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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 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. 1990 to Dec. 1990)

-continued from NO. 92 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, 1990				
Ooita, OOITA	32	44.5	0.05 ± 0.020	0.36 ± 0.033
April, 1990				
Koufu, YAMANASHI	30	51.0	0.04 ± 0.020	0.02 ± 0.022
Nara, NARA	32	120.3	0.00 ± 0.030	0.10 ± 0.023
Wakayama, WAKAYAMA	30	56.5	0.00 ± 0.051	0.06 ± 0.026
Matsue, SHIMANE	30	98.9	0.06 ± 0.016	0.14 ± 0.019
Ishii-machi, TOKUSHIMA	31	63.5	0.02 ± 0.023	0.07 ± 0.017
Ooita, OOITA	30	121.0	0.03 ± 0.015	0.28 ± 0.031
May, 1990				
Koufu, YAMANASHI	32	47.0	0.05 ± 0.020	0.02 ± 0.022
Kyoto, KYOTO	31	119.6	0.01 ± 0.022	0.00 ± 0.019
Nara, NARA	32	138.8	0.00 ± 0.020	0.01 ± 0.019
Wakayama, WAKAYAMA	32	156.7	0.02 ± 0.022	0.02 ± 0.023
Matsue, SHIMANE	32	112.5	0.02 ± 0.013	0.06 ± 0.015
Ishii-machi, TOKUSHIMA	32	115.0	0.01 ± 0.019	0.01 ± 0.014
Ooita, OOITA	32	138.5	0.004 ± 0.015	0.07 ± 0.019
Miyazaki, MIYAZAKI	32	261.9	0.00 ± 0.024	0.06 ± 0.023
June, 1990				
Aomori, AOMORI	31	70.0	0.11 ± 0.066	0.05 ± 0.026
Ookuma-machi, FUKUSHIMA	32	81.6	0.02 ± 0.018	0.01 ± 0.020
Shinjuku, TOKYO	32	57.9	0.05 ± 0.021	0.00 ± 0.021
Koufu, YAMANASHI	32	45.0	0.02 ± 0.019	0.03 ± 0.021
Shizuoka, SHIZUOKA	32	341.5	0.02 ± 0.019	0.06 ± 0.022
Nagoya, AICHI	32	126.2	0.002 ± 0.013	0.04 ± 0.017
Tsu, MIE	32	155.5	0.06 ± 0.037	0.16 ± 0.021
Kyoto, KYOTO	31	146.9	0.00 ± 0.019	0.00 ± 0.018
Nara, NARA	32	244.3	0.00 ± 0.026	0.00 ± 0.020
Wakayama, WAKAYAMA	32	204.2	0.06 ± 0.028	0.002 ± 0.016
Matsue, SHIMANE	32	95.6	0.01 ± 0.012	0.03 ± 0.014
Hiroshima, HIROSHIMA	34	364.4	0.02 ± 0.022	0.001 ± 0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Matsuyama, EHIME	32	231.5	0.02 ± 0.012	0.003 ± 0.016
Ishii-machi, TOKUSHIMA	31	177.5	0.00 ± 0.022	0.01 ± 0.014
Takamatsu, KAGAWA	32	178.0	0.01 ± 0.018	0.04 ± 0.022
Dazaifu, FUKUOKA	32	284.2	0.03 ± 0.019	0.02 ± 0.022
Kumamoto, KUMAMOTO	32	431.2	0.01 ± 0.019	0.001 ± 0.012
Ooita, OOITA	32	309.0	0.02 ± 0.022	0.06 ± 0.021
Miyazaki, MIYAZAKI	32	314.6	0.02 ± 0.019	0.05 ± 0.023
Yonagusuku-mura, OKINAWA	30	268.5	0.00 ± 0.017	0.004 ± 0.020
July, 1990				
Sapporo, HOKKAIDO	31	64.5	0.10 ± 0.039	0.03 ± 0.016
Aomori, AOMORI	30	99.5	0.03 ± 0.021	0.02 ± 0.018
Onagawa-machi, MIYAGI	31	172.0	0.03 ± 0.016	0.06 ± 0.022
Morioka, IWATE	31	302.7	0.02 ± 0.019	0.03 ± 0.020
Mito, IBARAGI	31	123.0	0.00 ± 0.019	0.03 ± 0.015
Shinjuku, TOKYO	31	94.1	0.02 ± 0.028	0.06 ± 0.015
Yokohama, KANAGAWA	32	87.3	0.07 ± 0.031	0.06 ± 0.023
Utsunomiya, TOCHIGI	31	150.4	0.03 ± 0.011	0.04 ± 0.023
Kosugi-machi, TOYAMA	31	126.0	0.01 ± 0.019	0.03 ± 0.015
Fukui, FUKUI	30	175.2	0.12 ± 0.094	0.00 ± 0.110
Koufu, YAMANASHI	31	67.0	0.02 ± 0.019	0.05 ± 0.022
Shizuoka, SHIZUOKA	31	231.0	0.00 ± 0.021	0.03 ± 0.022
Nagoya, AICHI	31	178.1	0.01 ± 0.014	0.04 ± 0.018
Tsu, MIE	31	188.0	0.05 ± 0.024	0.12 ± 0.023
Ootsu, SHIGA	32	228.6	0.03 ± 0.035	0.02 ± 0.014
Kyoto, KYOTO	32	172.3	0.01 ± 0.015	0.03 ± 0.017
Kobe, HYOGO	32	177.2	0.00 ± 0.029	0.02 ± 0.025
Nara, NARA	30	193.0	0.04 ± 0.026	0.00 ± 0.022
Wakayama, WAKAYAMA	31	54.1	0.00 ± 0.019	0.02 ± 0.015
Tottori, TOTTORI	32	153.3	0.05 ± 0.041	0.02 ± 0.015
Matsue, SHIMANE	31	134.5	0.06 ± 0.059	0.08 ± 0.016
Hiroshima, HIROSHIMA	32	45.3	0.18 ± 0.026	0.004 ± 0.020
Matsuyama, EHIME	31	71.0	0.04 ± 0.013	0.03 ± 0.017
Ishii-machi, TOKUSHIMA	32	38.5	0.00 ± 0.019	0.01 ± 0.020
Takamatsu, KAGAWA	31	51.0	0.00 ± 0.019	0.02 ± 0.021
Dazaifu, FUKUOKA	31	156.9	0.03 ± 0.021	0.01 ± 0.013
Saga, SAGA	31	125.0	0.03 ± 0.020	0.03 ± 0.020
Nagasaki, NAGASAKI	31	164.5	0.07 ± 0.041	0.02 ± 0.020
Kumamoto, KUMAMOTO	31	186.8	0.004 ± 0.020	0.00 ± 0.011
Ooita, OOITA	31	84.0	0.02 ± 0.020	0.03 ± 0.018

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Miyazaki, MIYAZAKI	31	152.0	0.03 ±0.018	0.02 ±0.022
Yonagusuku-mura, OKINAWA	33	41.5	0.02 ±0.022	0.01 ±0.013
August, 1990				
Sapporo, HOKKAIDO	32	135.5	0.07 ±0.039	0.01 ±0.018
Aomori, AOMORI	32	41.5	0.03 ±0.012	0.05 ±0.022
Onagawa-machi, MIYAGI	34	115.0	0.05 ±0.021	0.04 ±0.018
Morioka, IWATE	32	147.1	0.02 ±0.019	0.001±0.013
Yamagata, YAMAGATA	32	89.3	0.00 ±0.018	0.03 ±0.014
Ookuma-machi, FUKUSHIMA	34	76.6	0.02 ±0.020	0.17 ±0.022
Mito, IBARAGI	32	141.0	0.02 ±0.009	0.02 ±0.021
Shinjuku, TOKYO	32	163.8	0.03 ±0.024	0.08 ±0.017
Yokohama, KANAGAWA	32	147.7	0.05 ±0.022	0.22 ±0.028
Utsunomiya, TOCHIGI	34	184.1	0.00 ±0.017	0.13 ±0.020
Kosugi-machi, TOYAMA	32	79.3	0.00 ±0.020	0.03 ±0.014
Fukui, FUKUI	31	87.5	0.10 ±0.051	0.24 ±0.100
Shizuoka, SHIZUOKA	34	255.0	0.005±0.025	0.03 ±0.014
Nagoya, AICHI	32	73.3	0.01 ±0.022	0.03 ±0.018
Ootsu, SHIGA	32	8.1	0.02 ±0.019	0.00 ±0.019
Kyoto, KYOTO	33	28.0	0.01 ±0.014	0.00 ±0.016
Kobe, HYOGO	32	30.1	0.00 ±0.013	0.08 ±0.023
Nara, NARA	35	66.0	0.04 ±0.019	0.02 ±0.016
Wakayama, WAKAYAMA	32	58.0	0.01 ±0.024	0.06 ±0.021
Matsue, SHIMANE	32	73.5	0.06 ±0.017	0.08 ±0.016
Hiroshima, HIROSHIMA	29	89.3	0.10 ±0.028	0.02 ±0.021
Matsuyama, EHIME	32	122.0	0.01 ±0.019	0.06 ±0.022
Ishii-machi, TOKUSHIMA	32	88.5	0.00 ±0.021	0.04 ±0.022
Takamatsu, KAGAWA	32	84.5	0.02 ±0.020	0.02 ±0.021
Dazaifu, FUKUOKA	32	46.2	0.01 ±0.014	0.03 ±0.018
Saga, SAGA	32	64.0	0.01 ±0.012	0.01 ±0.017
Nagasaki, NAGASAKI	31	38.0	0.07 ±0.015	0.02 ±0.020
Kumamoto, KUMAMOTO	32	111.5	0.02 ±0.018	0.01 ±0.018
Ooita, OOITA	32	280.0	0.02 ±0.022	0.00 ±0.014
Miyazaki, MIYAZAKI	32	266.0	0.01 ±0.019	0.02 ±0.023
Yonagusuku-mura, OKINAWA	32	136.0	0.03 ±0.014	0.001±0.018
September, 1990				
Sapporo, HOKKAIDO	31	122.5	0.03 ±0.023	0.01 ±0.016
Onagawa-machi, MIYAGI	29	124.0	0.01 ±0.019	0.00 ±0.016
Morioka, IWATE	31	281.8	0.00 ±0.013	0.01 ±0.016

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Yamagata, YAMAGATA	31	68.3	0.02 ± 0.010	0.02 ± 0.021
Ookuma-machi, FUKUSHIMA	29	80.4	0.05 ± 0.011	0.78 ± 0.046
Shinjuku, TOKYO	31	315.5	0.01 ± 0.030	0.02 ± 0.022
Yokohama, KANAGAWA	30	248.6	0.05 ± 0.023	0.10 ± 0.023
Utsunomiya, TOCHIGI	29	367.8	0.00 ± 0.014	0.02 ± 0.019
Fukui, FUKUI	31	236.3	0.00 ± 0.096	0.00 ± 0.086
Shizuoka, SHIZUOKA	29	388.0	0.00 ± 0.030	0.03 ± 0.017
Nagoya, AICHI	31	521.6	0.01 ± 0.022	0.07 ± 0.020
Tsu, MIE	31	589.5	0.001 ± 0.010	0.06 ± 0.020
Ootsu, SHIGA	31	344.6	0.04 ± 0.026	0.00 ± 0.019
Kyoto, KYOTO	31	358.6	0.04 ± 0.021	0.08 ± 0.032
Kobe, HYOGO	30	192.8	0.00 ± 0.020	0.02 ± 0.022
Nara, NARA	29	477.0	0.02 ± 0.026	0.02 ± 0.015
Wakayama, WAKAYAMA	31	294.1	0.05 ± 0.028	0.06 ± 0.020
Tottori, TOTTORI	29	500.8	0.12 ± 0.029	0.06 ± 0.023
Matsue, SHIMANE	31	221.8	0.03 ± 0.018	0.04 ± 0.012
Hiroshima, HIROSHIMA	30	239.7	0.02 ± 0.019	0.002 ± 0.023
Matsuyama, EHIME	31	197.0	0.01 ± 0.019	0.03 ± 0.018
Ishii-machi, TOKUSHIMA	31	376.5	0.005 ± 0.020	0.005 ± 0.018
Takamatsu, KAGAWA	31	343.5	0.00 ± 0.014	0.02 ± 0.017
Dazaifu, FUKUOKA	31	100.4	0.03 ± 0.022	0.00 ± 0.021
Saga, SAGA	31	100.2	0.03 ± 0.021	0.00 ± 0.017
Nagasaki, NAGASAKI	30	210.0	0.04 ± 0.033	0.004 ± 0.016
Kumamoto, KUMAMOTO	31	184.6	0.03 ± 0.018	0.02 ± 0.022
Yonagusuku-mura, OKINAWA	32	210.5	0.002 ± 0.019	0.03 ± 0.023
October, 1990				
Morioka, IWATE	32	113.8	0.002 ± 0.012	0.03 ± 0.017
Yamagata, YAMAGATA	32	96.8	0.03 ± 0.022	0.01 ± 0.018
Ookuma-machi, FUKUSHIMA	31	248.7	0.03 ± 0.011	0.10 ± 0.025
Mito, IBARAGI	32	150.5	0.04 ± 0.011	0.04 ± 0.023
Shinjuku, TOKYO	32	149.7	0.02 ± 0.011	0.04 ± 0.023
Yokohama, KANAGAWA	33	343.9	0.03 ± 0.038	0.07 ± 0.017
Utsunomiya, TOCHIGI	32	158.3	0.00 ± 0.013	0.03 ± 0.018
Fukui, FUKUI	32	212.7	0.00 ± 0.092	0.15 ± 0.100
Shizuoka, SHIZUOKA	32	125.0	0.01 ± 0.011	0.02 ± 0.018
Nagoya, AICHI	32	181.5	0.005 ± 0.011	0.04 ± 0.018
Ootsu, SHIGA	32	219.1	0.00 ± 0.013	0.005 ± 0.015
Kobe, HYOGO	33	154.3	0.00 ± 0.017	0.01 ± 0.017
Wakayama, WAKAYAMA	36	164.3	0.01 ± 0.021	0.04 ± 0.017

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Hiroshima, HIROSHIMA	33	187.8	0.01 ± 0.019	0.001 ± 0.016
Matsuyama, EHIME	32	157.0	0.00 ± 0.014	0.00 ± 0.016
Dazaifu, FUKUOKA	32	131.4	0.005 ± 0.020	0.02 ± 0.013
Saga, SAGA	32	108.8	0.00 ± 0.019	0.00 ± 0.012
Nagasaki, NAGASAKI	32	133.0	0.07 ± 0.022	0.00 ± 0.013
Kumamoto, KUMAMOTO	32	102.7	0.00 ± 0.021	0.002 ± 0.012
Yonagusuku-mura, OKINAWA	31	118.0	0.02 ± 0.022	0.002 ± 0.013
November, 1990				
Morioka, IWATE	31	154.0	0.00 ± 0.013	0.00 ± 0.017
Yamagata, YAMAGATA	31	153.5	0.01 ± 0.010	0.04 ± 0.023
Mito, IBARAGI	31	217.0	0.02 ± 0.010	0.01 ± 0.022
Yokohama, KANAGAWA	31	213.4	0.02 ± 0.009	0.03 ± 0.017
Utsunomiya, TOCHIGI	31	157.2	0.00 ± 0.007	0.01 ± 0.017
Fukui, FUKUI	33	274.6	0.00 ± 0.045	0.15 ± 0.100
Shizuoka, SHIZUOKA	33	190.0	0.03 ± 0.012	0.05 ± 0.019
Kobe, HYOGO	31	88.1	0.02 ± 0.015	0.00 ± 0.016
Wakayama, WAKAYAMA	29	45.3	0.00 ± 0.029	0.15 ± 0.025
Dazaifu, FUKUOKA	31	74.0	0.02 ± 0.009	0.00 ± 0.017
Saga, SAGA	33	33.6	0.02 ± 0.016	0.00 ± 0.015
Nagasaki, NAGASAKI	31	29.0	0.03 ± 0.010	0.01 ± 0.019
Kumamoto, KUMAMOTO	31	26.4	0.02 ± 0.009	0.00 ± 0.018
Yonagusuku-mura, OKINAWA	31	121.5	0.01 ± 0.008	0.00 ± 0.016
December, 1990				
Yamagata, YAMAGATA	35	59.2	0.002 ± 0.009	0.05 ± 0.019
Wakayama, WAKAYAMA	34	27.5	0.00 ± 0.019	0.02 ± 0.017

(1)-2 Strontium-90 and Cesium-137 in Rain and Dry Fallout(for WHO program)
(from Apr. 1990 to Nov. 1990)

-continued from NO. 92 of this publication-

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

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
April, 1990				
Niigata, NIIGATA	30	86.0	0.18 ± 0.025	0.14 ± 0.025
May, 1990				
Niigata, NIIGATA	32	56.6	0.15 ± 0.024	0.07 ± 0.023
Yamaguchi, YAMAGUCHI	32	279.5	0.01 ± 0.018	0.08 ± 0.022
Kagoshima, KAGOSHIMA	31	293.0	0.05 ± 0.019	0.12 ± 0.040
June, 1990				
Akita, AKITA	32	286.9	0.04 ± 0.010	0.05 ± 0.023
Chiba, CHIBA	32	69.5	0.01 ± 0.022	0.04 ± 0.017
Niigata, NIIGATA	32	110.8	0.19 ± 0.029	0.05 ± 0.022
Nagano, NAGANO	32	72.7	0.00 ± 0.017	0.01 ± 0.020
Yamaguchi, YAMAGUCHI	32	460.0	0.01 ± 0.020	0.01 ± 0.020
Kochi, KOCHI	33	456.4	0.09 ± 0.021	0.06 ± 0.022
Kagoshima, KAGOSHIMA	31	411.0	0.04 ± 0.020	0.04 ± 0.040
July, 1990				
Akita, AKITA	31	279.8	0.07 ± 0.011	0.01 ± 0.021
Chiba, CHIBA	31	53.7	0.003 ± 0.023	0.04 ± 0.017
Niigata, NIIGATA	31	54.9	0.28 ± 0.032	0.03 ± 0.015
Kanazawa, ISHIKAWA	30	88.0	0.04 ± 0.020	0.003 ± 0.012
Nagano, NAGANO	31	584.0	0.01 ± 0.015	0.04 ± 0.017
Okayama, OKAYAMA	31	79.2	0.05 ± 0.032	0.07 ± 0.023
Yamaguchi, YAMAGUCHI	31	167.0	0.01 ± 0.020	0.03 ± 0.021
Kagoshima, KAGOSHIMA	34	157.0	0.03 ± 0.015	0.08 ± 0.042
August, 1990				
Akita, AKITA	32	121.1	0.06 ± 0.011	0.02 ± 0.021
Chiba, CHIBA	34	105.6	0.01 ± 0.014	0.06 ± 0.021
Niigata, NIIGATA	34	64.0	0.23 ± 0.022	0.05 ± 0.019
Kanazawa, ISHIKAWA	35	93.0	0.06 ± 0.024	0.04 ± 0.015
Nagano, NAGANO	32	39.7	0.00 ± 0.010	0.003 ± 0.016
Osaka, OSAKA	32	24.1	0.02 ± 0.019	0.03 ± 0.020
Okayama, OKAYAMA	32	56.8	0.004 ± 0.022	0.04 ± 0.019

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/Km^2)	^{137}Cs (MBq/Km^2)
Kochi, KOCHI	32	415.1	0.16 ± 0.027	0.01 ± 0.016
Kagoshima, KAGOSHIMA	29	148.5	0.04 ± 0.020	0.15 ± 0.058
September, 1990				
Akita, AKITA	31	281.3	0.07 ± 0.019	0.03 ± 0.017
Chiba, CHIBA	29	202.3	0.001 ± 0.009	0.00 ± 0.017
Niigata, NIIGATA	29	72.7	0.04 ± 0.011	0.01 ± 0.018
Kanazawa, ISHIKAWA	29	268.0	0.05 ± 0.021	0.03 ± 0.021
Nagano, NAGANO	31	136.6	0.00 ± 0.010	0.01 ± 0.017
Osaka, OSAKA	32	455.4	0.01 ± 0.024	0.01 ± 0.022
Okayama, OKAYAMA	32	381.6	0.05 ± 0.024	0.10 ± 0.022
Yamaguchi, YAMAGUCHI	31	167.5	0.00 ± 0.020	0.02 ± 0.014
Kochi, KOCHI	31	615.3	0.03 ± 0.018	0.05 ± 0.017
Kagoshima, KAGOSHIMA	33	478.5	0.03 ± 0.023	0.09 ± 0.033
October, 1990				
Akita, AKITA	32	152.1	0.02 ± 0.010	0.00 ± 0.022
Niigata, NIIGATA	32	91.2	0.05 ± 0.016	0.02 ± 0.019
Kanazawa, ISHIKAWA	30	276.5	0.04 ± 0.013	0.00 ± 0.012
Nagano, NAGANO	32	118.8	0.00 ± 0.011	0.02 ± 0.016
Osaka, OSAKA	31	201.2	0.02 ± 0.028	0.02 ± 0.017
Okayama, OKAYAMA	31	134.8	0.04 ± 0.017	0.04 ± 0.014
Yamaguchi, YAMAGUCHI	32	184.5	0.002 ± 0.012	0.03 ± 0.017
Kochi, KOCHI	32	192.2	0.06 ± 0.022	0.02 ± 0.012
November, 1990				
Akita, AKITA	31	169.6	0.03 ± 0.011	0.00 ± 0.021
Nagano, NAGANO	31	35.4	0.00 ± 0.011	0.03 ± 0.017
Osaka, OSAKA	34	175.6	0.00 ± 0.013	0.005 ± 0.016
Okayama, OKAYAMA	31	151.5	0.04 ± 0.010	0.01 ± 0.017
Kochi, KOCHI	31	157.1	0.07 ± 0.027	0.02 ± 0.014

(2) Strontium-90 and Cesium-137 in Airborne Dust (from Apr. 1989 to Dec. 1990)

-continued from NO. 92 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)
April～June, 1989				
Niigata, NIIGATA	4～6	14,303	0.001 ± 0.0006	0.000 ± 0.0004
July～September, 1989				
Niigata, NIIGATA	7～9	15,150	0.001 ± 0.0006	0.000 ± 0.0003
October～December, 1989				
Niigata, NIIGATA	10～12	14,578	0.001 ± 0.0007	0.001 ± 0.0004
January～March, 1990				
Niigata, NIIGATA	1～3	14,480	0.0001 ± 0.0006	0.0002 ± 0.0004
Nagoya, AICHI	1～3	11,535	0.000 ± 0.0007	0.000 ± 0.0005
Kyoto, KYOTO	1～3	8,337	0.001 ± 0.0011	0.001 ± 0.0007
Tokushima, TOKUSHIMA	1～3	10,455	0.000 ± 0.0009	0.0005 ± 0.0006
Ooita, OOITA	1～3	9,900	0.000 ± 0.0010	0.0002 ± 0.0006
March～March, 1990				
Nara, NARA	3～3	8,529	0.000 ± 0.0010	0.001 ± 0.0008
April～June, 1990				
Morioka, IWATE	4～6	12,173	0.003 ± 0.0009	0.0004 ± 0.0005
Yamagata, YAMAGATA	4～6	12,960	0.002 ± 0.0008	0.001 ± 0.0004
Ookuma-machi, FUKUSHIMA	4～6	9,993	0.002 ± 0.0010	0.001 ± 0.0006
Mito, IBARAGI	4～6	9,399	0.001 ± 0.0010	0.001 ± 0.0006
Yokohama, KANAGAWA	4～6	7,282	0.002 ± 0.0014	0.001 ± 0.0007
Utsunomiya, TOCHIGI	4～6	14,632	0.001 ± 0.0007	0.001 ± 0.0005
Niigata, NIIGATA	4～6	13,939	0.001 ± 0.0008	0.0005 ± 0.0004
Kosugi-machi, TOYAMA	4～6	18,383	0.002 ± 0.0006	0.0004 ± 0.0003
Fukui, FUKUI	4～6	11,436	0.001 ± 0.0009	0.002 ± 0.0005
Nagano, NAGANO	4～6	18,389	0.000 ± 0.0003	0.001 ± 0.0003
Koufu, YAMANASHI	4～6	16,413	0.001 ± 0.0006	0.0003 ± 0.0003
Hamaoka-machi, SHIZUOKA	4～6	10,194	0.002 ± 0.0011	0.002 ± 0.0006
Nagoya, AICHI	4～6	11,810	0.001 ± 0.0008	0.001 ± 0.0005
Tsu, MIE	4～6	14,695	0.003 ± 0.0010	0.000 ± 0.0004
Ootsu, SHIGA	4～6	10,949	0.0004 ± 0.0008	0.0004 ± 0.0005
Kyoto, KYOTO	4～6	7,925	0.003 ± 0.0016	0.002 ± 0.0009
Osaka, OSAKA	4～6	16,273	0.001 ± 0.0006	0.001 ± 0.0004

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Kobe, HYOGO	4～6	10,090	0.001 ± 0.0009	0.001 ± 0.0005
Nara, NARA	4～6	10,466	0.001 ± 0.0013	0.0005 ± 0.0005
Wakayama, WAKAYAMA	4～6	9,960	0.0005 ± 0.0010	0.0002 ± 0.0006
Tottori, TOTTORI	4～6	12,911	0.0003 ± 0.0009	0.001 ± 0.0005
Hiroshima, HIROSHIMA	4～6	12,059	0.0004 ± 0.0008	0.0001 ± 0.0004
Yamaguchi, YAMAGUCHI	4～6	19,833	0.0002 ± 0.0004	0.001 ± 0.0004
Tokushima, TOKUSHIMA	4～6	10,120	0.000 ± 0.0011	0.001 ± 0.0006
Takamatsu, KAGAWA	4～6	15,665	0.001 ± 0.0012	0.0001 ± 0.0004
Saga, SAGA	4～6	10,078	0.002 ± 0.0010	0.002 ± 0.0006
Nagasaki, NAGASAKI	4～6	11,422	0.001 ± 0.0008	0.0004 ± 0.0005
Kumamoto, KUMAMOTO	4～6	16,270	0.001 ± 0.0007	0.001 ± 0.0003
Ooita, OOITA	4～6	9,973	0.001 ± 0.0007	0.001 ± 0.0005
Miyazaki, MIYAZAKI	4～6	13,670	0.002 ± 0.0007	0.0005 ± 0.0004
July～September, 1990				
Morioka, IWATE	7～9	12,058	0.001 ± 0.0008	0.000 ± 0.0003
Yamagata, YAMAGATA	7～9	12,960	0.000 ± 0.0005	0.0005 ± 0.0004
Yokohama, KANAGAWA	7～9	11,596	0.000 ± 0.0007	0.001 ± 0.0006
Utsunomiya, TOCHIGI	7～9	15,406	0.0001 ± 0.0006	0.0004 ± 0.0003
Niigata, NIIGATA	7～9	11,046	0.000 ± 0.0008	0.000 ± 0.0007
Kosugi-machi, TOYAMA	7～9	18,460	0.0002 ± 0.0004	0.0002 ± 0.0003
Fukui, FUKUI	7～9	13,720	0.000 ± 0.0006	0.001 ± 0.0004
Koufu, YAMANASHI	7～9	20,297	0.0002 ± 0.0002	0.001 ± 0.0003
Hamaoka-machi, SHIZUOKA	7～9	11,266	0.0005 ± 0.0007	0.001 ± 0.0005
Nagoya, AICHI	7～9	10,913	0.000 ± 0.0008	0.001 ± 0.0006
Tsu, MIE	7～9	14,640	0.002 ± 0.0007	0.000 ± 0.0005
Ootsu, SHIGA	7～9	10,377	0.001 ± 0.0008	0.0001 ± 0.0006
Kyoto, KYOTO	7～9	9,056	0.000 ± 0.0009	0.000 ± 0.0008
Osaka, OSAKA	7～9	15,478	0.000 ± 0.0004	0.001 ± 0.0004
Kobe, HYOGO	7～9	9,958	0.0003 ± 0.0006	0.0001 ± 0.0005
Nara, NARA	7～9	9,814	0.0005 ± 0.0005	0.001 ± 0.0006
Wakayama, WAKAYAMA	7～9	9,960	0.0003 ± 0.0005	0.0001 ± 0.0006
Tottori, TOTTORI	7～9	13,329	0.000 ± 0.0006	0.000 ± 0.0005
Hiroshima, HIROSHIMA	7～9	10,825	0.000 ± 0.0007	0.0005 ± 0.0004
Yamaguchi, YAMAGUCHI	7～9	19,218	0.000 ± 0.0004	0.000 ± 0.0003
Tokushima, TOKUSHIMA	7～9	11,100	0.001 ± 0.0008	0.0004 ± 0.0006
Takamatsu, KAGAWA	7～9	15,670	0.0002 ± 0.0005	0.0003 ± 0.0003
Saga, SAGA	7～9	11,185	0.0003 ± 0.0009	0.000 ± 0.0005
Nagasaki, NAGASAKI	7～9	10,260	0.002 ± 0.0009	0.000 ± 0.0006
Kumamoto, KUMAMOTO	7～9	17,776	0.000 ± 0.0004	0.0001 ± 0.0003

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Ooita, OOITA	7～9	10,490	0.0003 ± 0.0008	0.001 ± 0.0007
Miyazaki, MIYAZAKI	7～9	13,449	0.000 ± 0.0006	0.0001 ± 0.0005
August～October, 1990				
Ookuma-machi, FUKUSHIMA	8～10	11,570	0.001 ± 0.0008	0.001 ± 0.0004
October～December, 1990				
Yamagata, YAMAGATA	10～12	12,960	0.000 ± 0.0006	0.001 ± 0.0006
Ookuma-machi, FUKUSHIMA	10～12	11,338	0.0004 ± 0.0006	0.0003 ± 0.0005
Yokohama, KANAGAWA	10～12	11,445	0.0003 ± 0.0003	0.001 ± 0.0006
Utsunomiya, TOCHIGI	10～12	14,005	0.001 ± 0.0003	0.000 ± 0.0003
Kosugi-machi, TOYAMA	10～12	18,444	0.0004 ± 0.0002	0.0002 ± 0.0003
Fukui, FUKUI	10～12	12,179	0.001 ± 0.0004	0.0001 ± 0.0004
Koufu, YAMANASHI	10～12	11,016	0.001 ± 0.0004	0.001 ± 0.0005
Hamaoka-machi, SHIZUOKA	10～12	11,504	0.0002 ± 0.0004	0.0002 ± 0.0005
Nagoya, AICHI	10～12	9,035	0.002 ± 0.0006	0.003 ± 0.0008
Osaka, OSAKA	10～12	15,511	0.001 ± 0.0003	0.0001 ± 0.0004
Kobe, HYOGO	10～12	9,860	0.0004 ± 0.0004	0.000 ± 0.0005
Nara, NARA	10～12	10,255	0.001 ± 0.0005	0.000 ± 0.0005
Wakayama, WAKAYAMA	10～12	10,209	0.001 ± 0.0007	0.001 ± 0.0006
Hiroshima, HIROSHIMA	10～12	12,373	0.0004 ± 0.0003	0.000 ± 0.0005
Takamatsu, KAGAWA	10～12	15,642	0.0005 ± 0.0003	0.000 ± 0.0003
Saga, SAGA	10～12	10,163	0.0003 ± 0.0009	0.000 ± 0.0007
Kumamoto, KUMAMOTO	10～12	16,183	0.0001 ± 0.0002	0.0002 ± 0.0004
Miyazaki, MIYAZAKI	10～12	13,496	0.0002 ± 0.0005	0.001 ± 0.0004

(3) Strontium-90 and Cesium-137 in Service Water
(from Jun. 1990 to Jan. 1991)

-continued from NO. 92 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, 1990			
Katsushika, TOKYO	7.3	1.9 ±0.21	0.5 ±0.12
Nagano, NAGANO	7.9	1.0 ±0.16	0.2 ±0.08
Inuyama, AICHI	6.8	1.9 ±0.21	0.1 ±0.12
Fukuoka, FUKUOKA	7.0	1.8 ±0.18	0.2 ±0.08
July, 1990			
Sapporo, HOKKAIDO	7.1	2.1 ±0.27	0.1 ±0.07
August, 1990			
Kyoto, KYOTO	6.6	4.7 ±0.17	0.1 ±0.08
December, 1990			
Tsukui-machi, KANAGAWA	7.5	0.7 ±0.10	0.04 ±0.07
Inuyama, AICHI	6.8	2.5 ±0.19	0.02 ±0.09
Fukuoka, FUKUOKA	6.7	2.3 ±0.18	0.1 ±0.07
January, 1991			
Nagano, NAGANO	7.2	1.3 ±0.15	0.0 ±0.08
(Tap Water)			
June, 1990			
Wakkanai, HOKKAIDO	6.8	1.7 ±0.25	0.04 ±0.10
Morioka, IWATE	7.2	1.3 ±0.17	0.0 ±0.10
Fukushima, FUKUSHIMA	-	3.3 ±0.22	0.1 ±0.07
Mito, IBARAGI	7.7	1.3 ±0.15	0.1 ±0.08
Katsushika, TOKYO	7.1	2.1 ±0.20	0.5 ±0.13
Utsunomiya, TOCHIGI	7.2	0.8 ±0.13	0.2 ±0.12
Niigata, NIIGATA	7.5	2.6 ±0.20	0.3 ±0.11
Kosugi-machi, TOYAMA	6.8	1.6 ±0.16	0.2 ±0.10
Kanazawa, ISHIKAWA	7.0	2.9 ±0.20	0.2 ±0.10
Fukui, FUKUI	7.4	0.8 ±0.13	0.01 ±0.10
Nagano, NAGANO	7.6	0.8 ±0.13	0.0 ±0.06
Koufu, YAMANASHI	7.6	1.5 ±0.17	0.0 ±0.10
Shizuoka, SHIZUOKA	7.7	1.0 ±0.16	0.0 ±0.10
Nagoya, AICHI	6.7	2.1 ±0.22	0.03 ±0.10
Ootsu, SHIGA	6.2	4.8 ±0.28	0.2 ±0.08

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
Nara, NARA	7.0	3.6 ±0.24	0.0 ±0.10
Tottori, TOTTORI	7.5	2.0 ±0.25	0.2 ±0.06
Matsue, SHIMANE	-	2.9 ±0.14	0.1 ±0.08
Hiroshima, HIROSHIMA	6.9	1.5 ±0.17	0.0 ±0.09
Ube, YAMAGUCHI	6.9	1.7 ±0.19	0.02 ±0.10
Matsuyama, EHIME	7.4	1.6 ±0.17	0.0 ±0.09
Takamatsu, KAGAWA	7.8	2.3 ±0.21	0.1 ±0.07
Fukuoka, FUKUOKA	6.5	3.2 ±0.20	0.1 ±0.08
Nagasaki, NAGASAKI	7.0	1.7 ±0.24	0.2 ±0.07
Kumamoto, KUMAMOTO	6.4	0.0 ±0.11	0.0 ±0.11
Ooita, OOITA	8.0	1.3 ±0.19	0.2 ±0.12
Miyazaki, MIYAZAKI	7.0	0.9 ±0.16	0.0 ±0.07
July, 1990			
Sendai, MIYAGI	-	2.3 ±0.24	0.1 ±0.07
Akita, AKITA	7.3	2.4 ±0.20	0.2 ±0.10
Shinguu, WAKAYAMA	7.0	1.9 ±0.19	0.0 ±0.11
Kochi, KOCHI	7.2	1.5 ±0.16	0.1 ±0.11
August, 1990			
Kyoto, KYOTO	6.9	4.0 ±0.17	0.1 ±0.08
November, 1990			
Niigata, NIIGATA	7.2	3.3 ±0.27	0.I ±0.09
December, 1990			
Morioka, IWATE	6.9	1.6 ±0.15	0.05 ±0.08
Yamagata, YAMAGATA	6.9	2.8 ±0.21	0.1 ±0.07
Fukushima, FUKUSHIMA	6.9	2.7 ±0.13	0.1 ±0.11
Mito, IBARAGI	7.7	1.6 ±0.14	0.0 ±0.09
Yokohama, KANAGAWA	6.6	0.6 ±0.10	0.1 ±0.07
Maebashi, GUNMA	7.3	1.3 ±0.17	0.04 ±0.07
Utsunomiya, TOCHIGI	7.3	0.8 ±0.09	0.3 ±0.11
Kosugi-machi, TOYAMA	6.8	2.0 ±0.11	0.1 ±0.10
Kanazawa, ISHIKAWA	6.9	3.1 ±0.15	0.1 ±0.10
Fukui, FUKUI	7.2	1.1 ±0.14	0.1 ±0.07
Koufu, YAMANASHI	7.6	1.1 ±0.14	0.0 ±0.06
Shizuoka, SHIZUOKA	7.7	1.3 ±0.14	0.0 ±0.06
Gihu, GIFU	6.7	1.4 ±0.15	0.02 ±0.08
Nagoya, AICHI	6.8	2.8 ±0.21	0.2 ±0.09
Ootsu, SHIGA	6.5	4.5 ±0.29	0.2 ±0.09
Osaka, OSAKA	7.0	2.9 ±0.15	0.0 ±0.10

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
Kobe, HYOGO	7.0	3.3 ±0.16	0.03 ±0.10
Nara, NARA	6.6	2.8 ±0.14	0.05 ±0.10
Okayama, OKAYAMA	7.0	2.6 ±0.18	0.1 ±0.07
Ube, YAMAGUCHI	7.0	2.1 ±0.18	0.1 ±0.08
Kochi, KOCHI	7.2	1.7 ±0.16	0.1 ±0.08
Fukuoka, FUKUOKA	6.7	3.1 ±0.21	0.0 ±0.06
Nagasaki, NAGASAKI	8.1	1.3 ±0.13	0.2 ±0.08
Kumamoto, KUMAMOTO	6.7	0.0 ±0.06	0.1 ±0.11
Ooita, OOITA	6.6	0.7 ±0.14	0.01 ±0.07
Miyazaki, MIYAZAKI	7.2	1.0 ±0.10	0.0 ±0.10
January, 1991			
Nagano, NAGANO	7.1	0.5 ±0.10	0.1 ±0.09
Hiroshima, HIROSHIMA	6.6	1.3 ±0.12	0.2 ±0.08

(4) Strontium-90 and Cesium-137 in Freshwater
(from May 1990 to Dec. 1990)

-continued from NO. 92 of this publication-

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

Location	pH	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
(Freshwater)			
May, 1990			
Kasumigaura, IBARAGI	9.1	2.9 ±0.24	0.7 ±0.13
August, 1990			
Akita, AKITA	7.3	3.7 ±0.15	0.5 ±0.10
Turuga, FUKUI	7.3	5.6 ±0.20	4.5 ±0.24
November, 1990			
Shobara, HIROSHIMA	6.8	1.5 ±0.15	0.1 ±0.07
December, 1990			
Suwa-lake, NAGANO	7.4	1.0 ±0.14	0.4 ±0.10

(5) Strontium-90 and Cesium-137 in Soil
(from Jul. 1989 to Aug. 1990)

-continued from NO. 92 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)
July, 1989					
Kashiwazaki, NIIGATA	0～5	0.9 ± 0.12	58 ± 8.1	12 ± 0.4	800 ± 24
〃	5～20	1.4 ± 0.14	360 ± 37	6.6 ± 0.28	1700 ± 70
November, 1989					
Nishihara-mura, KUMAMOTO	0～5	8.6 ± 0.30	200 ± 7	90 ± 1.0	2100 ± 20
〃	5～20	9.2 ± 0.32	590 ± 20	17 ± 0.5	1100 ± 30
March, 1990					
Yashu-chou, SHIGA	0～5	0.9 ± 0.12	55 ± 7.2	9.9 ± 0.34	590 ± 20
〃	5～20	1.6 ± 0.15	250 ± 23	2.9 ± 0.20	450 ± 31
Kashihara, NARA	0～5	0.7 ± 0.11	34 ± 5.4	5.1 ± 0.25	260 ± 13
〃	5～20	0.8 ± 0.11	99 ± 15	5.2 ± 0.25	670 ± 33
Kamiita-machi, TOKUSHIMA	0～5	1.3 ± 0.14	170 ± 19	4.7 ± 0.24	650 ± 33
〃	5～20	1.0 ± 0.13	150 ± 18	3.4 ± 0.21	480 ± 29
May, 1990					
Tokai-mura, IBARAGI	0～5	12 ± 0.4	550 ± 17	70 ± 1.0	3200 ± 40
〃	5～20	11 ± 0.4	1000 ± 30	11 ± 0.4	1000 ± 30
Akabane-machi, AICHI	0～5	0.5 ± 0.12	33 ± 8.0	4.4 ± 0.24	300 ± 16
〃	5～20	0.3 ± 0.11	79 ± 27	2.8 ± 0.20	660 ± 46
June, 1990					
Fukushima, FUKUSHIMA	0～5	2.4 ± 0.19	73 ± 5.6	5.2 ± 0.26	160 ± 8
〃	5～20	0.9 ± 0.13	47 ± 7.0	0.3 ± 0.09	15 ± 4.6
July, 1990					
Yamagata, YAMAGATA	0～5	5.1 ± 0.26	240 ± 12	27 ± 0.6	1300 ± 30
〃	5～20	1.7 ± 0.17	220 ± 21	5.1 ± 0.26	650 ± 32
Kashiwazaki, NIIGATA	0～5	1.1 ± 0.13	76 ± 8.9	18 ± 0.5	1200 ± 30
〃	5～20	1.1 ± 0.13	280 ± 32	7.2 ± 0.31	1800 ± 80
Kosugi-machi, TOYAMA	0～5	7.0 ± 0.31	530 ± 24	19 ± 0.5	1500 ± 40
〃	5～20	6.1 ± 0.30	1100 ± 50	1.9 ± 0.17	330 ± 29
Fukui, FUKUI	0～5	0.8 ± 0.14	40 ± 6.5	5.8 ± 0.27	280 ± 13
〃	5～20	0.8 ± 0.14	54 ± 9.0	2.2 ± 0.18	150 ± 12

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)
Gotenba, SHIZUOKA	0～5	1.6 ± 0.17	63 ± 6.4	14 ± 0.5	550 ± 16
〃	5～20	1.1 ± 0.14	150 ± 20	7.7 ± 0.32	1100 ± 40
Osaka, OSAKA	0～5	1.1 ± 0.15	51 ± 7.1	8.0 ± 0.32	380 ± 15
〃	5～20	1.3 ± 0.17	240 ± 30	3.5 ± 0.22	630 ± 40
Kamiita-machi, TOKUSHIMA	0～5	0.9 ± 0.14	70 ± 11	4.0 ± 0.24	300 ± 18
〃	5～20	1.0 ± 0.15	210 ± 33	3.0 ± 0.21	670 ± 46
August, 1990					
Hagi, YAMAGUCHI	0～5	2.0 ± 0.17	130 ± 11	8.3 ± 0.33	540 ± 21
〃	5～20	1.5 ± 0.15	380 ± 38	5.8 ± 0.28	1500 ± 70
Saga, SAGA	0～5	0.6 ± 0.10	37 ± 6.4	2.8 ± 0.20	180 ± 13
〃	5～20	0.9 ± 0.12	120 ± 16	2.5 ± 0.19	330 ± 25

(6) Strontium-90 and Cesium-137 in Sea Water
(from Jul. 1990 to Oct. 1990)

-continued from NO. 92 of this publication-

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

Location	Sample volume analyzed (ℓ)	Cl (‰)	^{90}Sr (mBq/ℓ)	^{137}Cs (mBq/ℓ)
July, 1990				
Niigata-Port, NIIGATA	40.0	18.60	2.5 ± 0.34	3.7 ± 0.33
Moji-Port, FUKUOKA	40.0	15.85	2.4 ± 0.34	3.2 ± 0.32
Kaseda, KAGOSHIMA	40.0	17.96	2.8 ± 0.40	4.0 ± 0.42
August, 1990				
Mutsu-bay, AOMORI	40.0	17.90	2.7 ± 0.37	3.4 ± 0.32
Matsukawaura, FUKUSHIMA	40.0	16.30	2.6 ± 0.35	3.1 ± 0.32
Odawa-bay, KANAGAWA	40.0	17.70	2.4 ± 0.34	3.7 ± 0.33
Osaka-Port, OSAKA	40.0	12.32	3.7 ± 0.38	2.2 ± 0.29
Yamaguchi-bay, YAMAGUCHI	40.0	19.20	2.4 ± 0.36	3.8 ± 0.34
October, 1990				
Kinnakagusuku-bay, OKINAWA	40.0	19.25	2.4 ± 0.39	4.0 ± 0.41

(7) Strontium-90 and Cesium-137 in Sea Sediments
(Jul. 1989)

-continued from NO. 92 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)
July, 1989 Niigata-Port, NIIGATA	20.0	0.00 ±0.08	2.6 ±0.19

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

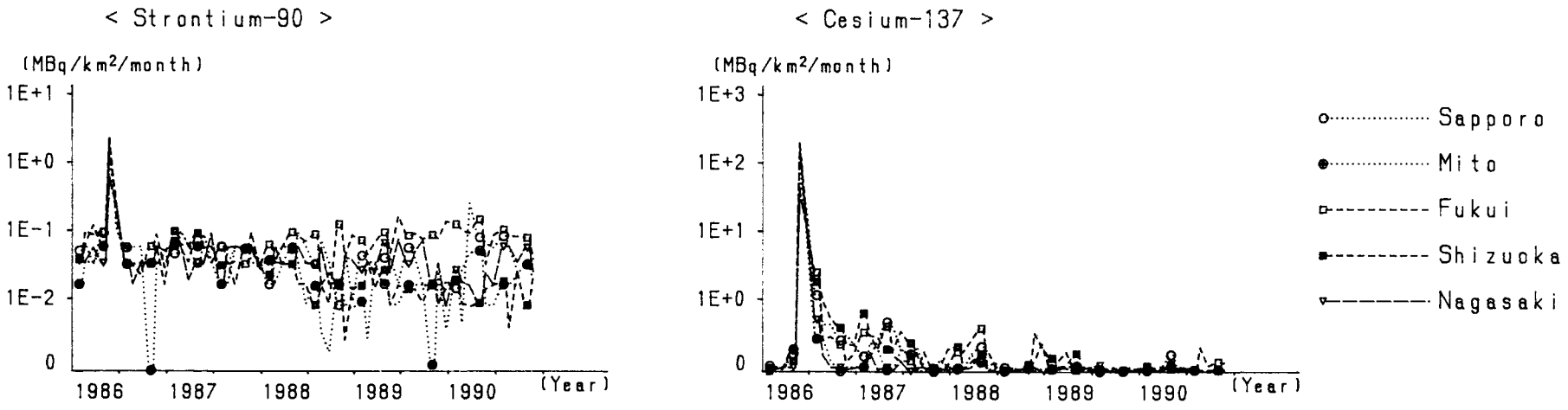

Fig. 1-1

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

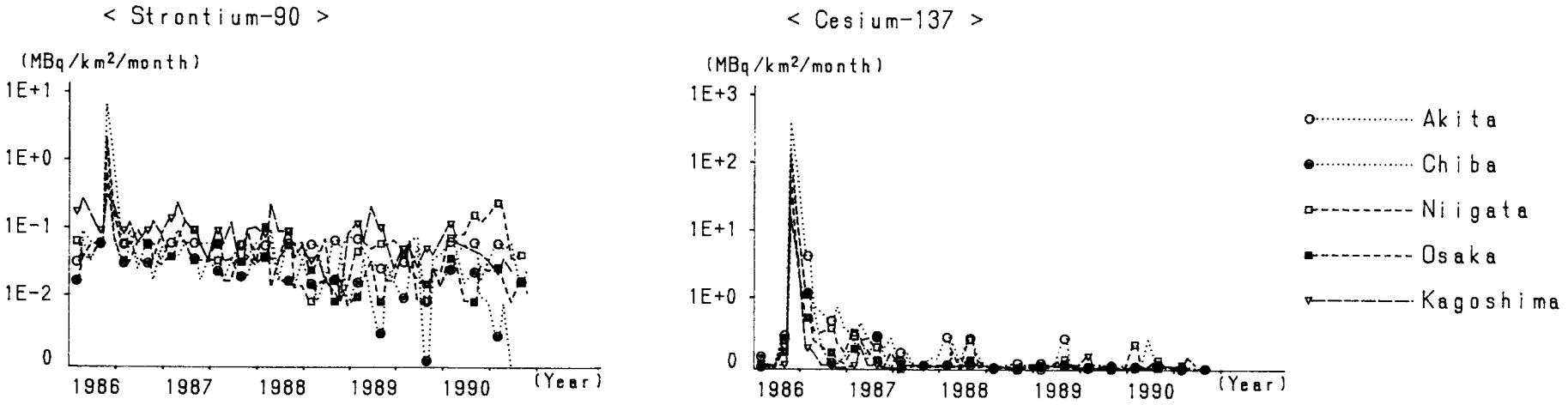

Fig. 1-2

＊＊＊　Airborne Dust　＊＊＊

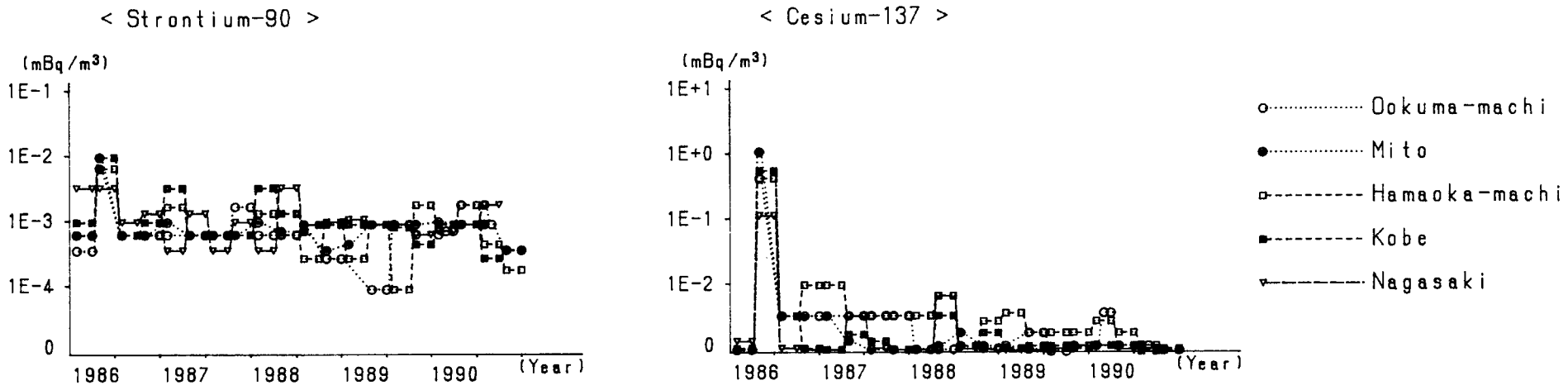

Fig.2

* * * Tap water * * *

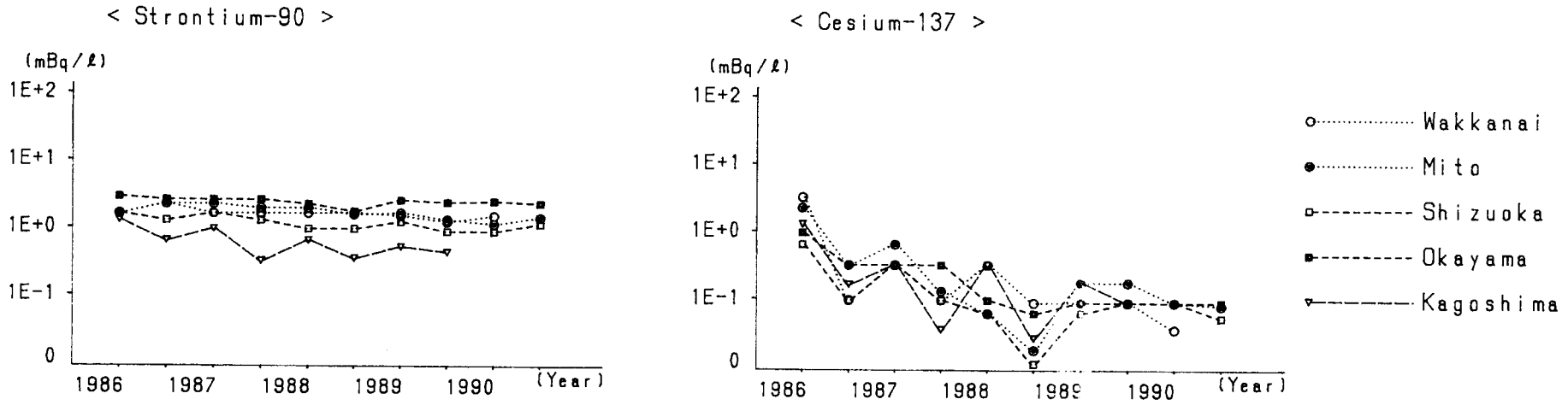

Fig.3

＊＊＊　Freshwater　＊＊＊

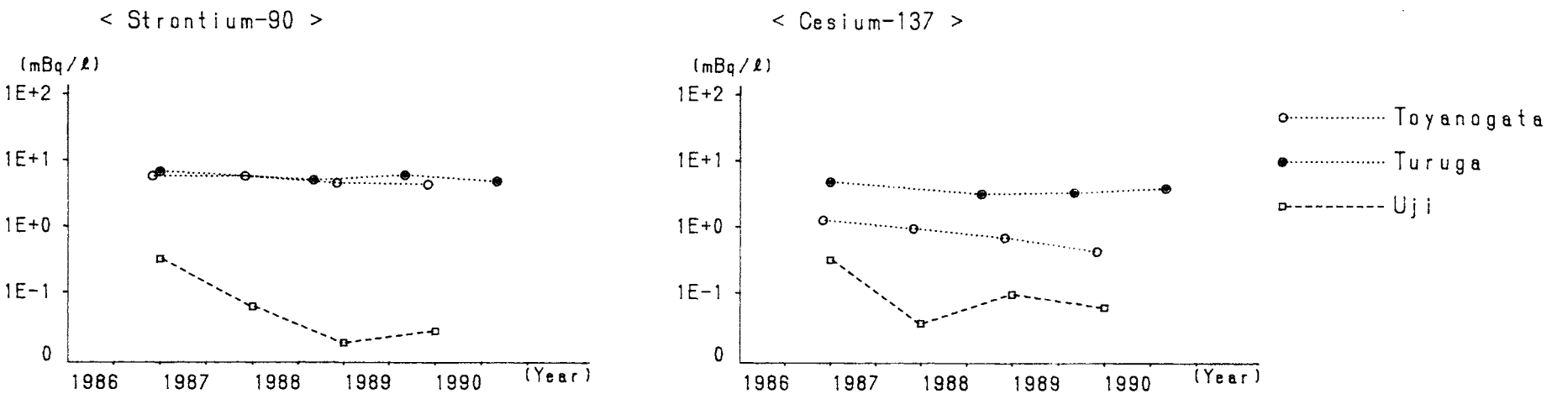

Fig.4

* * *　Soil　* * *

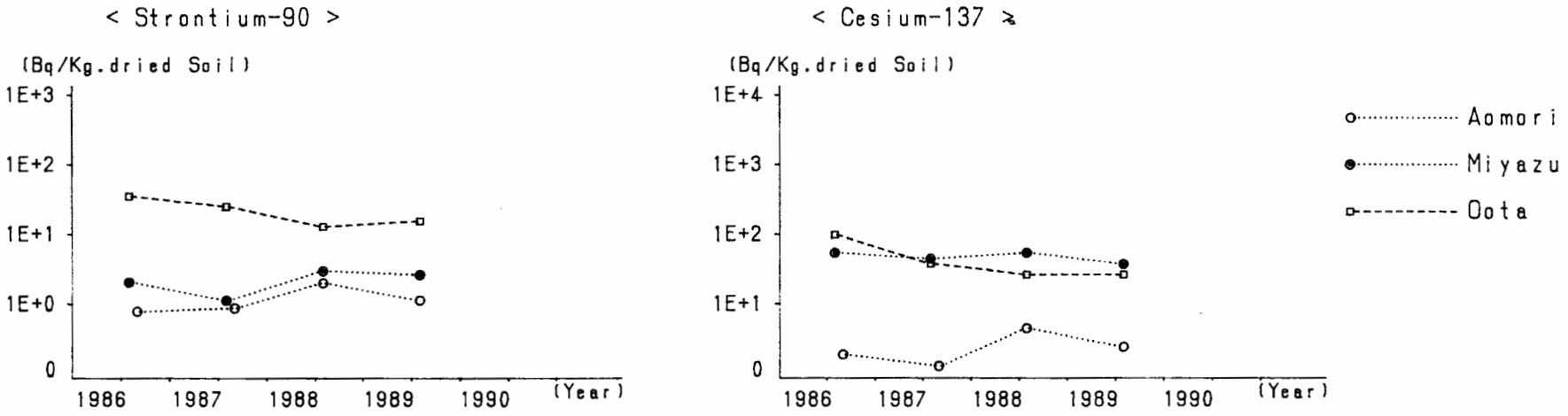

Fig.5-1 (Sampling Depth 0-5cm)

* * * Soil * * *

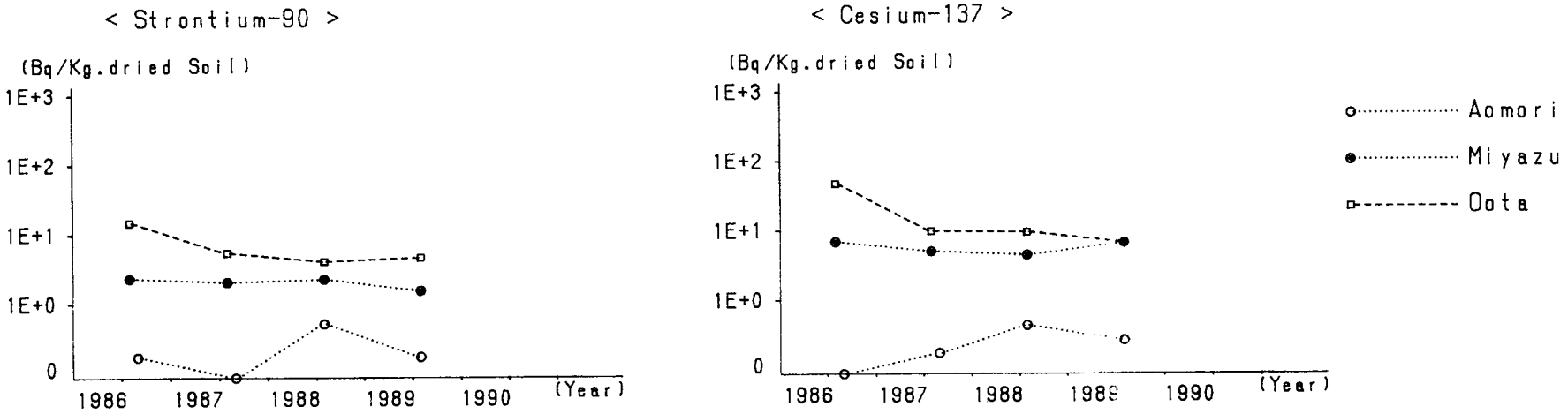

Fig.5-2 (Sampling Depth 5-20cm)

* * * Sea Sediments * * *

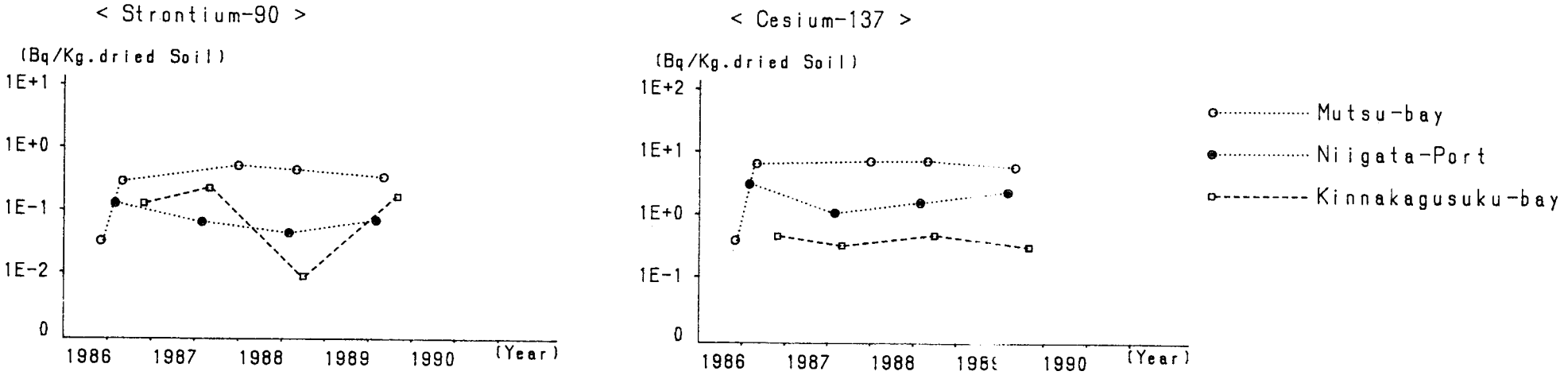

Fig.6

** 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