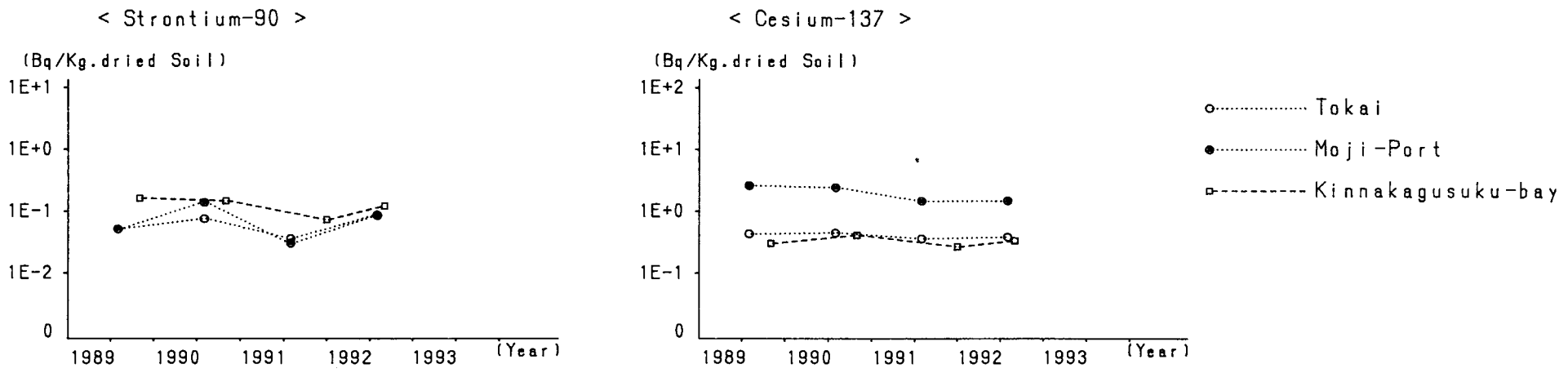
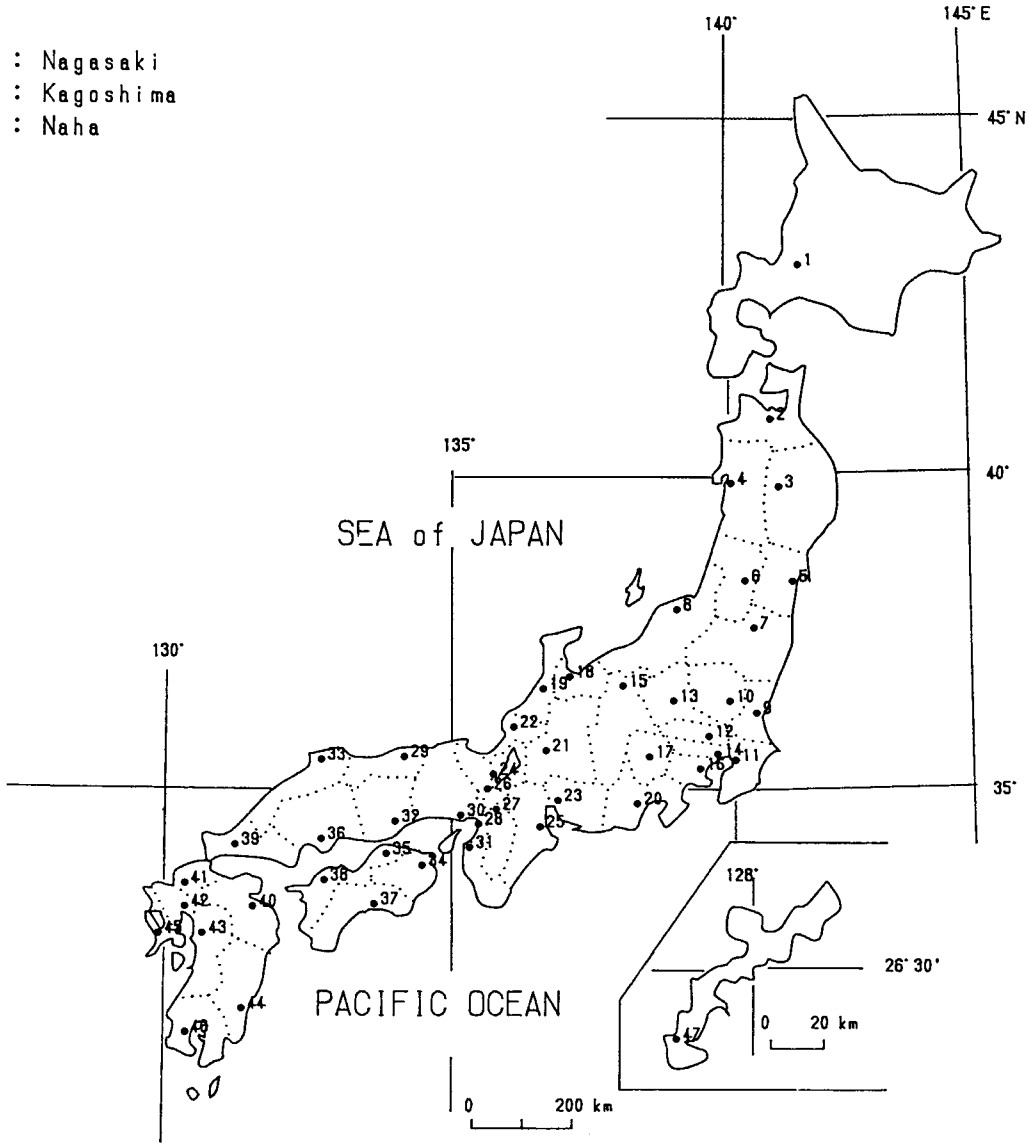


Fig.7

** 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 : Maebashi
14 : Shinjuku
15 : Nagano
16 : Yokohama
17 : Koufu
18 : Toyama
19 : Kanazawa
20 : Shizuoka
21 : Gifu
22 : Fukui
23 : Nagoya
24 : Ootsu
25 : Tsu
26 : Kyoto
27 : Nara
28 : Osaka
29 : Tottori
30 : Kobe
31 : Wakayama
32 : Okayama
33 : Matsue
34 : Tokushima
35 : Takamatsu
36 : Hiroshima
37 : Kochi
38 : Matsuyama
39 : Yamaguchi
40 : Ooita
41 : Fukuoka
42 : Saga
43 : Kumamoto
44 : Miyazaki
45 : Nagasaki
46 : Kagoshima
47 : Naha



** 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 : Maebaahi
14 : Shinjuku
15 : Nagano
16 : Yokohama
17 : Koufu
18 : Toyama
19 : Kanazawa
20 : Shizuoka
21 : Gifu
22 : Fukui
23 : Nagoya
24 : Ootsu
25 : Tsu
26 : Kyoto
27 : Nara
28 : Osaka
29 : Tottori
30 : Kobe
31 : Wakayama
32 : Okayama
33 : Matsue
34 : Tokushima
35 : Takamatsu
36 : Hiroshima
37 : Kochi
38 : Matsuyama
39 : Yamaguchi
40 : Ooita
41 : Fukuoka
42 : Saga
43 : Kumamoto
44 : Miyazaki
45 : Nagasaki
46 : Kagoshima
47 : Naha