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RADIOACTIVITY SURVEY DATA in Japan

Part 1
= Environmental Materials =

NUMBER 90
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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 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 1 mℓ to 1 ℓ 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 stenless 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 32 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 leaf 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	yearly (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 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 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 Mar. 1989 to Dec. 1989)

-continued from NO. 88 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)
March, 1989				
Ooita, OOITA	34	27.5	0.00 ± 0.020	0.05 ± 0.023
April, 1989				
Onagawa-machi, MIYAGI	29	244.3	0.01 ± 0.018	0.08 ± 0.017
Morioka, IWATE	32	181.5	0.04 ± 0.018	0.11 ± 0.019
Koufu, YAMANASHI	31	108.0	0.01 ± 0.021	0.05 ± 0.024
Kyoto, KYOTO	32	44.5	0.03 ± 0.020	0.04 ± 0.015
Wakayama, WAKAYAMA	29	99.6	0.01 ± 0.019	0.08 ± 0.018
Matsue, SHIMANE	31	50.7	0.02 ± 0.012	0.09 ± 0.014
Ooita, OOITA	30	53.0	0.00 ± 0.023	0.04 ± 0.023
May, 1989				
Aomori, AOMORI	32	37.0	0.07 ± 0.025	0.16 ± 0.022
Onagawa-machi, MIYAGI	32	109.7	0.03 ± 0.018	0.04 ± 0.014
Morioka, IWATE	32	72.5	0.04 ± 0.018	0.05 ± 0.016
Koufu, YAMANASHI	32	101.0	0.00 ± 0.020	0.03 ± 0.024
Kyoto, KYOTO	31	104.3	0.003 ± 0.019	0.03 ± 0.015
Wakayama, WAKAYAMA	32	128.1	0.02 ± 0.020	0.02 ± 0.015
Matsue, SHIMANE	32	127.0	0.04 ± 0.013	0.09 ± 0.015
Ooita, OOITA	31	192.0	0.01 ± 0.027	0.05 ± 0.022
June, 1989				
Sapporo, HOKKAIDO	31	88.0	0.02 ± 0.022	0.06 ± 0.017
Onagawa-machi, MIYAGI	33	127.1	0.002 ± 0.016	0.03 ± 0.013
Morioka, IWATE	31	62.3	0.03 ± 0.019	0.00 ± 0.013
Ookuma-machi, FUKUSHIMA	31	167.9	0.00 ± 0.019	0.08 ± 0.024
Mito, IBARAGI	31	171.5	0.01 ± 0.018	0.01 ± 0.013
Utsunomiya, TOCHIGI	33	311.5	0.00 ± 0.018	0.03 ± 0.022
Kosugi-machi, TOYAMA	31	112.9	0.04 ± 0.018	0.14 ± 0.020
Koufu, YAMANASHI	31	153.0	0.01 ± 0.019	0.05 ± 0.024
Shizuoka, SHIZUOKA	33	364.5	0.02 ± 0.020	0.05 ± 0.023
Kyoto, KYOTO	31	164.8	0.00 ± 0.026	0.03 ± 0.015
Wakayama, WAKAYAMA	33	235.6	0.01 ± 0.022	0.03 ± 0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Matsue, SHIMANE	31	131.9	0.01 ± 0.013	0.02 ± 0.009
Ooita, OOITA	31	133.0	0.00 ± 0.023	0.06 ± 0.021
July, 1989				
Sapporo, HOKKAIDO	32	30.0	0.07 ± 0.024	0.04 ± 0.020
Aomori, AOMORI	32	34.0	0.10 ± 0.024	0.10 ± 0.026
Onagawa-machi, MIYAGI	30	82.2	0.00 ± 0.017	0.01 ± 0.017
Morioka, IWATE	32	37.4	0.00 ± 0.017	0.01 ± 0.013
Ookuma-machi, FUKUSHIMA	32	90.8	0.30 ± 0.200	0.04 ± 0.018
Mito, IBARAGI	32	169.0	0.02 ± 0.018	0.005 ± 0.015
Shinjuku, TOKYO	32	283.5	0.02 ± 0.022	0.00 ± 0.016
Yokohama, KANAGAWA	31	323.8	0.01 ± 0.020	0.05 ± 0.020
Utsunomiya, TOCHIGI	30	368.2	0.02 ± 0.020	0.01 ± 0.016
Kosugi-machi, TOYAMA	32	228.0	0.05 ± 0.019	0.02 ± 0.014
Fukui, FUKUI	33	264.1	0.00 ± 0.099	0.00 ± 0.110
Koufu, YAMANASHI	32	146.5	0.00 ± 0.018	0.02 ± 0.021
Shizuoka, SHIZUOKA	30	232.5	0.00 ± 0.016	0.04 ± 0.017
Nagoya, AICHI	32	126.1	0.00 ± 0.019	0.04 ± 0.015
Tsu, MIE	32	230.0	0.01 ± 0.021	0.05 ± 0.022
Kobe, HYOGO	32	113.9	0.02 ± 0.021	0.05 ± 0.022
Wakayama, WAKAYAMA	30	125.6	0.02 ± 0.023	0.06 ± 0.017
Tottori, TOTTORI	31	139.3	0.08 ± 0.025	0.04 ± 0.018
Matsue, SHIMANE	32	155.0	0.01 ± 0.015	0.05 ± 0.017
Hiroshima, HIROSHIMA	32	174.0	0.07 ± 0.024	0.002 ± 0.020
Matsuyama, EHIME	32	113.5	0.01 ± 0.021	0.00 ± 0.020
Takamatsu, KAGAWA	32	128.0	0.03 ± 0.023	0.03 ± 0.017
Dazaifu, FUKUOKA	33	121.1	0.06 ± 0.040	0.06 ± 0.028
Saga, SAGA	30	107.2	0.001 ± 0.017	0.001 ± 0.015
Nagasaki, NAGASAKI	32	536.0	0.04 ± 0.024	0.10 ± 0.022
Ooita, OOITA	32	200.5	0.00 ± 0.008	0.10 ± 0.022
Miyazaki, MIYAZAKI	32	556.3	0.00 ± 0.019	0.20 ± 0.030
Yonagusuku-mura, OKINAWA	32	112.5	0.00 ± 0.019	0.00 ± 0.022
August, 1989				
Sapporo, HOKKAIDO	32	148.5	0.05 ± 0.021	0.02 ± 0.015
Aomori, AOMORI	32	77.5	0.13 ± 0.025	0.09 ± 0.025
Onagawa-machi, MIYAGI	32	135.2	0.00 ± 0.017	0.01 ± 0.015
Morioka, IWATE	32	165.4	0.03 ± 0.018	0.07 ± 0.015
Yamagata, YAMAGATA	32	152.9	0.04 ± 0.020	0.05 ± 0.018
Ookuma-machi, FUKUSHIMA	32	182.8	0.02 ± 0.018	0.16 ± 0.024

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Mito, IBARAGI	32	190.0	0.02 ± 0.017	0.02 ± 0.014
Shinjuku, TOKYO	32	261.2	0.04 ± 0.018	0.03 ± 0.017
Yokohama, KANAGAWA	31	276.4	0.06 ± 0.019	0.11 ± 0.020
Utsunomiya, TOCHIGI	32	164.9	0.04 ± 0.019	0.02 ± 0.016
Kosugi-machi, TOYAMA	32	175.2	0.06 ± 0.019	0.01 ± 0.013
Fukui, FUKUI	31	150.0	0.11 ± 0.100	0.04 ± 0.076
Koufu, YAMANASHI	32	224.0	0.03 ± 0.020	0.03 ± 0.024
Shizuoka, SHIZUOKA	35	134.0	0.00 ± 0.016	0.06 ± 0.019
Nagoya, AICHI	32	81.6	0.17 ± 0.028	0.06 ± 0.015
Tsu, MIE	32	245.0	0.00 ± 0.018	0.14 ± 0.024
Kobe, HYOGO	32	157.9	0.03 ± 0.021	0.06 ± 0.019
Wakayama, WAKAYAMA	32	130.2	0.00 ± 0.020	0.03 ± 0.015
Tottori, TOTTORI	30	148.7	0.23 ± 0.027	0.03 ± 0.017
Matsue, SHIMANE	32	125.4	0.02 ± 0.014	0.03 ± 0.015
Hiroshima, HIROSHIMA	32	143.2	0.11 ± 0.022	0.01 ± 0.016
Matsuyama, EHIME	32	189.0	0.02 ± 0.019	0.03 ± 0.017
Takamatsu, KAGAWA	32	165.5	0.01 ± 0.016	0.04 ± 0.017
Dazaifu, FUKUOKA	32	77.1	0.03 ± 0.019	0.03 ± 0.017
Saga, SAGA	32	63.6	0.02 ± 0.018	0.05 ± 0.018
Nagasaki, NAGASAKI	32	19.0	0.06 ± 0.022	0.02 ± 0.015
Ooita, OOITA	32	234.0	0.01 ± 0.009	0.00 ± 0.015
Miyazaki, MIYAZAKI	32	505.6	0.03 ± 0.019	0.05 ± 0.017
Yonagusuku-mura, OKINAWA	32	263.5	0.001 ± 0.019	0.01 ± 0.012
September, 1989				
Sapporo, HOKKAIDO	32	156.0	0.00 ± 0.018	0.02 ± 0.022
Aomori, AOMORI	31	195.5	0.07 ± 0.022	0.26 ± 0.031
Onagawa-machi, MIYAGI	32	185.4	0.04 ± 0.059	0.04 ± 0.062
Morioka, IWATE	32	343.0	0.00 ± 0.015	0.01 ± 0.013
Yamagata, YAMAGATA	32	272.5	0.02 ± 0.017	0.02 ± 0.015
Ookuma-machi, FUKUSHIMA	30	149.4	0.00 ± 0.016	0.04 ± 0.015
Mito, IBARAGI	32	157.0	0.02 ± 0.018	0.004 ± 0.014
Shinjuku, TOKYO	32	218.0	0.03 ± 0.018	0.04 ± 0.015
Yokohama, KANAGAWA	31	229.3	0.05 ± 0.019	0.14 ± 0.021
Utsunomiya, TOCHIGI	32	195.8	0.01 ± 0.016	0.01 ± 0.015
Kosugi-machi, TOYAMA	32	470.8	0.02 ± 0.009	0.03 ± 0.014
Fukui, FUKUI	32	500.7	0.00 ± 0.088	0.00 ± 0.070
Koufu, YAMANASHI	31	229.5	0.01 ± 0.017	0.02 ± 0.023
Shizuoka, SHIZUOKA	29	263.0	0.01 ± 0.017	0.01 ± 0.016
Nagoya, AICHI	32	321.2	0.03 ± 0.020	0.08 ± 0.017

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Tsu, MIE	32	424.0	0.03 ± 0.019	0.05 ± 0.019
Kobe, HYOGO	31	434.9	0.02 ± 0.018	0.04 ± 0.017
Wakayama, WAKAYAMA	33	842.4	0.00 ± 0.022	0.05 ± 0.018
Tottori, TOTTORI	32	427.7	0.12 ± 0.025	0.15 ± 0.027
Matsue, SHIMANE	32	333.9	0.04 ± 0.014	0.04 ± 0.015
Hiroshima, HIROSHIMA	33	302.7	0.07 ± 0.014	0.01 ± 0.013
Matsuyama, EHIME	30	280.0	0.03 ± 0.018	0.03 ± 0.017
Takamatsu, KAGAWA	32	302.0	0.02 ± 0.018	0.00 ± 0.015
Dazaifu, FUKUOKA	32	535.2	0.03 ± 0.018	0.01 ± 0.022
Saga, SAGA	32	404.2	0.03 ± 0.010	0.03 ± 0.023
Nagasaki, NAGASAKI	32	432.5	0.09 ± 0.021	0.03 ± 0.015
Ooita, OOITA	32	239.5	0.00 ± 0.007	0.01 ± 0.016
Miyazaki, MIYAZAKI	31	531.5	0.02 ± 0.016	0.05 ± 0.025
Yonagusuku-mura, OKINAWA	30	171.0	0.002 ± 0.016	0.03 ± 0.026
October, 1989				
Sapporo, HOKKAIDO	31	67.0	0.00 ± 0.019	0.00 ± 0.021
Aomori, AOMORI	32	133.5	0.08 ± 0.023	0.05 ± 0.023
Onagawa-machi, MIYAGI	31	164.5	0.02 ± 0.018	0.00 ± 0.022
Morioka, IWATE	31	64.1	0.02 ± 0.018	0.001 ± 0.013
Yamagata, YAMAGATA	31	41.5	0.00 ± 0.017	0.01 ± 0.014
Mito, IBARAGI	31	173.5	0.001 ± 0.017	0.01 ± 0.014
Yokohama, KANAGAWA	32	204.4	0.04 ± 0.018	0.06 ± 0.023
Utsunomiya, TOCHIGI	31	177.7	0.00 ± 0.016	0.02 ± 0.015
Kosugi-machi, TOYAMA	31	115.1	0.00 ± 0.008	0.04 ± 0.014
Fukui, FUKUI	31	112.6	0.00 ± 0.100	0.01 ± 0.072
Koufu, YAMANASHI	32	138.0	0.02 ± 0.019	0.00 ± 0.022
Shizuoka, SHIZUOKA	31	154.5	0.02 ± 0.008	0.01 ± 0.013
Nagoya, AICHI	31	64.9	0.01 ± 0.020	0.01 ± 0.013
Tsu, MIE	31	34.5	0.06 ± 0.010	0.07 ± 0.018
Kobe, HYOGO	32	24.7	0.03 ± 0.020	0.04 ± 0.016
Tottori, TOTTORI	32	115.5	0.08 ± 0.022	0.03 ± 0.023
Matsue, SHIMANE	31	86.3	0.01 ± 0.006	0.04 ± 0.010
Hiroshima, HIROSHIMA	30	26.3	0.17 ± 0.016	0.02 ± 0.014
Takamatsu, KAGAWA	31	41.5	0.01 ± 0.009	0.005 ± 0.015
Dazaifu, FUKUOKA	31	22.4	0.01 ± 0.009	0.01 ± 0.015
Saga, SAGA	31	18.5	0.001 ± 0.007	0.05 ± 0.023
Nagasaki, NAGASAKI	31	16.5	0.02 ± 0.019	0.03 ± 0.022
Ooita, OOITA	32	58.0	0.02 ± 0.009	0.03 ± 0.015
Miyazaki, MIYAZAKI	32	86.0	0.002 ± 0.009	0.03 ± 0.015

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Yonagusuku-mura, OKINAWA	33	13.5	0.03 ±0.012	0.00 ±0.023
November, 1989				
Sapporo, HOKKAIDO	31	68.0	0.01 ±0.018	0.07 ±0.024
Aomori, AOMORI	32	104.0	0.07 ±0.021	0.02 ±0.016
Onagawa-machi, MIYAGI	34	61.5	0.02 ±0.017	0.02 ±0.023
Yamagata, YAMAGATA	31	71.9	0.004±0.009	0.04 ±0.014
Yokohama, KANAGAWA	31	119.5	0.02 ±0.017	0.00 ±0.018
Utsunomiya, TOCHIGI	31	28.1	0.01 ±0.019	0.04 ±0.015
Kosugi-machi, TOYAMA	31	242.4	0.01 ±0.008	0.05 ±0.015
Fukui, FUKUI	34	285.4	0.10 ±0.100	0.00 ±0.070
Koufu, YAMANASHI	31	26.0	0.02 ±0.007	0.01 ±0.013
Shizuoka, SHIZUOKA	31	191.5	0.01 ±0.007	0.03 ±0.015
Nagoya, AICHI	31	54.9	0.06 ±0.021	0.02 ±0.013
Tsu, MIE	31	34.5	0.02 ±0.010	0.05 ±0.016
Ootsu, SHIGA	31	15.8	0.01 ±0.010	0.01 ±0.013
Kobe, HYOGO	31	35.2	0.02 ±0.009	0.01 ±0.022
Tottori, TOTTORI	30	177.5	0.07 ±0.022	0.07 ±0.024
Hiroshima, HIROSHIMA	35	121.0	0.12 ±0.014	0.03 ±0.015
Dazaifu, FUKUOKA	31	56.0	0.00 ±0.028	0.02 ±0.025
Nagasaki, NAGASAKI	31	93.5	0.04 ±0.020	0.01 ±0.020
Ooita, OOITA	31	72.0	0.02 ±0.008	0.03 ±0.015
Yonagusuku-mura, OKINAWA	31	118.5	0.01 ±0.008	0.01 ±0.022
December, 1989				
Sapporo, HOKKAIDO	28	60.5	0.02 ±0.018	0.02 ±0.016
Yamagata, YAMAGATA	35	47.5	0.02 ±0.018	0.03 ±0.024
Yokohama, KANAGAWA	29	30.8	0.04 ±0.019	0.04 ±0.017
Utsunomiya, TOCHIGI	36	24.6	0.01 ±0.018	0.04 ±0.025
Koufu, YAMANASHI	35	19.5	0.01 ±0.008	0.04 ±0.016
Tsu, MIE	35	16.0	0.02 ±0.009	0.09 ±0.018
Kobe, HYOGO	29	14.5	0.02 ±0.010	0.03 ±0.014
Tottori, TOTTORI	36	219.9	0.05 ±0.019	0.04 ±0.018
Nagasaki, NAGASAKI	35	27.0	0.01 ±0.017	0.03 ±0.017
Ooita, OOITA	35	1.0	0.02 ±0.007	0.03 ±0.014

(1)-2 Strontium-90 and Cesium-137 in Rain and Dry Fallout(for WHO program) (from Feb. 1989 to Dec. 1989)

-continued from NO. 88 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)
February, 1989				
Chiba, CHIBA	29	131.1	0.04 ± 0.023	0.03 ± 0.019
March, 1989				
Chiba, CHIBA	32	121.1	0.01 ± 0.019	0.07 ± 0.020
April, 1989				
Chiba, CHIBA	28	178.5	0.003 ± 0.020	0.06 ± 0.020
May, 1989				
Chiba, CHIBA	35	168.2	0.04 ± 0.022	0.13 ± 0.022
June, 1989				
Chiba, CHIBA	36	217.8	0.00 ± 0.019	0.05 ± 0.020
Kagoshima, KAGOSHIMA	31	250.5	0.03 ± 0.013	0.07 ± 0.024
July, 1989				
Akita, AKITA	33	42.4	0.04 ± 0.025	0.03 ± 0.016
Chiba, CHIBA	28	181.7	0.01 ± 0.020	0.04 ± 0.019
Kanazawa, ISHIKAWA	32	275.0	0.03 ± 0.023	0.03 ± 0.015
Nagano, NAGANO	32	107.8	0.03 ± 0.021	0.02 ± 0.016
Okayama, OKAYAMA	32	120.2	0.00 ± 0.020	0.04 ± 0.017
Yamaguchi, YAMAGUCHI	32	210.5	0.003 ± 0.022	0.05 ± 0.023
Kochi, KOCHI	30	358.2	0.05 ± 0.023	0.02 ± 0.015
Kagoshima, KAGOSHIMA	32	399.5	0.06 ± 0.016	0.17 ± 0.028
August, 1989				
Akita, AKITA	32	147.5	0.08 ± 0.022	0.09 ± 0.021
Chiba, CHIBA	35	165.0	0.03 ± 0.020	0.03 ± 0.014
Kanazawa, ISHIKAWA	31	154.0	0.08 ± 0.022	0.09 ± 0.020
Nagano, NAGANO	32	134.3	0.003 ± 0.019	0.00 ± 0.013
Osaka, OSAKA	32	166.1	0.03 ± 0.021	0.03 ± 0.016
Okayama, OKAYAMA	32	191.8	0.05 ± 0.019	0.06 ± 0.018
Yamaguchi, YAMAGUCHI	32	168.5	0.00 ± 0.015	0.04 ± 0.016
Kochi, KOCHI	32	700.1	0.09 ± 0.023	0.02 ± 0.014
Kagoshima, KAGOSHIMA	31	109.0	0.06 ± 0.009	0.01 ± 0.017

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
September, 1989				
Akita, AKITA	32	373.3	0.09 ± 0.023	0.08 ± 0.020
Chiba, CHIBA	29	149.0	0.06 ± 0.021	0.03 ± 0.013
Kanazawa, ISHIKAWA	32	580.5	0.09 ± 0.021	0.05 ± 0.016
Nagano, NAGANO	32	163.1	0.02 ± 0.020	0.01 ± 0.015
Osaka, OSAKA	30	521.7	0.02 ± 0.019	0.04 ± 0.018
Okayama, OKAYAMA	32	261.7	0.004 ± 0.019	0.01 ± 0.022
Yamaguchi, YAMAGUCHI	32	363.5	0.003 ± 0.019	0.03 ± 0.014
Kochi, KOCHI	32	651.0	0.11 ± 0.023	0.002 ± 0.016
Kagoshima, KAGOSHIMA	30	407.5	0.03 ± 0.008	0.06 ± 0.021
October, 1989				
Akita, AKITA	32	149.9	0.01 ± 0.020	0.07 ± 0.025
Kanazawa, ISHIKAWA	32	186.0	0.03 ± 0.020	0.00 ± 0.020
Nagano, NAGANO	31	53.9	0.02 ± 0.021	0.01 ± 0.014
Osaka, OSAKA	33	41.6	0.00 ± 0.017	0.03 ± 0.015
Okayama, OKAYAMA	31	32.9	0.002 ± 0.019	0.05 ± 0.023
Yamaguchi, YAMAGUCHI	31	62.0	0.002 ± 0.008	0.01 ± 0.015
Kochi, KOCHI	31	32.5	0.12 ± 0.025	0.04 ± 0.024
Kagoshima, KAGOSHIMA	32	16.0	0.06 ± 0.010	0.05 ± 0.019
November, 1989				
Akita, AKITA	30	210.6	0.04 ± 0.021	0.02 ± 0.021
Kanazawa, ISHIKAWA	32	358.5	0.04 ± 0.020	0.04 ± 0.021
Osaka, OSAKA	30	32.5	0.03 ± 0.023	0.04 ± 0.015
Okayama, OKAYAMA	31	64.0	0.02 ± 0.019	0.03 ± 0.021
Yamaguchi, YAMAGUCHI	31	17.5	0.00 ± 0.008	0.02 ± 0.022
Kochi, KOCHI	31	164.1	0.06 ± 0.012	0.02 ± 0.013
Kagoshima, KAGOSHIMA	32	35.5	0.05 ± 0.009	0.02 ± 0.014
December, 1989				
Akita, AKITA	31	165.0	0.05 ± 0.020	0.09 ± 0.026
Kanazawa, ISHIKAWA	27	170.0	0.03 ± 0.018	0.03 ± 0.023
Osaka, OSAKA	38	21.1	0.02 ± 0.009	0.03 ± 0.014
Okayama, OKAYAMA	36	5.6	0.03 ± 0.017	0.004 ± 0.015
Yamaguchi, YAMAGUCHI	35	43.0	0.004 ± 0.009	0.02 ± 0.013

(2) Strontium-90 and Cesium-137 in Airborne Dust
(from Oct. 1988 to Dec. 1989)

-continued from NO. 88 of this publication-

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

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
October～December, 1988				
Tsu, MIE	10～12	10,000	0.001 ± 0.0006	0.001 ± 0.0006
Wakayama, WAKAYAMA	10～12	14,250	0.001 ± 0.0005	0.001 ± 0.0004
January～March, 1989				
Morioka, IWATE	1～3	13,202	0.000 ± 0.0003	0.001 ± 0.0006
Mito, IBARAGI	1～3	9,242	0.0005 ± 0.0011	0.001 ± 0.0006
Yokohama, KANAGAWA	1～3	6,875	0.001 ± 0.0007	0.0003 ± 0.0007
Utsunomiya, TOCHIGI	1～3	10,037	0.001 ± 0.0011	0.002 ± 0.0005
Niigata, NIIGATA	1～3	10,383	0.000 ± 0.0010	0.002 ± 0.0005
Kosugi-machi, TOYAMA	1～3	17,264	0.000 ± 0.0005	0.001 ± 0.0004
Fukui, FUKUI	1～3	8,197	0.001 ± 0.0013	0.001 ± 0.0006
Nagano, NAGANO	1～3	16,872	0.000 ± 0.0006	0.000 ± 0.0003
Koufu, YAMANASHI	1～3	11,955	0.000 ± 0.0008	0.001 ± 0.0004
Hamaoka-machi, SHIZUOKA	1～3	10,601	0.0003 ± 0.0009	0.004 ± 0.0007
Nagoya, AICHI	1～3	11,310	0.000 ± 0.0008	0.Q02 ± 0.0006
Kyoto, KYOTO	1～3	6,390	0.001 ± 0.0009	0.000 ± 0.0012
Osaka, OSAKA	1～3	9,605	0.001 ± 0.0010	0.001 ± 0.0008
Kobe, HYOGO	1～3	10,969	0.001 ± 0.0009	0.000 ± 0.0006
Wakayama, WAKAYAMA	1～3	11,430	0.001 ± 0.0005	0.001 ± 0.0005
Tottori, TOTTORI	1～3	12,963	0.000 ± 0.0008	0.0004 ± 0.0004
Hiroshima, HIROSHIMA	1～3	11,013	0.001 ± 0.0010	0.0004 ± 0.0007
Yamaguchi, YAMAGUCHI	1～3	4,658	0.000 ± 0.0019	0.001 ± 0.0011
Takamatsu, KAGAWA	1～3	13,700	0.000 ± 0.0007	0.001 ± 0.0006
Saga, SAGA	1～3	12,405	0.001 ± 0.0008	0.001 ± 0.0005
Nagasaki, NAGASAKI	1～3	8,483	0.000 ± 0.0012	0.0003 ± 0.0006
Ooita, OOITA	1～3	9,996	0.000 ± 0.0013	0.000 ± 0.0004
Miyazaki, MIYAZAKI	1～3	5,613	0.001 ± 0.0018	0.004 ± 0.0015
February～March, 1989				
Tsu, MIE	2～3	10,000	0.0002 ± 0.0005	0.002 ± 0.0006
March～March, 1989				
Tsu, MIE	3～3	4,939	0.003 ± 0.0013	0.004 ± 0.0012
April～June, 1989				
Morioka, IWATE	4～6	13,385	0.000 ± 0.0006	0.0004 ± 0.0004

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Yamagata, YAMAGATA	4～6	12,000	0.001 ± 0.0008	0.001 ± 0.0005
Ookuma-machi, FUKUSHIMA	4～6	10,442	0.0001 ± 0.0010	0.002 ± 0.0006
Mito, IBARAGI	4～6	9,831	0.001 ± 0.0004	0.0004 ± 0.0005
Yokohama, KANAGAWA	4～6	10,955	0.0002 ± 0.0007	0.001 ± 0.0004
Utsunomiya, TOCHIGI	4～6	14,943	0.000 ± 0.0007	0.001 ± 0.0004
Kosugi-machi, TOYAMA	4～6	18,230	0.000 ± 0.0005	0.001 ± 0.0003
Fukui, FUKUI	4～6	12,413	0.001 ± 0.0008	0.001 ± 0.0005
Nagano, NAGANO	4～6	15,178	0.001 ± 0.0006	0.001 ± 0.0006
Koufu, YAMANASHI	4～6	16,474	0.002 ± 0.0006	0.001 ± 0.0003
Hamaoka-machi, SHIZUOKA	4～6	10,883	0.001 ± 0.0008	0.002 ± 0.0005
Nagoya, AICHI	4～6	12,566	0.002 ± 0.0008	0.0002 ± 0.0004
Tsu, MIE	4～6	14,730	0.0005 ± 0.0006	0.0003 ± 0.0003
Kyoto, KYOTO	4～6	14,045	0.001 ± 0.0007	0.001 ± 0.0004
Osaka, OSAKA	4～6	12,886	0.000 ± 0.0007	0.0002 ± 0.0005
Kobe, HYOGO	4～6	10,057	0.001 ± 0.0010	0.001 ± 0.0005
Tottori, TOTTORI	4～6	13,123	0.001 ± 0.0007	0.001 ± 0.0005
Hiroshima, HIROSHIMA	4～6	11,703	0.001 ± 0.0008	0.0001 ± 0.0005
Yamaguchi, YAMAGUCHI	4～6	19,688	0.0004 ± 0.0005	0.0003 ± 0.0002
Takamatsu, KAGAWA	4～6	15,810	0.0002 ± 0.0006	0.0001 ± 0.0003
Saga, SAGA	4～6	14,211	0.002 ± 0.0008	0.001 ± 0.0004
Nagasaki, NAGASAKI	4～6	13,339	0.001 ± 0.0008	0.0003 ± 0.0004
Ooita, OOITA	4～6	9,918	0.001 ± 0.0009	0.000 ± 0.0004
Miyazaki, MIYAZAKI	4～6	12,600	0.000 ± 0.0008	0.001 ± 0.0005
July～September, 1989				
Morioka, IWATE	7～9	13,944	0.0003 ± 0.0003	0.002 ± 0.0005
Yamagata, YAMAGATA	7～9	12,960	0.0003 ± 0.0007	0.0002 ± 0.0004
Ookuma-machi, FUKUSHIMA	7～9	10,193	0.001 ± 0.0010	0.0001 ± 0.0005
Mito, IBARAGI	7～9	10,710	0.001 ± 0.0004	0.000 ± 0.0005
Yokohama, KANAGAWA	7～9	9,029	0.000 ± 0.0004	0.001 ± 0.0005
Utsunomiya, TOCHIGI	7～9	15,589	0.000 ± 0.0006	0.0001 ± 0.0003
Kosugi-machi, TOYAMA	7～9	18,435	0.001 ± 0.0002	0.000 ± 0.0003
Fukui, FUKUI	7～9	11,823	0.000 ± 0.0008	0.0001 ± 0.0004
Nagano, NAGANO	7～9	17,424	0.000 ± 0.0002	0.001 ± 0.0003
Hamaoka-machi, SHIZUOKA	7～9	10,690	0.0001 ± 0.0004	0.002 ± 0.0007
Nagoya, AICHI	7～9	12,561	0.001 ± 0.0004	0.000 ± 0.0004
Tsu, MIE	7～9	14,120	0.0002 ± 0.0003	0.001 ± 0.0004
Kyoto, KYOTO	7～9	11,644	0.001 ± 0.0009	0.0002 ± 0.0004
Osaka, OSAKA	7～9	15,213	0.001 ± 0.0003	0.0001 ± 0.0004
Kobe, HYOGO	7～9	9,782	0.000 ± 0.0009	0.001 ± 0.0005

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Tottori, TOTTORI	7～9	13,329	0.001 ± 0.0007	0.000 ± 0.0003
Hiroshima, HIROSHIMA	7～9	12,404	0.0004 ± 0.0003	0.000 ± 0.0004
Yamaguchi, YAMAGUCHI	7～9	19,592	0.001 ± 0.0005	0.002 ± 0.0003
Takamatsu, KAGAWA	7～9	16,590	0.000 ± 0.0005	0.0001 ± 0.0003
Saga, SAGA	7～9	12,220	0.000 ± 0.0003	0.001 ± 0.0005
Nagasaki, NAGASAKI	7～9	10,940	0.001 ± 0.0004	0.000 ± 0.0005
Ooita, OOITA	7～9	11,608	0.000 ± 0.0003	0.0001 ± 0.0004
Miyazaki, MIYAZAKI	7～9	12,309	0.001 ± 0.0004	0.0001 ± 0.0005
October～December, 1989				
Yamagata, YAMAGATA	10～12	12,960	0.000 ± 0.0007	0.000 ± 0.0003
Utsunomiya, TOCHIGI	10～12	13,746	0.001 ± 0.0007	0.001 ± 0.0004
Kosugi-machi, TOYAMA	10～12	18,323	0.000 ± 0.0005	0.0003 ± 0.0003
Fukui, FUKUI	10～12	10,013	0.001 ± 0.0010	0.001 ± 0.0005
Nagoya, AICHI	10～12	11,842	0.0004 ± 0.0004	0.000 ± 0.0004
Kobe, HYOGO	10～12	9,955	0.0005 ± 0.0005	0.000 ± 0.0005
Miyazaki, MIYAZAKI	10～12	14,132	0.001 ± 0.0007	0.001 ± 0.0004

(3) Strontium-90 and Cesium-137 in Service Water
(from Jun. 1989 to Jan. 1990)

-continued from NO. 88 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, 1989			
Nagoya, AICHI	6.9	2.7 ±0.19	0.1 ±0.07
August, 1989			
Kyoto, KYOTO	7.7	4.9 ±0.19	0.3 ±0.08
December, 1989			
Tsukui-machi, KANAGAWA	8.1	0.5 ±0.06	0.03 ±0.11
Fukuoka, FUKUOKA	6.8	2.1 ±0.22	0.3 ±0.12
January, 1990			
Sapporo, HOKKAIDO	6.9	1.9 ±0.12	0.3 ±0.12
(Tap Water)			
June, 1989			
Aomori, AOMORI	7.5	1.6 ±0.16	0.5 ±0.12
Morioka, IWATE	7.1	1.4 ±0.14	0.1 ±0.07
Mito, IBARAGI	7.7	1.9 ±0.15	0.2 ±0.11
Koufu, YAMANASHI	7.4	1.4 ±0.16	0.2 ±0.11
Nagoya, AICHI	6.6	2.6 ±0.20	0.2 ±0.08
Tsu, MIE	7.0	2.4 ±0.19	0.2 ±0.11
Matsue, SHIMANE	-	3.7 ±0.21	0.1 ±0.07
Ooita, OOITA	7.8	0.9 ±0.15	0.1 ±0.11
July, 1989			
Sendai, MIYAGI	-	2.1 ±0.21	0.0 ±0.11
Naha, OKINAWA	7.7	5.3 ±0.25	0.1 ±0.07
August, 1989			
Akita, AKITA	6.8	4.7 ±0.25	0.5 ±0.10
Kyoto, KYOTO	7.3	4.6 ±0.18	0.3 ±0.08
Shinguu, WAKAYAMA	7.0	1.6 ±0.12	0.1 ±0.07
December, 1989			
Wakkanai, HOKKAIDO	6.8	1.4 ±0.16	0.1 ±0.11
Aomori, AOMORI	7.4	1.3 ±0.10	0.2 ±0.11
Yamagata, YAMAGATA	7.2	2.8 ±0.19	0.2 ±0.08
Yokohama, KANAGAWA	6.9	0.6 ±0.07	0.1 ±0.11

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
Utsunomiya, TOCHIGI	7.2	0.5 ±0.12	0.1 ±0.07
Kosugi-machi, TOYAMA	6.8	2.5 ±0.19	0.2 ±0.07
Kanazawa, ISHIKAWA	7.4	3.0 ±0.13	0.2 ±0.11
Fukui, FUKUI	7.2	0.6 ±0.13	0.0 ±0.14
Koufu, YAMANASHI	7.4	1.4 ±0.18	0.1 ±0.11
Shizuoka, SHIZUOKA	7.6	1.0 ±0.14	0.1 ±0.11
Osaka, OSAKA	7.0	4.1 ±0.24	0.04 ±0.11
Kobe, HYOGO	7.6	3.2 ±0.15	0.1 ±0.08
Tottori, TOTTORI	7.3	2.6 ±0.12	0.0 ±0.10
Okayama, OKAYAMA	6.9	2.7 ±0.12	0.1 ±0.11
Ube, YAMAGUCHI	6.8	1.8 ±0.20	0.03 ±0.12
Fukuoka, FUKUOKA	6.8	3.2 ±0.16	0.1 ±0.12
Saga, SAGA	7.3	1.8 ±0.13	0.1 ±0.08
Nagasaki, NAGASAKI	7.0	2.1 ±0.17	0.1 ±0.07
Ooita, OOITA	7.9	0.7 ±0.09	0.4 ±0.13
Miyazaki, MIYAZAKI	7.1	1.2 ±0.15	0.2 ±0.08
Kagoshima, KAGOSHIMA	6.8	0.5 ±0.08	0.1 ±0.12

(4) Strontium-90 and Cesium-137 in Freshwater
(from Jul. 1989 to Nov. 1989)

-continued from NO. 88 of this publication-

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

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
(Freshwater)			
July, 1989			
Akita, AKITA	6.8	4.5 ± 0.24	0.6 ± 0.13
August, 1989			
Turuga, FUKUI	8.0	6.9 ± 0.31	3.9 ± 0.24
September, 1989			
Fukushima, FUKUSHIMA	6.9	2.5 ± 0.19	0.4 ± 0.13
November, 1989			
Shobara, HIROSHIMA	6.9	1.9 ± 0.18	0.1 ± 0.07

(5) Strontium-90 and Cesium-137 in Soil
(from May 1989 to Sep. 1989)

-continued from NO. 88 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, 1989					
Tokai-mura, IBARAGI	0～5	13 ± 0.5	490 ± 19	58 ± 0.9	2200 ± 30
〃	5～20	7.8 ± 0.31	840 ± 33	6.5 ± 0.29	700 ± 31
Akabane-machi, AICHI	0～5	0.6 ± 0.10	38 ± 7.0	5.2 ± 0.24	360 ± 16
〃	5～20	0.2 ± 0.07	34 ± 13	1.3 ± 0.13	240 ± 24
June, 1989					
Fukushima, FUKUSHIMA	0～5	4.1 ± 0.26	85 ± 5.4	14 ± 0.5	300 ± 9
〃	5～20	2.6 ± 0.21	110 ± 9	3.9 ± 0.23	170 ± 10
Katsushika, TOKYO	0～5	0.1 ± 0.07	8 ± 4.2	3.5 ± 0.22	220 ± 14
〃	5～20	0.5 ± 0.12	96 ± 24	2.4 ± 0.19	480 ± 37
July, 1989					
Yamagata, YAMAGATA	0～5	5.6 ± 0.26	310 ± 14	25 ± 0.6	1400 ± 30
〃	5～20	1.4 ± 0.15	150 ± 17	1.8 ± 0.17	200 ± 19
Imaichi, TOCHIGI	0～5	9.4 ± 0.33	210 ± 7	23 ± 0.5	530 ± 11
〃	5～20	4.2 ± 0.23	91 ± 4.9	3.3 ± 0.20	72 ± 4.2
Kosugi-machi, TOYAMA	0～5	7.2 ± 0.31	550 ± 23	13 ± 0.4	960 ± 29
〃	5～20	8.6 ± 0.33	1500 ± 60	2.8 ± 0.20	500 ± 36
Kanazawa, ISHIKAWA	0～5	8.6 ± 0.31	480 ± 17	37 ± 0.7	2000 ± 40
〃	5～20	9.5 ± 0.32	1500 ± 50	26 ± 0.6	4200 ± 90
Fukui, FUKUI	0～5	1.2 ± 0.15	56 ± 7.2	6.8 ± 0.30	330 ± 14
〃	5～20	0.9 ± 0.14	67 ± 10	3.0 ± 0.21	220 ± 15
Nagano, NAGANO	0～5	3.8 ± 0.22	79 ± 4.6	74 ± 0.9	1500 ± 20
〃	5～20	2.8 ± 0.19	160 ± 11	6.9 ± 0.27	400 ± 16
Tsu, MIE	0～5	0.5 ± 0.11	36 ± 8.9	0.4 ± 0.10	33 ± 7.6
〃	5～20	0.1 ± 0.10	17 ± 21	0.2 ± 0.11	34 ± 24
Kasai, HYOGO	0～5	0.7 ± 0.12	32 ± 5.5	41 ± 0.7	1900 ± 30
〃	5～20	0.3 ± 0.09	33 ± 10	3.4 ± 0.20	410 ± 23
Kokufu-machi, TOTTORI	0～5	0.3 ± 0.10	16 ± 5.9	5.8 ± 0.24	360 ± 15
〃	5～20	0.7 ± 0.12	110 ± 19	2.1 ± 0.16	330 ± 24

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)
Asahi-machi, OKAYAMA	0～5	0.3 ± 0.14	14 ± 7.0	0.6 ± 0.10	29 ± 5.0
〃	5～20	0.3 ± 0.15	58 ± 26	0.5 ± 0.10	92 ± 17
Hiroshima, HIROSHIMA	0～5	0.9 ± 0.17	35 ± 6.8	3.1 ± 0.20	120 ± 8
〃	5～20	1.3 ± 0.21	210 ± 34	7.4 ± 0.30	1200 ± 50
Matsuyama, EHIME	0～5	2.2 ± 0.18	48 ± 3.7	30 ± 0.6	650 ± 12
〃	5～20	0.5 ± 0.12	53 ± 11	13 ± 0.4	1200 ± 40
Sakaide, KAGAWA	0～5	2.5 ± 0.19	140 ± 11	16 ± 0.4	900 ± 23
〃	5～20	1.6 ± 0.17	180 ± 20	1.3 ± 0.13	140 ± 15
Fukuoka, FUKUOKA	0～5	8.4 ± 0.34	420 ± 17	14 ± 0.4	700 ± 19
〃	5～20	4.5 ± 0.26	500 ± 30	4.7 ± 0.22	530 ± 25
Obama-machi, NAGASAKI	0～5	11 ± 0.4	150 ± 5	93 ± 1.0	1200 ± 10
〃	5～20	7.0 ± 0.30	420 ± 18	20 ± 0.5	1200 ± 30
Sadowara-machi, MIYAZAKI	0～5	1.9 ± 0.16	150 ± 13	9.8 ± 0.32	780 ± 25
〃	5～20	1.7 ± 0.16	340 ± 32	8.7 ± 0.30	1700 ± 60
Naha, OKINAWA	0～5	1.9 ± 0.24	110 ± 13	5.6 ± 0.27	320 ± 15
〃	5～20	1.6 ± 0.16	310 ± 32	4.3 ± 0.24	850 ± 47
August, 1989					
Sapporo, HOKKAIDO	0～5	13 ± 0.4	470 ± 13	44 ± 0.7	1600 ± 20
〃	5～20	10 ± 0.4	1600 ± 50	16 ± 0.5	2600 ± 70
Iwadeyama-machi, MIYAGI	0～5	2.5 ± 0.20	17 ± 1.3	6.2 ± 0.27	41 ± 1.8
〃	5～20	1.9 ± 0.18	19 ± 1.7	3.7 ± 0.22	35 ± 2.1
Kawabe-machi, AKITA	0～5	12 ± 0.4	360 ± 11	98 ± 1.0	2900 ± 30
〃	5～20	12 ± 0.4	1400 ± 40	110 ± 1	12000 ± 100
Yokohama, KANAGAWA	0～5	11 ± 0.4	260 ± 9	62 ± 0.9	1500 ± 20
〃	5～20	11 ± 0.4	980 ± 35	16 ± 0.5	1500 ± 40
Takane-machi, YAMANASHI	0～5	12 ± 0.5	550 ± 20	42 ± 0.8	1900 ± 30
〃	5～20	9.0 ± 0.39	1100 ± 50	14 ± 0.5	1700 ± 50
Gotenba, SHIZUOKA	0～5	1.2 ± 0.17	37 ± 4.9	15 ± 0.5	440 ± 13
〃	5～20	2.0 ± 0.19	310 ± 29	9.2 ± 0.34	1400 ± 50
Osaka, OSAKA	0～5	0.8 ± 0.12	33 ± 5.1	3.5 ± 0.20	150 ± 9
〃	5～20	2.1 ± 0.20	290 ± 27	6.6 ± 0.26	890 ± 36

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)
Hagi, YAMAGUCHI	0～5	2.2 ± 0.17	130 ± 10	8.4 ± 0.31	500 ± 18
〃	5～20	2.5 ± 0.20	720 ± 55	6.7 ± 0.28	1900 ± 80
Saga, SAGA	0～5	0.5 ± 0.11	24 ± 5.5	2.1 ± 0.17	100 ± 9
〃	5～20	0.9 ± 0.13	140 ± 21	3.2 ± 0.21	520 ± 34
Kaimon-machi, KAGOSHIMA	0～5	2.7 ± 0.19	160 ± 11	7.9 ± 0.31	450 ± 18
〃	5～20	3.4 ± 0.24	380 ± 27	7.3 ± 0.31	810 ± 34
September, 1989					
Kochi, KOCHI	0～5	11 ± 0.5	550 ± 22	38 ± 0.7	2000 ± 30
〃	5～20	6.8 ± 0.33	900 ± 44	13 ± 0.4	1700 ± 50

(6) Strontium-90 and Cesium-137 in Sea Sediments
(from May 1989 to Sep. 1989)

-continued from NO. 88 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)
May, 1989			
Mutsu, AOMORI	13.5	0.15 ±0.13	0.32 ±0.13
July, 1989			
Yoichi-bay, HOKKAIDO	13	0.00 ±0.08	0.64 ±0.14
Tokai, IBARAGI	7	0.06 ±0.09	0.50 ±0.13
Moji-Port, FUKUOKA	14	0.06 ±0.09	3.0 ±0.21
Kaseda, KAGOSHIMA	14	0.00 ±0.09	0.44 ±0.12
August, 1989			
Matsukawaura, FUKUSHIMA	5	0.00 ±0.08	0.80 ±0.14
Tokoname, AICHI	18	0.00 ±0.09	2.1 ±0.18
Osaka-Port, OSAKA	12.3	0.15 ±0.11	4.4 ±0.25
Yamaguchi-bay, YAMAGUCHI	10	0.17 ±0.11	3.3 ±0.21
September, 1989			
Yokosuka, KANAGAWA	8	0.08 ±0.09	2.2 ±0.18

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

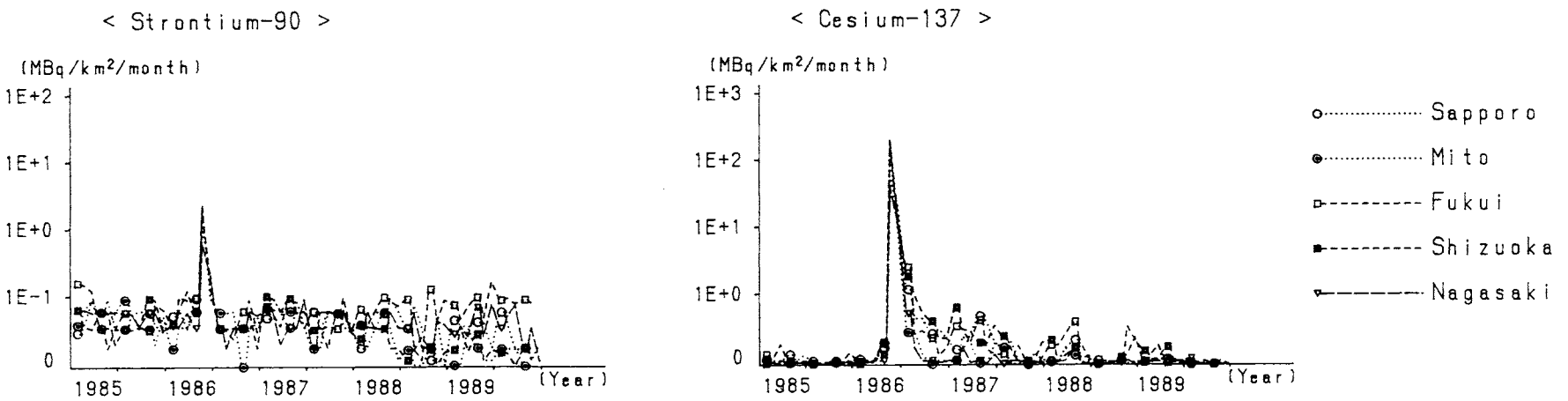

Fig. 1-1

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

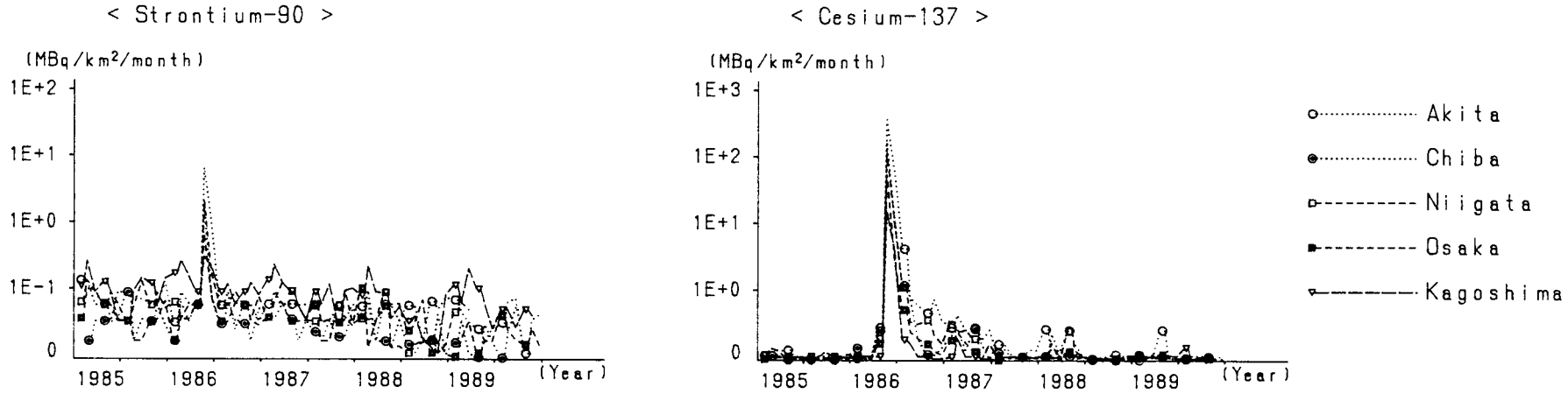

Fig.1-2

* * * Airborne Dust * * *

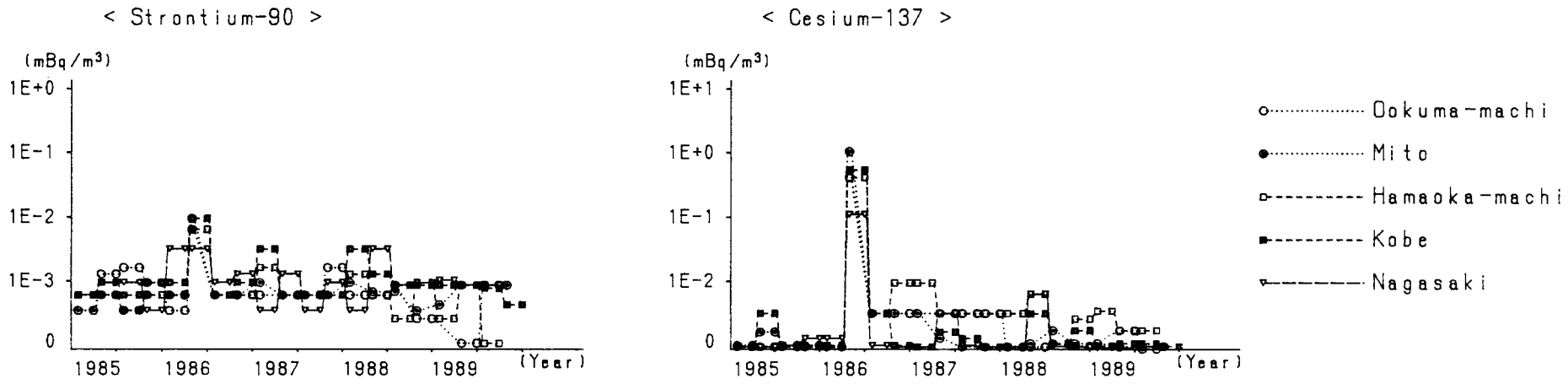

Fig.2

＊ ＊ ＊　Tap water　＊ ＊ ＊

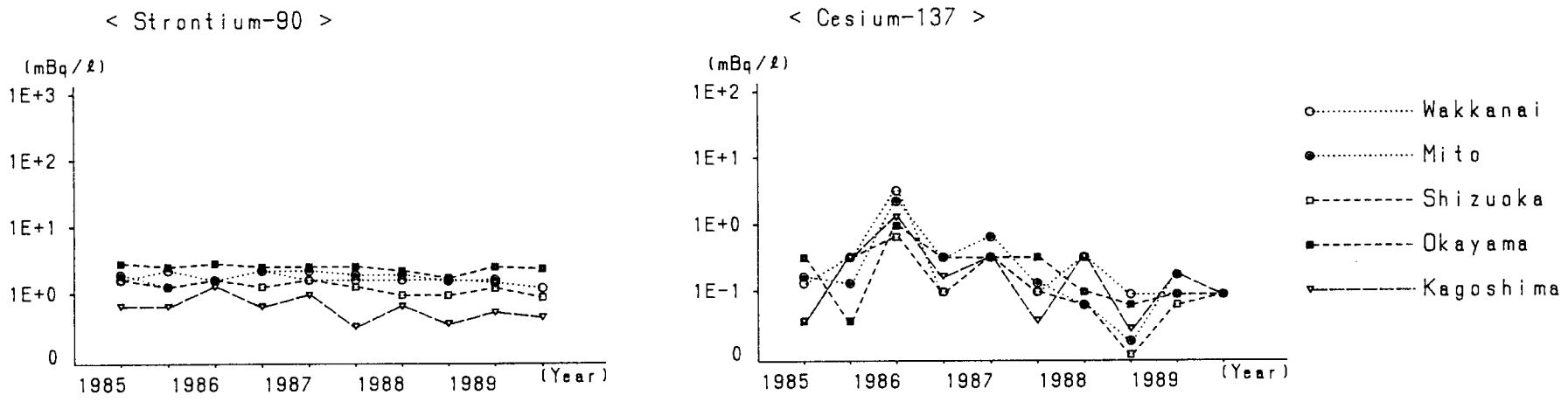

Fig.3

* * * Freshwater * * *

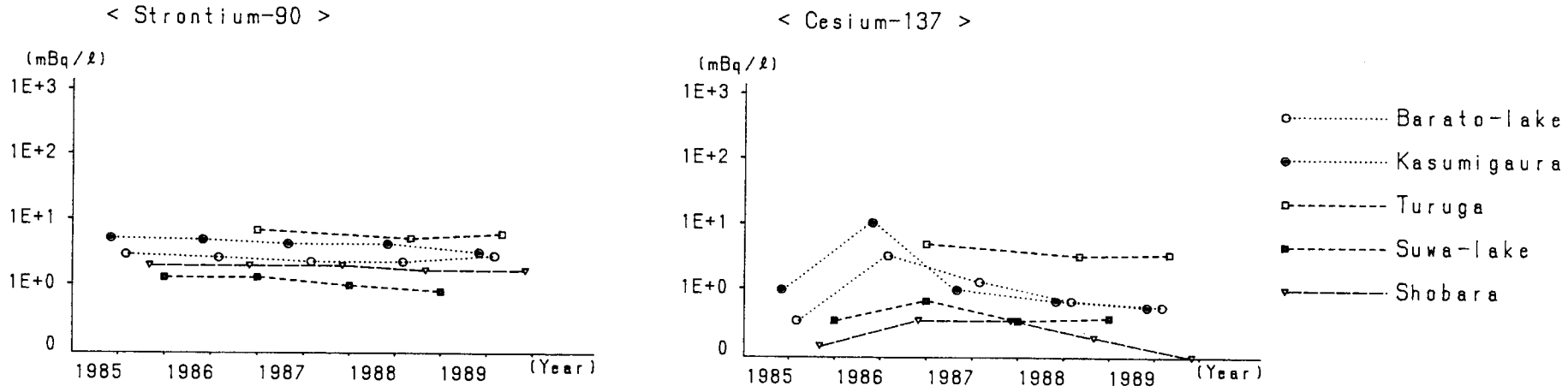

Fig. 4

＊ ＊ ＊　　Soil　　＊ ＊ ＊

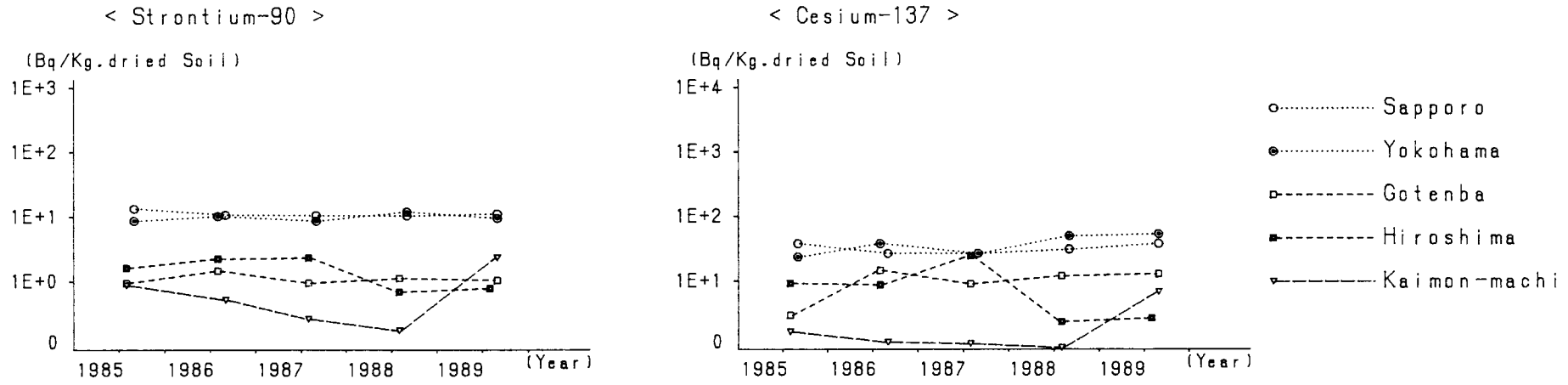

Fig.5 (Sampling Depth 0-5cm)

＊＊＊　Soil　＊＊＊

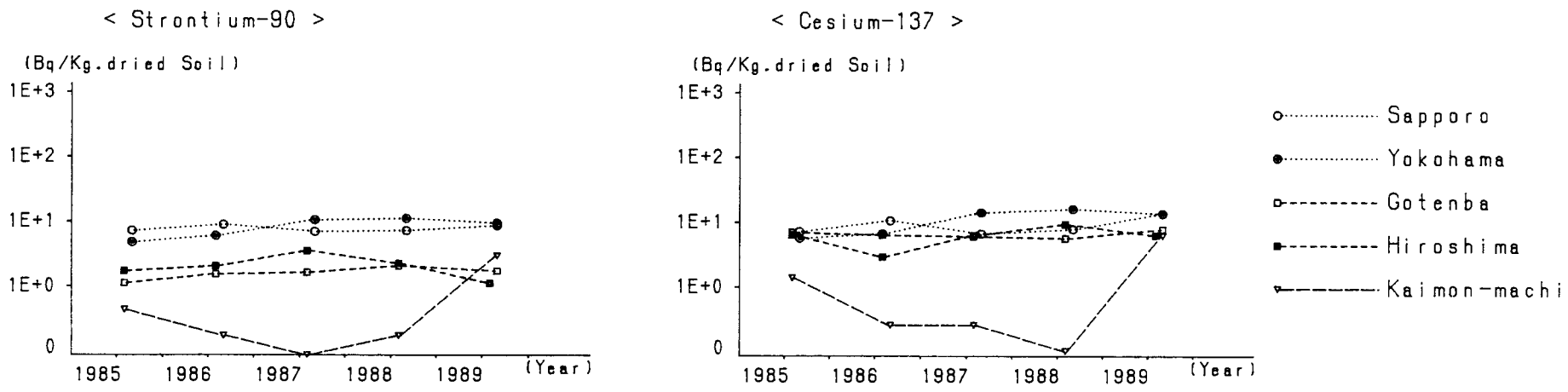

Fig.5 (Sampling Depth 5-20cm)

＊ ＊ ＊　Sea Sediments　＊ ＊ ＊

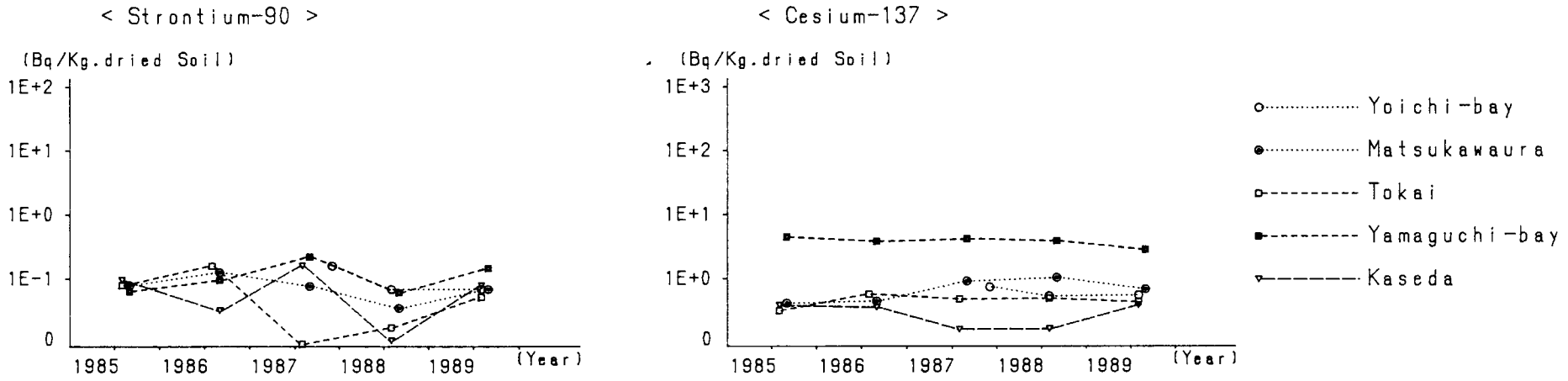

Fig.6

** 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