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RADIOACTIVITY SURVEY DATA in Japan

Part 1
= Environmental Materials =

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National Institute of Radiological Sciences
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Contents

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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.

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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 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 Jul. 1991 to Mar. 1992)

-continued from NO. 98 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)
July, 1991				
Kyoto, KYOTO	32	277.5	0.022 ± 0.021	0.000 ± 0.015
Matsue, SHIMANE	32	289.4	0.0095 ± 0.0065	0.0038 ± 0.012
Miyazaki, MIYAZAKI	32	196.8	0.004 ± 0.018	0.013 ± 0.013
August, 1991				
Kyoto, KYOTO	33	19.0	0.021 ± 0.018	0.015 ± 0.018
Matsue, SHIMANE	32	62.4	0.006 ± 0.011	0.022 ± 0.011
Nagasaki, NAGASAKI	33	232.5	0.011 ± 0.011	0.028 ± 0.018
Ooita, OOITA	33	343.0	0.000 ± 0.011	0.018 ± 0.018
Miyazaki, MIYAZAKI	33	215.6	0.25 ± 0.029	0.049 ± 0.016
September, 1991				
Onagawa-machi, MIYAGI	30	238.5	0.0047 ± 0.0091	0.019 ± 0.017
Mito, IBARAKI	30	450.0	0.015 ± 0.022	0.000 ± 0.018
Utsunomiya, TOCHIGI	30	328.9	0.000 ± 0.017	0.032 ± 0.014
Ootsu, SHIGA	31	121.3	0.029 ± 0.021	0.017 ± 0.014
Kyoto, KYOTO	31	87.5	0.006 ± 0.017	0.015 ± 0.016
Matsue, SHIMANE	31	143.4	0.053 ± 0.013	0.094 ± 0.016
Nagasaki, NAGASAKI	30	218.0	0.0000 ± 0.0098	0.000 ± 0.017
Ooita, OOITA	30	267.9	0.000 ± 0.012	0.008 ± 0.018
Miyazaki, MIYAZAKI	30	537.9	0.000 ± 0.016	0.007 ± 0.011
October, 1991				
Aomori, AOMORI	33	76.0	0.018 ± 0.0076	0.027 ± 0.021
Onagawa-machi, MIYAGI	32	378.5	0.0000 ± 0.0086	0.000 ± 0.018
Shinjyuku, TOKYO	32	487.1	0.003 ± 0.011	0.003 ± 0.019
Maebashi, GUNMA	32	312.0	0.000 ± 0.011	0.014 ± 0.013
Utsunomiya, TOCHIGI	32	320.4	0.000 ± 0.017	0.000 ± 0.011
Ootsu, SHIGA	32	245.4	0.000 ± 0.019	0.001 ± 0.012
Kyoto, KYOTO	32	233.5	0.023 ± 0.018	0.000 ± 0.016
Tottori, TOTTORI	32	96.3	0.053 ± 0.015	0.013 ± 0.016
Matsue, SHIMANE	32	62.5	0.0080 ± 0.0048	0.022 ± 0.012
Matsuyama, EHIME	32	33.5	0.0000 ± 0.0066	0.000 ± 0.015
Ishii-machi, TOKUSHIMA	33	136.0	0.021 ± 0.0088	0.028 ± 0.018
Nagasaki, NAGASAKI	32	43.0	0.030 ± 0.013	0.000 ± 0.016
Ooita, OOITA	32	49.1	0.000 ± 0.011	0.004 ± 0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Miyazaki, MIYAZAKI	32	195.6	0.000 ± 0.017	0.010 ± 0.011
November, 1991				
Sapporo, HOKKAIDO	32	45.5	0.018 ± 0.012	0.000 ± 0.018
Aomori, AOMORI	32	87.5	0.024 ± 0.0080	0.012 ± 0.018
Onagawa-machi, MIYAGI	32	48.5	0.0058 ± 0.0071	0.016 ± 0.017
Ichihara, CHIBA	32	173.1	0.000 ± 0.016	0.019 ± 0.019
Shinjyuku, TOKYO	32	92.4	0.0082 ± 0.0086	0.017 ± 0.017
Maebashi, GUNMA	32	30.5	0.017 ± 0.0080	0.036 ± 0.016
Utsunomiya, TOCHIGI	32	74.6	0.013 ± 0.018	0.000 ± 0.011
Koufu, YAMANASHI	32	17.8	0.0080 ± 0.0097	0.024 ± 0.018
Ootsu, SHIGA	31	88.0	0.015 ± 0.012	0.001 ± 0.016
Kyoto, KYOTO	33	103.5	0.003 ± 0.017	0.023 ± 0.019
Tottori, TOTTORI	32	126.1	0.095 ± 0.041	0.059 ± 0.020
Matsue, SHIMANE	32	88.1	0.026 ± 0.0076	0.076 ± 0.016
Hiroshima, HIROSHIMA	32	40.7	0.0059 ± 0.0072	0.021 ± 0.017
Matsuyama, EHIME	32	54.5	0.0036 ± 0.0074	0.000 ± 0.016
Ishii-machi, TOKUSHIMA	32	111.0	0.0000 ± 0.0080	0.000 ± 0.014
Nagasaki, NAGASAKI	32	62.5	0.000 ± 0.019	0.021 ± 0.018
Ooita, OOITA	32	58.9	0.0011 ± 0.0081	0.000 ± 0.013
Miyazaki, MIYAZAKI	32	85.7	0.013 ± 0.017	0.000 ± 0.017
Yonagusuku-mura, OKINAWA	33	48.0	0.000 ± 0.013	0.028 ± 0.024
December, 1991				
Sapporo, HOKKAIDO	26	39.0	0.002 ± 0.011	0.009 ± 0.017
Aomori, AOMORI	36	75.5	0.011 ± 0.0074	0.053 ± 0.021
Onagawa-machi, MIYAGI	36	34.5	0.015 ± 0.0080	0.042 ± 0.020
Ookuma-machi, FUKUSHIMA	34	19.3	0.006 ± 0.011	0.005 ± 0.012
Ichihara, CHIBA	34	46.5	0.030 ± 0.019	0.032 ± 0.016
Shinjyuku, TOKYO	34	41.8	0.022 ± 0.010	0.022 ± 0.014
Maebashi, GUNMA	34	16.5	0.014 ± 0.0089	0.019 ± 0.016
Utsunomiya, TOCHIGI	34	22.9	0.012 ± 0.0076	0.014 ± 0.021
Fukui, FUKUI	43	203.3	0.000 ± 0.041	0.17 ± 0.091
Koufu, YAMANASHI	34	10.4	0.011 ± 0.011	0.016 ± 0.019
Shizuoka, SHIZUOKA	36	62.0	0.017 ± 0.011	0.017 ± 0.014
Nagoya, AICHI	34	70.4	0.011 ± 0.0071	0.011 ± 0.016
Tsu, MIE	34	50.5	0.011 ± 0.012	0.054 ± 0.018
Ootsu, SHIGA	37	19.7	0.000 ± 0.013	0.035 ± 0.018
Kyoto, KYOTO	36	59.0	0.000 ± 0.018	0.023 ± 0.020
Kobe, HYOGO	28	16.6	0.009 ± 0.011	0.000 ± 0.016
Nara, NARA	36	39.1	0.029 ± 0.018	0.008 ± 0.013

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Wakayama, WAKAYAMA	36	39.0	0.021 ± 0.032	0.056 ± 0.020
Tottori, TOTTORI	36	209.1	0.12 ± 0.028	0.016 ± 0.018
Matsue, SHIMANE	26	93.8	0.021 ± 0.0053	0.030 ± 0.014
Hiroshima, HIROSHIMA	37	75.2	0.016 ± 0.018	0.013 ± 0.016
Matsuyama, EHIME	34	73.0	0.0028 ± 0.0090	0.000 ± 0.018
Ishii-machi, TOKUSHIMA	35	31.0	0.0000 ± 0.0082	0.003 ± 0.016
Takamatsu, KAGAWA	32	41.0	0.032 ± 0.021	0.035 ± 0.018
Dazaifu, FUKUOKA	36	29.4	0.0056 ± 0.0084	0.017 ± 0.017
Nagasaki, NAGASAKI	36	59.0	0.000 ± 0.010	0.020 ± 0.016
Kumamoto, KUMAMOTO	34	57.9	0.0047 ± 0.0087	0.017 ± 0.018
Ooita, OOITA	34	26.9	0.0000 ± 0.0072	0.015 ± 0.015
Miyazaki, MIYAZAKI	34	73.8	0.003 ± 0.017	0.000 ± 0.018
Yonagusuku-mura, OKINAWA	36	19.0	0.000 ± 0.011	0.000 ± 0.010
January, 1992				
Sapporo, HOKKAIDO	37	86.5	0.0028 ± 0.0075	0.016 ± 0.016
Aomori, AOMORI	27	62.5	0.018 ± 0.0085	0.041 ± 0.021
Onagawa-machi, MIYAGI	29	24.5	0.000 ± 0.017	0.001 ± 0.012
Morioka, IWATE	29	39.4	0.0021 ± 0.0094	0.012 ± 0.013
Yamagata, YAMAGATA	29	57.9	0.0000 ± 0.0082	0.005 ± 0.015
Ookuma-machi, FUKUSHIMA	31	56.3	0.021 ± 0.012	0.015 ± 0.012
Mito, IBARAKI	27	75.0	0.000 ± 0.015	0.042 ± 0.019
Ichihara, CHIBA	29	62.2	0.0000 ± 0.0070	0.000 ± 0.014
Shinjyuku, TOKYO	29	81.0	0.0047 ± 0.0082	0.044 ± 0.015
Yokohama, KANAGAWA	36	58.8	0.020 ± 0.0087	0.025 ± 0.018
Maebashi, GUNMA	29	21.0	0.017 ± 0.018	0.015 ± 0.013
Urawa, SAITAMA	31	68.6	0.019 ± 0.014	0.020 ± 0.015
Utsunomiya, TOCHIGI	31	40.9	0.052 ± 0.018	0.22 ± 0.031
Kosugi-machi, TOYAMA	27	201.9	0.038 ± 0.0085	0.036 ± 0.017
Fukui, FUKUI	22	163.6	0.000 ± 0.045	0.013 ± 0.090
Koufu, YAMANASHI	29	4.6	0.0047 ± 0.0067	0.021 ± 0.017
Shizuoka, SHIZUOKA	29	43.0	0.011 ± 0.010	0.040 ± 0.018
Gifu, GIFU	29	47.3	0.047 ± 0.024	0.060 ± 0.021
Nagoya, AICHI	29	40.9	0.0073 ± 0.0077	0.0000 ± 0.0097
Tsu, MIE	29	37.5	0.047 ± 0.012	0.047 ± 0.019
Ootsu, SHIGA	27	29.6	0.021 ± 0.0089	0.000 ± 0.020
Kyoto, KYOTO	26	13.5	0.000 ± 0.018	0.000 ± 0.020
Kobe, HYOGO	36	25.4	0.007 ± 0.011	0.022 ± 0.016
Nara, NARA	27	81.5	0.032 ± 0.019	0.028 ± 0.014
Wakayama, WAKAYAMA	32	23.0	0.013 ± 0.023	0.000 ± 0.011

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Matsue, SHIMANE	37	173.0	0.030 ± 0.0065	0.065 ± 0.017
Hiroshima, HIROSHIMA	26	27.0	0.013 ± 0.0078	0.000 ± 0.015
Matsuyama, EHIME	29	54.5	0.018 ± 0.017	0.014 ± 0.012
Takamatsu, KAGAWA	31	42.0	0.017 ± 0.0087	0.001 ± 0.017
Dazaifu, FUKUOKA	27	103.8	0.025 ± 0.018	0.039 ± 0.020
Saga, SAGA	27	11.6	0.0000 ± 0.0089	0.003 ± 0.015
Nagasaki, NAGASAKI	27	41.5	0.018 ± 0.019	0.009 ± 0.013
Kumamoto, KUMAMOTO	29	50.1	0.018 ± 0.018	0.020 ± 0.020
Ooita, OOITA	29	39.2	0.004 ± 0.016	0.015 ± 0.014
Miyazaki, MIYAZAKI	29	109.6	0.000 ± 0.016	0.000 ± 0.017
Yonagusuku-mura, OKINAWA	29	122.5	0.007 ± 0.018	0.018 ± 0.015
February, 1992				
Sapporo, HOKKAIDO	31	28.0	0.009 ± 0.017	0.009 ± 0.020
Aomori, AOMORI	31	106.0	0.048 ± 0.010	0.006 ± 0.017
Onagawa-machi, MIYAGI	29	10.0	0.000 ± 0.018	0.019 ± 0.014
Morioka, IWATE	31	17.4	0.012 ± 0.010	0.030 ± 0.014
Yamagata, YAMAGATA	31	36.1	0.0021 ± 0.0097	0.033 ± 0.014
Ookuma-machi, FUKUSHIMA	29	0.1	0.028 ± 0.013	0.006 ± 0.010
Mito, IBARAKI	31	1.5	0.0053 ± 0.0074	0.006 ± 0.016
Ichihara, CHIBA	31	67.7	0.0060 ± 0.0082	0.047 ± 0.016
Shinjyuku, TOKYO	31	9.6	0.000 ± 0.018	0.032 ± 0.016
Yokohama, KANAGAWA	30	70.6	0.043 ± 0.012	0.011 ± 0.023
Maebashi, GUNMA	31	10.5	0.031 ± 0.019	0.084 ± 0.023
Urawa, SAITAMA	31	1.3	0.030 ± 0.016	0.052 ± 0.016
Utsunomiya, TOCHIGI	29	0.1	0.043 ± 0.018	0.18 ± 0.028
Kosugi-machi, TOYAMA	33	200.7	0.016 ± 0.0070	0.032 ± 0.016
Fukui, FUKUI	29	170.2	0.10 ± 0.060	0.04 ± 0.10
Koufu, YAMANASHI	31	6.6	0.0000 ± 0.0060	0.000 ± 0.015
Shizuoka, SHIZUOKA	29	63.5	0.017 ± 0.011	0.043 ± 0.015
Gifu, GIFU	31	57.5	0.000 ± 0.022	0.004 ± 0.013
Nagoya, AICHI	31	20.8	0.014 ± 0.0080	0.000 ± 0.012
Tsu, MIE	31	21.5	0.049 ± 0.014	0.068 ± 0.017
Ootsu, SHIGA	31	50.6	0.015 ± 0.0099	0.004 ± 0.017
Kyoto, KYOTO	29	49.0	0.000 ± 0.018	0.011 ± 0.020
Kobe, HYOGO	30	26.2	0.0000 ± 0.0095	0.000 ± 0.011
Wakayama, WAKAYAMA	30	5.0	0.00 ± 0.11	0.016 ± 0.027
Tottori, TOTTORI	31	172.6	0.040 ± 0.0099	0.043 ± 0.019
Matsue, SHIMANE	31	127.7	0.013 ± 0.0052	0.011 ± 0.013
Hiroshima, HIROSHIMA	29	30.7	0.0000 ± 0.0093	0.000 ± 0.010

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Matsuyama, EHIME	31	71.5	0.006 ± 0.016	0.024 ± 0.013
Ishii-machi, TOKUSHIMA	29	9.0	0.0056 ± 0.0074	0.010 ± 0.017
Takamatsu, KAGAWA	31	18.0	0.0049 ± 0.0080	0.017 ± 0.019
Dazaifu, FUKUOKA	31	53.5	0.023 ± 0.012	0.043 ± 0.018
Saga, SAGA	31	29.4	0.004 ± 0.010	0.035 ± 0.014
Nagasaki, NAGASAKI	31	123.5	0.085 ± 0.024	0.015 ± 0.013
Kumamoto, KUMAMOTO	31	85.3	0.013 ± 0.011	0.011 ± 0.012
Ooita, OOITA	31	9.0	0.000 ± 0.015	0.003 ± 0.011
Miyazaki, MIYAZAKI	31	38.4	0.029 ± 0.019	0.018 ± 0.020
Yonagusuku-mura, OKINAWA	29	233.0	0.005 ± 0.019	0.000 ± 0.013
March, 1992				
Sapporo, HOKKAIDO	31	16.5	0.011 ± 0.016	0.020 ± 0.020
Aomori, AOMORI	31	32.0	0.016 ± 0.018	0.066 ± 0.023
Onagawa-machi, MIYAGI	31	133.5	0.007 ± 0.020	0.026 ± 0.014
Morioka, IWATE	31	45.0	0.047 ± 0.014	0.033 ± 0.014
Yamagata, YAMAGATA	31	79.6	0.000 ± 0.021	0.020 ± 0.013
Ookuma-machi, FUKUSHIMA	31	198.3	0.000 ± 0.019	0.014 ± 0.017
Mito, IBARAKI	31	156.0	0.000 ± 0.016	0.044 ± 0.021
Ichihara, CHIBA	31	245.3	0.053 ± 0.018	0.018 ± 0.015
Shinjyuku, TOKYO	31	207.0	0.028 ± 0.020	0.032 ± 0.022
Yokohama, KANAGAWA	31	232.6	0.036 ± 0.019	0.090 ± 0.019
Maebashi, GUNMA	31	121.5	0.004 ± 0.017	0.039 ± 0.019
Urawa, SAITAMA	31	176.1	0.030 ± 0.016	0.052 ± 0.016
Utsunomiya, TOCHIGI	31	134.7	0.074 ± 0.021	1.2 ± 0.06
Kosugi-machi, TOYAMA	31	182.5	0.027 ± 0.0077	0.11 ± 0.019
Fukui, FUKUI	32	230.6	0.025 ± 0.039	0.000 ± 0.072
Koufu, YAMANASHI	31	149.5	0.005 ± 0.019	0.043 ± 0.018
Shizuoka, SHIZUOKA	31	211.0	0.030 ± 0.0093	0.025 ± 0.015
Gifu, GIFU	31	154.0	0.035 ± 0.013	0.035 ± 0.014
Nagoya, AICHI	31	179.4	0.028 ± 0.018	0.033 ± 0.014
Tsu, MIE	31	142.0	0.031 ± 0.0086	0.080 ± 0.018
Ootsu, SHIGA	31	175.0	0.007 ± 0.019	0.036 ± 0.016
Kyoto, KYOTO	34	176.5	0.003 ± 0.019	0.048 ± 0.020
Kobe, HYOGO	32	130.4	0.022 ± 0.0081	0.024 ± 0.015
Nara, NARA	59	177.4	0.029 ± 0.022	0.005 ± 0.012
Wakayama, WAKAYAMA	26	82.0	0.047 ± 0.026	0.009 ± 0.012
Tottori, TOTTORI	31	165.0	0.045 ± 0.011	0.055 ± 0.021
Matsue, SHIMANE	31	113.5	0.017 ± 0.0054	0.041 ± 0.014
Hiroshima, HIROSHIMA	32	196.4	0.000 ± 0.019	0.000 ± 0.012
Matsuyama, EHIME	31	233.0	0.071 ± 0.019	0.017 ± 0.014

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Ishii-machi, TOKUSHIMA	31	143.0	0.035 ± 0.0095	0.017 ± 0.014
Takamatsu, KAGAWA	31	138.5	0.022 ± 0.0078	0.000 ± 0.017
Dazaifu, FUKUOKA	31	317.3	0.024 ± 0.017	0.000 ± 0.011
Saga, SAGA	31	284.7	0.001 ± 0.016	0.000 ± 0.016
Nagasaki, NAGASAKI	31	295.5	0.008 ± 0.019	0.041 ± 0.020
Kumamoto, KUMAMOTO	31	291.6	0.001 ± 0.019	0.032 ± 0.019
Ooita, OOITA	31	312.0	0.000 ± 0.015	0.033 ± 0.021
Miyazaki, MIYAZAKI	31	467.2	0.000 ± 0.020	0.064 ± 0.020
Yonagusuku-mura, OKINAWA	30	186.5	0.015 ± 0.022	0.015 ± 0.022

(1)-2 Strontium-90 and Cesium-137 in Rain and Dry Fallout(for WHO program)
(from Jun. 1991 to Mar. 1992)

-continued from NO. 98 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)
June, 1991				
Niigata, NIIGATA	31	96.3	0.26 ± 0.032	0.022 ± 0.017
July, 1991				
Niigata, NIIGATA	32	222.6	0.40 ± 0.035	0.11 ± 0.020
August, 1991				
Niigata, NIIGATA	33	135.5	0.27 ± 0.032	0.032 ± 0.013
Sptember, 1991				
Niigata, NIIGATA	30	69.9	0.38 ± 0.034	0.053 ± 0.016
Kanazawa, ISHIKAWA	31	153.0	0.013 ± 0.0074	0.000 ± 0.016
October, 1991				
Niigat, NIIGATA	32	127.4	0.25 ± 0.029	0.026 ± 0.014
Kanazawa, ISHIKAWA	32	263.5	0.017 ± 0.0084	0.000 ± 0.018
November, 1991				
Niigata, NIIGATA	32	125.6	0.21 ± 0.026	0.036 ± 0.021
Kanazawa, ISHIKAWA	30	272.0	0.046 ± 0.011	0.070 ± 0.021
Yamaguchi, YAMAGUCHI	32	65.5	0.0000 ± 0.0076	0.008 ± 0.016
Kagoshima, KAGOSHIMA	33	37.5	0.041 ± 0.017	0.053 ± 0.020
December, 1991				
Akita, AKITA	30	127.2	0.034 ± 0.014	0.081 ± 0.020
Chiba, CHIBA	36	54.8	0.000 ± 0.020	0.000 ± 0.015
Niigata, NIIGATA	34	158.5	0.17 ± 0.025	0.067 ± 0.026
Kanazawa, ISHIKAWA	28	153.0	0.17 ± 0.018	0.037 ± 0.020
Nagano, NAGANO	34	5.6	0.014 ± 0.019	0.0000 ± 0.0096
Oosaka, OOSAKA	36	55.8	0.014 ± 0.0077	0.010 ± 0.014
Yamaguchi, YAMAGUCHI	34	46.5	0.000 ± 0.033	0.028 ± 0.018
Kohchi, KOHCHI	37	134.1	0.063 ± 0.011	0.052 ± 0.020
Kagoshima, KAGOSHIMA	25	42.0	0.045 ± 0.019	0.010 ± 0.018
January, 1991				
Akita, AKITA	33	154.6	0.010 ± 0.018	0.034 ± 0.020
Chiba, CHIBA	29	85.8	0.005 ± 0.018	0.020 ± 0.014
Niigata, NIIGATA	29	172.9	0.16 ± 0.025	0.044 ± 0.023
Kanazawa, ISHIKAWA	37	323.0	0.020 ± 0.015	0.020 ± 0.018
Nagano, NAGANO	29	47.2	0.0070 ± 0.0081	0.027 ± 0.019

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Oosaka, OOSAKA	26	20.9	0.024 ± 0.012	0.019 ± 0.018
Okayamashi, OKAYAMA	27	30.0	0.0082 ± 0.0080	0.014 ± 0.017
Yamaguchi, YAMAGUCHI	29	84.5	0.010 ± 0.0084	0.021 ± 0.017
Kohchi, KOHCHI	29	43.0	0.069 ± 0.011	0.029 ± 0.019
Kagoshima, KAGOSHIMA	34	67.5	0.12 ± 0.017	0.021 ± 0.013
February, 1991				
Akita, AKITA	31	123.6	0.028 ± 0.0086	0.030 ± 0.016
Chiba, CHIBA	29	13.8	0.000 ± 0.016	0.044 ± 0.018
Niigata, NIIGATA	31	188.3	0.11 ± 0.023	0.087 ± 0.025
Kanazawa, ISHIKAWA	29	187.0	0.025 ± 0.021	0.034 ± 0.017
Nagano, NAGANO	31	20.7	0.0029 ± 0.0072	0.005 ± 0.016
Oosaka, OOSAKA	32	57.0	0.0090 ± 0.0078	0.001 ± 0.015
Okayamashi, OKAYAMA	31	19.0	0.000 ± 0.017	0.004 ± 0.019
Yamaguchi, YAMAGUCHI	31	75.5	0.017 ± 0.0083	0.011 ± 0.014
Kohchi, KOHCHI	28	36.9	0.11 ± 0.022	0.031 ± 0.013
March, 1991				
Akita, AKITA	31	106.7	0.004 ± 0.019	0.061 ± 0.016
Chiba, CHIBA	31	195.1	0.035 ± 0.021	0.017 ± 0.016
Niigata, NIIGATA	31	111.3	0.22 ± 0.028	0.043 ± 0.022
Kanazawa, ISHIKAWA	27	184.0	0.003 ± 0.016	0.027 ± 0.015
Nagano, NAGANO	31	85.4	0.020 ± 0.019	0.023 ± 0.020
Oosaka, OOSAKA	30	169.4	0.024 ± 0.0084	0.064 ± 0.017
Okayamashi, OKAYAMA	31	201.6	0.014 ± 0.020	0.013 ± 0.018
Yamaguchi, YAMAGUCHI	31	266.5	0.035 ± 0.024	0.023 ± 0.021
Kohchi, KOHCHI	30	280.9	0.073 ± 0.011	0.042 ± 0.023
Kagoshima, KAGOSHIMA	33	325.5	0.038 ± 0.018	0.030 ± 0.017

(2) Strontium-90 and Cesium-137 in Airborne Dust
(from Apr. 1991 to Apr. 1992)

-continued from NO. 98 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				
Mito, IBARAKI	4～7	7,395.5	0.00072± 0.00075	0.00000± 0.00068
July～Septmber, 1991				
Wakayama, WAKAYAMA	7～9	5,119.2	0.0000 ± 0.0018	0.0007 ± 0.0010
Nagasaki, NAGASAKI	7～9	14,702.0	0.00024± 0.00025	0.00006± 0.00040
Miyazaki, MIYAZAKI	7～9	14,160.0	0.00000± 0.00031	0.00013± 0.00041
October～Nobember, 1991				
Ookuma-machi, FUKUSHIMA	10～11	7,993.0	0.0003 ± 0.0011	0.00033± 0.00066
October～December, 1991				
Ichihara, CHIBA	10～12	12,960.0	0.00065± 0.00071	0.00000± 0.00037
Maebashi, GUNMA	10～12	13,553.0	0.0010 ± 0.00070	0.00016± 0.00044
Utsunomiya, TOCHIGI	10～12	14,644.0	0.00006± 0.00028	0.00028± 0.00038
Niigata, NIIGATA	10～12	13,052.0	0.00050± 0.00073	0.00000± 0.00045
Nagano, NAGANO	10～12	12,839.0	0.00033± 0.00029	0.00000± 0.00042
Koufu, YAMANASHI	10～12	11,106.0	0.00000± 0.00072	0.00055± 0.00053
Ootsu, SHIGA	10～12	10,271.0	0.00000± 0.00079	0.00038± 0.00055
Kyoto, KYOTO	10～12	7,277.0	0.00000± 0.00092	0.00056± 0.00077
Nara, NARA	10～12	9,927.0	0.00000± 0.00086	0.00000± 0.00051
Wakayama, WAKAYAMA	10～12	15,789.6	0.00000± 0.00062	0.00057± 0.00037
Tottori, TOTTORI	10～12	16,864.0	0.00040± 0.00034	0.00028± 0.00036
Yamaguchi, YAMAGUCHI	10～12	21,338.0	0.00046± 0.00027	0.00026± 0.00028
Tokushima, TOKUSHIMA	10～12	10,080.0	0.00045± 0.00054	0.00005± 0.00062
Nagasaki, NAGASAKI	10～12	13,162.0	0.00053± 0.00029	0.00056± 0.00049
Ooita, OOITA	10～12	9,939.0	0.00074± 0.00041	0.00000± 0.00060
Miyazaki, MIYAZAKI	10～12	13,721.0	0.00044± 0.00043	0.00078± 0.00041
October～January, 1991				
Mito, IBARAKI	10～1	8,505.5	0.0018 ± 0.00075	0.00005± 0.00071
January～March, 1992				
Morioka, IWATE	1～3	10,177.0	0.00000± 0.00087	0.00040± 0.00062
Yamagata, YAMAGATA	1～3	12,960.0	0.00021± 0.00032	0.00058± 0.00048
Ichihara, CHIBA	1～3	12,960.0	0.00056± 0.00071	0.00000± 0.00038
Yokohama, KANAGAWA	1～3	12,256.0	0.00042± 0.00075	0.00033± 0.00050
Maebashi, GUNMA	1～3	12,619.4	0.00000± 0.00074	0.0010 ± 0.00047

Location	Sampling period	Absorption volume (m3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Utsunomiya, TOCHIGI	1～3	14,218.0	0.00000± 0.00061	0.00000± 0.00033
Niigata, NIIGATA	1～3	14,077.0	0.00000± 0.00039	0.00000± 0.00039
Kosugi-machi, TOYAMA	1～3	18,559.0	0.00034± 0.00030	0.00053± 0.00032
Fukui, FUKUI	1～3	10,911.0	0.00027± 0.00041	0.00091± 0.00057
Nagano, NAGANO	1～3	14,413.0	0.00000± 0.00055	0.00018± 0.00038
Shizuoka, SHIZUOKA	1～3	11,497.0	0.00007± 0.00033	0.00000± 0.00052
Gifu, GIFU	1～3	12,260.0	0.00007± 0.00032	0.00033± 0.00050
Nagoya, AICHI	1～3	10,845.0	0.00000± 0.00072	0.00000± 0.00043
Tsu, MIE	1～3	14,460.0	0.00000± 0.00027	0.00000± 0.00038
Ootsu, SHIGA	1～3	10,560.0	0.00029± 0.00078	0.00013± 0.00053
Kyoto, KYOTO	1～3	9,370.0	0.00055± 0.00078	0.00000± 0.00052
Oosaka, OOSAKA	1～3	17,121.0	0.00000± 0.00023	0.00000± 0.00033
Koube, HYOUGO	1～3	9,886.0	0.00030± 0.00046	0.0011 ± 0.00066
Nara, NARA	1～3	11,283.0	0.00000± 0.00079	0.00028± 0.00048
Wakayama, WAKAYAMA	1～3	15,415.0	0.00000± 0.00032	0.00035± 0.00037
Tottori, TOTTORI	1～3	15,828.0	0.00038± 0.00044	0.00020± 0.00034
Okayama, OKAYAMA	1～3	11,520.0	0.00000± 0.00053	0.00012± 0.00046
Hiroshima, HIROSIMA	1～3	10,548.0	0.00086± 0.00057	0.00017± 0.00052
Yamaguchi, YAMAGUCHI	1～3	20,196.0	0.00072± 0.00031	0.00030± 0.00026
Tokushima, TOKUSHIMA	1～3	11,220.0	0.0012 ± 0.00087	0.00067± 0.00056
Takamatsu, KAGAWA	1～3	16,772.0	0.00000± 0.00049	0.00000± 0.00033
Saga, SAGA	1～3	9,853.0	0.00000± 0.00039	0.00070± 0.00058
Nagasaki NAGASAKI	1～3	14,831.0	0.00033± 0.00039	0.00015± 0.00036
Kumamoto, KUMAMOTO	1～3	9,422.0	0.00036± 0.00045	0.00000± 0.00052
Ooita, OOITA	1～3	10,166.0	0.00000± 0.00089	0.00026± 0.00055
Miyazaki, MIYAZAKI	1～3	13,381.0	0.00000± 0.00040	0.00000± 0.00038
January～April, 1992				
Mito, IBARAKI	1～4	7,685.9	0.00013± 0.00065	0.00075± 0.00074
March, 1992				
Ookuma-machi, FUKUSHIMA	3	10,071.0	0.00000± 0.00081	0.00000± 0.00056

(3) Strontium-90 and Cesium-137 in Service Water
(from Jul. 1991 to Mar. 1992)

-continued from NO. 98 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, 1991			
Kisarazu, CHIBA	7.6	1.7 ± 0.16	0.13 ± 0.096
Katsushika, TOKYO	7.3	1.4 ± 0.20	0.15 ± 0.095
Nagano, NAGANO	7.3	1.1 ± 0.08	0.000 ± 0.069
Inuyama, AICHI	6.9	2.3 ± 0.20	0.13 ± 0.068
Fukuoka, FUKUOKA	6.8	2.4 ± 0.13	0.10 ± 0.085
January, 1992			
Sapporo, HOKKIDO	6.9	1.9 ± 0.16	0.13 ± 0.095
Kyoto, KYOTO	7.71	4.2 ± 0.15	0.17 ± 0.10
(Tap Water)			
July, 1991			
Niigata, NIIGATA	7.86	2.4 ± 0.20	0.060 ± 0.057
December, 1991			
Wakkanai, HOKKAIDO	6.8	1.8 ± 0.17	0.006 ± 0.060
Aomori, AOMORI	7.3	1.1 ± 0.08	0.16 ± 0.11
Sendai, MIYAGI	-	2.1 ± 0.19	0.000 ± 0.081
Akita, AKITA	7.03	2.9 ± 0.22	0.064 ± 0.059
Fukushima, FUKUSHIMA	-	2.8 ± 0.19	0.007 ± 0.085
Ichihara, CHIBA	7.17	2.5 ± 0.19	0.020 ± 0.088
Katsushika, TOKYO	7.3	1.3 ± 0.17	0.42 ± 0.11
Kanazawa, ISHIKAWA	7.77	2.4 ± 0.18	0.033 ± 0.076
Koufu, YAMANASHI	6.8	0.56 ± 0.083	0.000 ± 0.044
Nagoya, AICHI	6.7	2.4 ± 0.21	0.012 ± 0.063
Tsu, MIE	6.9	1.9 ± 0.19	0.13 ± 0.060
Ootsu, SHIGA	6.62	4.0 ± 0.17	0.088 ± 0.089
Nara, NARA	7.5	2.5 ± 0.19	0.000 ± 0.083
Shinguu, WAKAYAMA	7.0	1.9 ± 0.26	0.12 ± 0.11
Tottori, TOTTORI	7.1	1.7 ± 0.26	0.036 ± 0.053
Matsue, SHIMANE	-	3.7 ± 0.21	0.20 ± 0.096
Matsuyama, EHIME	7.6	2.0 ± 0.16	0.000 ± 0.086
Kochi, KOCHI	7.4	1.9 ± 0.11	0.18 ± 0.085
Takamatsu, KAGAWA	7.2	2.7 ± 0.21	0.088 ± 0.064
Fukuoka, FUKUOKA	7.0	3.7 ± 0.23	0.050 ± 0.064

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
Kumamoto, KUMAMOTO	6.2	0.000± 0.090	0.000± 0.052
Ooita, OOITA	7.6	0.55 ± 0.091	0.14 ± 0.099
Miyazaki, MIYAZAKI	7.08	1.3 ± 0.13	0.000± 0.088
Kagoshima, KAGOSHIMA	7.1	0.60 ± 0.11	0.027± 0.091
January, 1992			
Kyoto, KYOTO	7.70	3.8 ± 0.16	0.000± 0.084
Hiroshima, HIROSHIMA	6.70	2.7 ± 0.13	0.000± 0.079
Tokusyuma, TOKUSHIMA	6.8	1.8 ± 0.18	0.054± 0.090
February, 1992			
Shinguu, WAKAYAMA	7.0	1.9 ± 0.26	0.12 ± 0.11
Naha, OKINAWA	7.68	5.5 ± 0.28	0.04 ± 0.10
March, 1992			
Maebashi, GUNMA	7.3	1.6 ± 0.10	0.11 ± 0.10

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

-continued from NO. 98 of this publication-

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

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
(Freshwater)			
November, 1991			
Niigata, NIIGATA	6.80	3.5 ± 0.22	0.31 ± 0.11
December, 1991			
Suwa, NAGANO	6.9	0.89 ± 0.078	0.33 ± 0.10
Uzi, KYOTO	6.67	0.036 ± 0.035	0.000 ± 0.096

(5) Strontium-90 and Cesium-137 in Soil
(from May. 1991 to Oct. 1991)

-continued from NO. 96 of this publication-

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

Location	Sampling Depth (cm)	^{90}Sr (Bq/kg) (dried Soil)	^{90}Sr (MBq/km^2)	^{137}Cs (Bq/kg) (dried Soil)	^{137}Cs (MBq/km^2)
May, 1991					
Tokai-mura, IBARAKI	0～5	4.2 ± 0.21	200 ± 10	43 ± 0.7	2000 ± 30
〃	5～20	11 ± 0.3	1100 ± 30	3.6 ± 0.21	370 ± 22
Akabane-machi, AICHI	0～5	0.43 ± 0.11	22 ± 5.8	3.4 ± 0.21	170 ± 10
〃	5～20	0.15 ± 0.11	33 ± 24	0.66 ± 0.11	140 ± 24
Kanazawa, ISHIKAWA	0～5	8.3 ± 0.21	330 ± 8	9.0 ± 0.32	360 ± 13
〃	5～20	3.9 ± 0.15	610 ± 23	9.5 ± 0.32	1500 ± 50
June, 1991					
Fukushima, FUKUSHIMA	0～5	6.5 ± 0.20	78 ± 2.4	18 ± 0.5	220 ± 6
〃	5～20	3.7 ± 0.16	59 ± 2.5	8.5 ± 0.34	140 ± 5
Katsushika, TOKYO	0～5	0.51 ± 0.10	36 ± 7.3	3.8 ± 0.24	270 ± 17
〃	5～20	0.93 ± 0.12	200 ± 26	2.8 ± 0.21	600 ± 44
Naha, OKINAWA	0～5	1.2 ± 0.14	91 ± 11	5.9 ± 0.28	460 ± 22
〃	5～20	1.2 ± 0.14	150 ± 17	4.66 ± 0.26	560 ± 31
July, 1991					
Yamagata, YAMAGATA	0～5	3.1 ± 0.19	120 ± 8	21 ± 0.5	820 ± 19
〃	5～20	0.55 ± 0.099	57 ± 10	1.7 ± 0.15	170 ± 15
Imaichi, TOCHIGI	0～5	18 ± 0.3	410 ± 7	56 ± 0.8	1300 ± 20
〃	5～20	7.9 ± 0.21	520 ± 14	26 ± 0.5	1700 ± 30
Kashiwazaki, Niigata	0～5	0.93 ± 0.13	61 ± 8.5	24 ± 0.6	1600 ± 40
〃	5～20	0.62 ± 0.069	140 ± 15	8.6 ± 0.34	1900 ± 80
Kosugi-machi, TOYAMA	0～5	3.8 ± 0.24	260 ± 17	13 ± 0.4	910 ± 28
〃	5～20	6.3 ± 0.33	990 ± 52	2.1 ± 0.17	340 ± 27
Kanazawa, ISHIKAWA	0～5	8.3 ± 0.21	330 ± 8	9.0 ± 0.32	360 ± 13
〃	5～20	3.9 ± 0.15	610 ± 23	9.5 ± 0.32	1500 ± 50
Fukui, FUKUI	0～5	0.58 ± 0.11	32 ± 5.9	6.3 ± 0.27	350 ± 15
〃	5～20	0.61 ± 0.11	57 ± 10	1.6 ± 0.15	150 ± 14

Location	Sampling Depth (cm)	^{90}Sr (Bq/kg) (dried Soil)	^{90}Sr (MBq/km^2)	^{137}Cs (Bq/kg) (dried Soil)	^{137}Cs (MBq/km^2)
Gotenjyou, SHIZUOKA	0～5	0.79 ± 0.11	30 ± 4.0	13 ± 0.4	480 ± 14
〃	5～20	0.62 ± 0.095	89 ± 14	4.8 ± 0.24	680 ± 34
Gifu, GIFU	0～5	1.3 ± 0.10	62 ± 4.4	11 ± 0.4	500 ± 17
〃	5～20	2.5 ± 0.12	490 ± 24	8.4 ± 0.33	1600 ± 60
Tsu, MIE	0～5	0.33 ± 0.10	28 ± 8.9	1.9 ± 0.17	160 ± 15
〃	5～20	0.35 ± 0.11	89 ± 27	1.0 ± 0.14	260 ± 35
Nosyu-machi, SHIGA	0～5	0.21 ± 0.048	12 ± 2.9	13 ± 0.4	780 ± 24
〃	5～20	0.44 ± 0.061	57 ± 7.9	14 ± 0.4	1800 ± 50
Miyatsu, KYOTO	0～5	1.8 ± 0.16	77 ± 6.9	60 ± 0.9	2600 ± 40
〃	5～20	1.2 ± 0.14	320 ± 39	7.0 ± 0.31	1900 ± 80
Oosaka, OOSAKA	0～5	0.69 ± 0.12	36 ± 6.5	7.2 ± 0.31	380 ± 16
〃	5～20	1.1 ± 0.14	210 ± 27	3.5 ± 0.22	650 ± 41
Kaebara, NARA	0～5	1.2 ± 0.14	91 ± 11	5.9 ± 0.28	460 ± 22
〃	5～20	1.2 ± 0.14	150 ± 17	4.6 ± 0.26	560 ± 31
Kokufu-machi, TOTTORI	0～5	0.47 ± 0.099	39 ± 8.3	3.1 ± 0.21	250 ± 17
〃	5～20	1.0 ± 0.12	200 ± 25	2.4 ± 0.19	480 ± 38
Asahi-machi, OKAYAMA	0～5	0.18 ± 0.10	8.1 ± 4.5	0.37 ± 0.090	17 ± 4.0
〃	5～20	0.12 ± 0.090	14 ± 11	0.20 ± 0.071	23 ± 8.4
Hiroshima, HIROSHIMA	0～5	0.39 ± 0.095	16 ± 3.9	1.6 ± 0.16	66 ± 6.6
〃	5～20	2.0 ± 0.17	490 ± 41	7.6 ± 0.32	1900 ± 80
Matsuyama, EHIME	0～5	0.68 ± 0.12	46 ± 8.0	11 ± 0.3	710 ± 23
〃	5～20	0.15 ± 0.095	16 ± 9.8	1.7 ± 0.16	180 ± 17
Uesaka-machi, TOKUSHIMA	0～5	0.91 ± 0.14	97 ± 15	4.8 ± 0.25	520 ± 26
〃	5～20	0.85 ± 0.14	220 ± 36	4.7 ± 0.23	1200 ± 60
Sakaide, KAGAWA	0～5	3.7 ± 0.23	100 ± 6	25 ± 0.5	680 ± 14
〃	5～20	2.8 ± 0.21	260 ± 19	1.1 ± 0.13	110 ± 12
Fukuoka, FUKUOKA	0～5	7.8 ± 0.22	410 ± 11	10 ± 0.3	530 ± 17
〃	5～20	3.6 ± 0.15	470 ± 19	0.91 ± 0.12	120 ± 15
Kohama-machi, NAGASAKI	0～5	6.5 ± 0.20	170 ± 5	90 ± 1.0	2300 ± 30
〃	5～20	4.8 ± 0.18	540 ± 20	31 ± 0.6	3500 ± 70

Location	Sampling Depth (cm)	^{90}Sr (Bq/kg) (dried Soil)	^{90}Sr (MBq/km^2)	^{137}Cs (Bq/kg) (dried Soil)	^{137}Cs (MBq/km^2)
Saibara-mura, KUMAMOTO	0～5	8.2 ± 0.28	150 ± 5	77 ± 0.9	1400 ± 20
〃	5～20	7.5 ± 0.29	460 ± 18	19 ± 0.5	1200 ± 30
Sadohara-machi, MIYAZAKI	0～5	1.1 ± 0.12	81 ± 8.9	9.1 ± 0.33	660 ± 24
〃	5～20	1.0 ± 0.12	190 ± 23	8.9 ± 0.33	1700 ± 60
August, 1991					
Sappro, HOKKIDO	0～5	10 ± 0.3	420 ± 14	34 ± 0.7	1400 ± 30
〃	5～20	6.1 ± 0.27	870 ± 38	8.5 ± 0.34	1200 ± 50
Aomori, AOMORI	0～5	1.1 ± 0.14	38 ± 4.9	3.9 ± 0.24	140 ± 9
〃	5～20	0.54 ± 0.11	55 ± 12	0.052± 0.088	5.3± 9.0
Takisawa-mura, IWATE	0～5	18 ± 0.5	560 ± 14	69 ± 0.9	2100 ± 30
〃	5～20	11 ± 0.4	980 ± 32	4.0 ± 0.24	350 ± 21
Ichihara, CHIBA	0～5	0.20 ± 0.043	11 ± 2.4	2.6 ± 0.18	140 ± 10
〃	5～20	0.26 ± 0.048	61 ± 11	0.89± 0.11	210 ± 26
Yokohama, KANAGAWA	0～5	5.0 ± 0.24	160 ± 8	16 ± 0.5	510 ± 15
〃	5～20	6.8 ± 0.29	740 ± 31	11 ± 0.4	1200 ± 40
Maebashi, GUNMA	0～5	1.3 ± 0.09	71 ± 4.8	2.9 ± 0.19	160 ± 10
〃	5～20	1.7 ± 0.10	210 ± 13	2.8 ± 0.18	350 ± 23
Nagano, NAGANO	0～5	2.5 ± 0.18	59 ± 4.1	19 ± 0.5	440 ± 12
〃	5～20	2.0 ± 0.16	100 ± 8	1.7 ± 0.17	86 ± 8.3
Takane-machi, YAMANASHI	0～5	13 ± 0.4	220 ± 7	43 ± 0.8	740 ± 13
〃	5～20	7.3 ± 0.30	570 ± 24	11 ± 0.4	840 ± 30
Kasai, HYOGO	0～5	0.99 ± 0.14	46 ± 6.4	29 ± 0.6	1400 ± 30
〃	5～20	0.41 ± 0.13	39 ± 12	5.6 ± 0.27	530 ± 26
Shinguu, WAKAYAMA	0～5	0.21 ± 0.084	9.2± 3.8	3.7 ± 0.23	170 ± 10
〃	5～20	0.32 ± 0.089	25 ± 6.8	1.3 ± 0.15	97 ± 12
Oota, SHIMANE	0～5	22 ± 0.3	530 ± 8	32 ± 0.6	780 ± 14
〃	5～20	6.9 ± 0.20	530 ± 16	15 ± 0.4	1200 ± 30
Kochi, KOCHI	0～5	7.2 ± 0.20	320 ± 9	32 ± 0.6	1400 ± 30
〃	5～20	6.8 ± 0.20	1100 ± 30	11 ± 0.4	1800 ± 60
Saga, SAGA	0～5	0.67 ± 0.10	24 ± 3.6	4.1 ± 0.22	150 ± 8
〃	5～20	0.92 ± 0.11	110 ± 14	3.4 ± 0.20	420 ± 25

Location	Sampling Depth (cm)	^{90}Sr (Bq/kg) (dried Soil)	^{90}Sr (MBq/km^2)	^{137}Cs (Bq/kg) (dried Soil)	^{137}Cs (MBq/km^2)
Kusumi-machi, Ooita	0～5	5.4 ± 0.24	80 ± 3.5	100 ± 1	1500 ± 20
〃	5～20	4.6 ± 0.23	220 ± 11	18 ± 0.5	890 ± 22
Kaibun-machi, KAGOSHIMA	0～5	0.44 ± 0.083	22 ± 4.2	0.67 ± 0.10	34 ± 5.3
〃	5～20	0.18 ± 0.065	20 ± 7.1	1.4 ± 0.14	160 ± 16
September, 1991					
Kawabe-machi, AKITA	0～5	7.7 ± 0.30	190 ± 7	68 ± 0.9	1700 ± 20
〃	5～20	7.4 ± 0.29	1000 ± 40	48 ± 0.8	6500 ± 110
Hagi, YAMAGUCHI	0～5	1.9 ± 0.16	120 ± 10	8.3 ± 0.34	530 ± 21
〃	5～20	1.7 ± 0.16	360 ± 34	7.6 ± 0.32	1600 ± 70
October, 1991					
Sendai, MIYAGI	0～5	3.1 ± 0.19	120 ± 7	6.6 ± 0.30	250 ± 12
〃	5～20	1.9 ± 0.16	340 ± 29	3.3 ± 0.22	590 ± 38

(7) Strontium-90 and Cesium-137 in Sea Sediments
(from May. 1991 to Dec. 1991)

-continued from NO. 96 of this publication-

Table (7): Strontium-90 and Cesium-137 in Sea Sediments

Location	Depth (m)	^{90}Sr (Bq/kg·dried Soil)	^{137}Cs (Bq/kg·dried Soil)
May, 1991			
Mutsu, AOMORI	14	0.045 ± 0.079	0.25 ± 0.081
July, 1991			
Yoichi-bay, HOKKAIDO	13	0.059 ± 0.073	0.47 ± 0.089
Tokai-mura, IBARAKI	7	0.042 ± 0.034	0.42 ± 0.11
Niigata-Port, NIIGATA	25	0.019 ± 0.036	1.5 ± 0.16
Tokosuberi, AICHI	21.0	0.052 ± 0.035	4.7 ± 0.26
Yamaguchi-bay, YAMAGUCHI	10	0.064 ± 0.041	4.2 ± 0.25
Moji-Port, FUKUOKA	9	0.035 ± 0.036	1.7 ± 0.17
August, 1991			
Mutsu-bay, AOMORI	13	0.34 ± 0.093	7.2 ± 0.29
Matsukawaura, FUKUSHIMA	5	0.000 ± 0.031	0.56 ± 0.11
Ichihara, CHIBA	16.1	0.34 ± 0.092	4.2 ± 0.22
Odawa-bay, KANAGAWA	7.5	0.12 ± 0.041	2.9 ± 0.21
Osaka-Port, OSAKA	11.4	0.095 ± 0.040	4.4 ± 0.25
Kaseda, KAGOSHIMA	14	0.000 ± 0.074	0.37 ± 0.081
December, 1991			
Kinnakagusuku-bay, OKINAWA	13.7	0.085 ± 0.073	0.31 ± 0.088

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

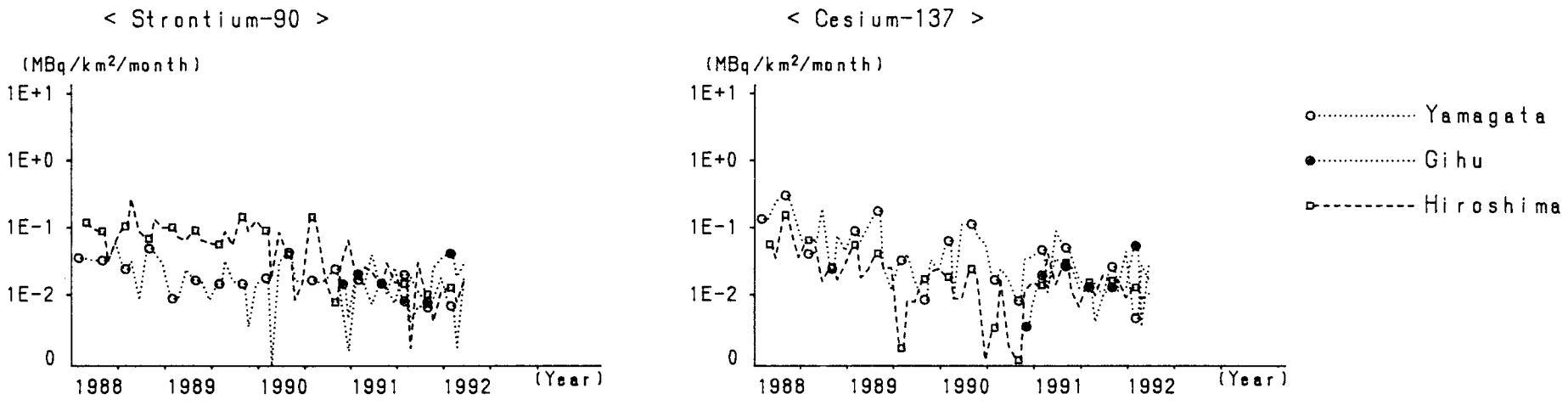

Fig. 1-1

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

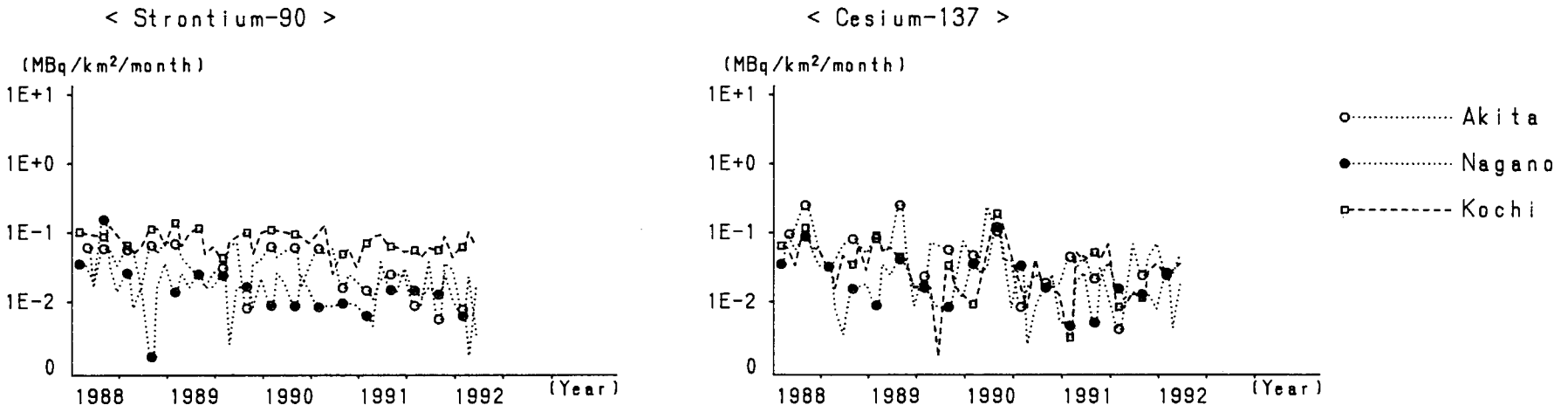

Fig. 1-2

* * * Airborne Dust * * *

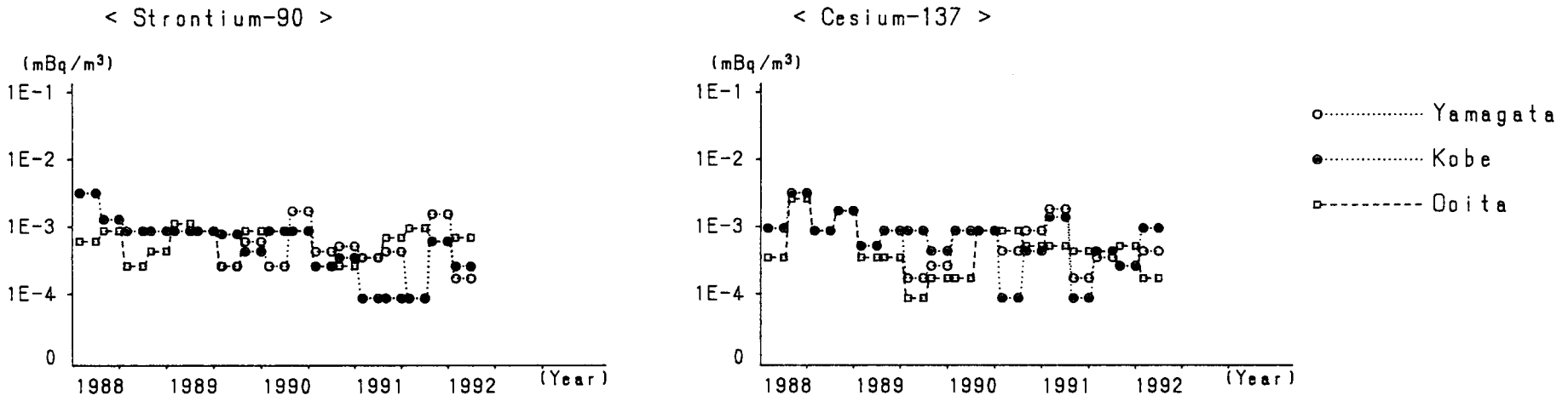

Fig. 2

* * * Source water * * *

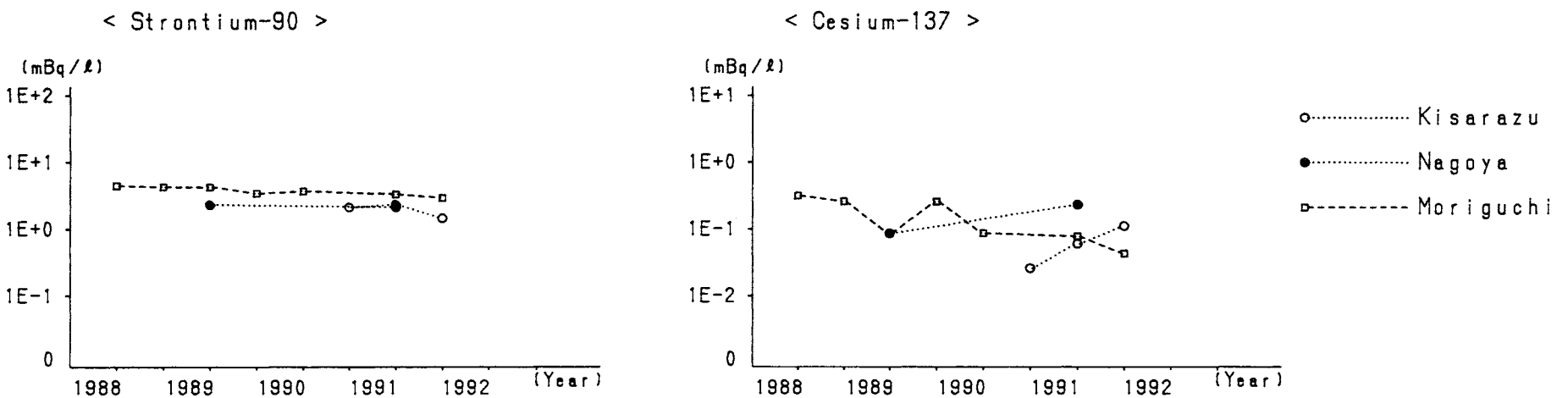

Fig.3-1

* * * Tap water * * *

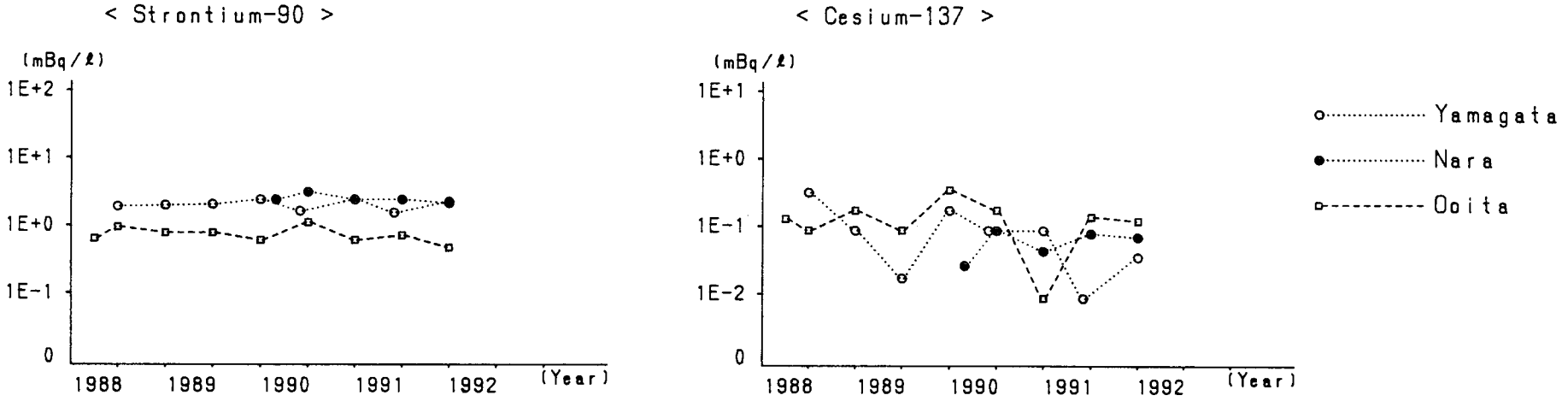

Fig.3-2

* * * Freshwater * * *

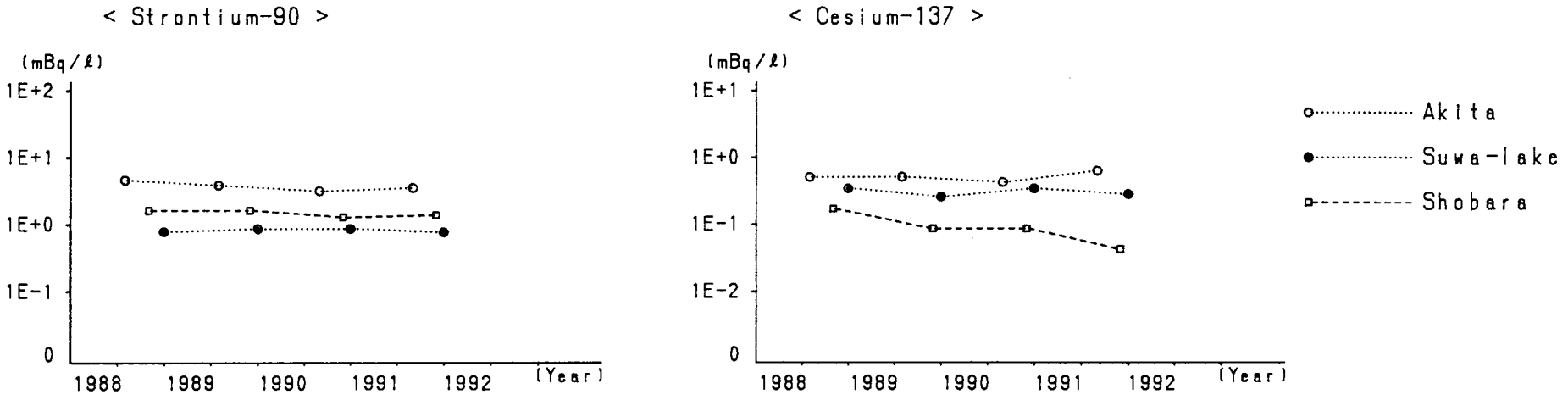

Fig. 4

* * * Sea Water * * *

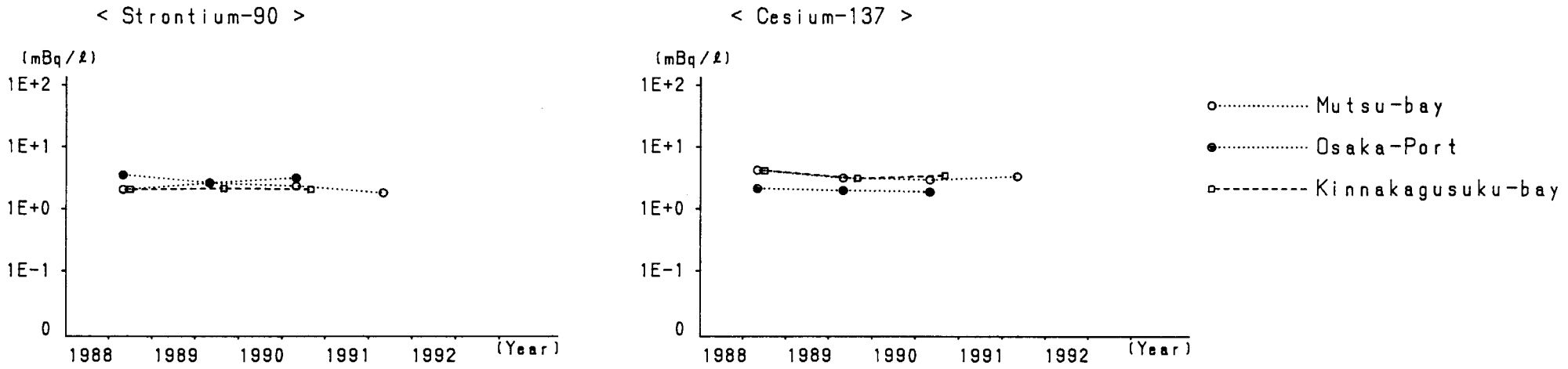

Fig.5

** 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