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RADIOACTIVITY SURVEY DATA in Japan

Part 1
= Environmental Materials =

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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 5000cm^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 5ℓ of distilled water and the washing was combined to the filtrate.

The sample was passed through a cation exchange column (500mℓ of Dowex 50W X8, 50~100 mesh, Na form) at a rate flow of 80mℓ/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 3000m^3 per month.

The sampling was done 1 to 1.5 meters above the ground.

(3) Service water and freshwater

Service water, 100ℓ 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 dust storms, inflow and out flow 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°C . The soil was then passed through a 2mm 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 20ℓ polyethylene containers. The sampling equipments as well as containers were thoroughly rinsed with dilute hydrochloric acid and then with distilled water before use. Two hundred milliliters of sea water was also collected at the same stations for the determination of chlorinity.

(6) Sea sediments

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

a. The depth of water exceeds 1m 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°C.

(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 transferred to a porcelain dish and then ashed at 450°C 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 nonstarch 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 4kg 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 details 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 0.25mm 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 0.25mm 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 0.35mm 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 molybdophosphate added.

After filtered off and washed with hydrochloric 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°C 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 90min. Net sample counting rates were corrected for counter efficiency, recovery, self-absorption and decay to obtain the content of strontium-90 and cesium-137per sample aliquot. From the results, concentrations of these nuclides in the original samples were calculated.

6. Results

(1)-1 Strontuim-90 and Cesium-137 in Rain and Dry Fallout(for domestic program) (from Oct. 1997 to Mar. 1998)

-continued from No. 122 of this publication-

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

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
September, 1997				
Nagoya, AICHI	31	189.9	0.034 ± 0.015	0.011 ± 0.014
October, 1997				
Sapporo, HOKKAIDOU	31	87.5	0.0058 ± 0.0067	0.017 ± 0.015
Aomori, AOMORI	31	155.7	0.030 ± 0.011	0.013 ± 0.011
Morioka, IWATE	35	32.5	0.072 ± 0.017	0.011 ± 0.013
Onagawa-machi, MIYAGI	35	30.5	0.016 ± 0.0080	0.0000 ± 0.0099
Yamagata, YAMAGATA	35	57.6	0.0034 ± 0.0064	0.027 ± 0.013
Ookuma-machi, FUKUSHIMA	35	15.7	0.000 ± 0.010	0.030 ± 0.016
Mito, IBARAKI	35	8.0	0.013 ± 0.0079	0.0000 ± 0.0091
Kawachi-machi, TOCHIGI	35	9.2	0.0076 ± 0.0064	0.020 ± 0.015
Maebashi, GUNMA	35	6.0	0.009 ± 0.010	0.012 ± 0.011
Urawa, SAITAMA	35	12.1	0.032 ± 0.013	0.019 ± 0.090
Ichihara, CHIBA	35	46.7	0.000 ± 0.013	0.010 ± 0.015
Shinjuku, TOKYO	35	20.2	0.022 ± 0.012	0.0000 ± 0.0098
Yokohama, KANAGAWA	31	23.2	0.012 ± 0.014	0.025 ± 0.015
Kosugi-machi, TOYAMA	31	127.4	0.012 ± 0.0069	0.0025 ± 0.0089
Fukui, FUKUI	35	184.3	0.12 ± 0.057	0.019 ± 0.056
Koufu, YAMANASHI	35	6.0	0.0037 ± 0.0094	0.0000 ± 0.0096
Gifu, GIFU	35	8.0	0.003 ± 0.011	0.001 ± 0.011
Shizuoka, SHIZUOKA	35	21.5	0.029 ± 0.011	0.002 ± 0.011
Nagoya, AICHI	35	8.4	0.003 ± 0.011	0.0000 ± 0.0099
Ootsu, SHIGA	35	9.6	0.032 ± 0.016	0.000 ± 0.013
Tsu, MIE	31	27.5	0.006 ± 0.014	0.011 ± 0.012
Kyoto, KYOTO	34	12.5	0.014 ± 0.013	0.003 ± 0.010
Kobe, HYOUGO	33	33.7	0.058 ± 0.010	0.024 ± 0.012
Nara, NARA	35	30.1	0.012 ± 0.012	0.055 ± 0.015

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Wakayama, WAKAYAMA	35	28.0	0.000 ± 0.023	0.012 ± 0.012
Tottori, TOTTORI	35	98.2	0.050 ± 0.0097	0.000 ± 0.015
Matsue, SHIMANE	35	51.4	0.0094 ± 0.0084	0.013 ± 0.0082
Hiroshima, HIROSHIMA	36	25.2	0.025 ± 0.0077	0.000 ± 0.011
Takamatsu, KAGAWA	31	29.0	0.000 ± 0.015	0.002 ± 0.013
Matsuyama, EHIME	35	65.5	0.007 ± 0.013	0.000 ± 0.010
Dazaifu, FUKUOKA	35	39.9	0.026 ± 0.0099	0.000 ± 0.011
Saga, SAGA	34	16.2	0.013 ± 0.0068	0.031 ± 0.017
Nagasaki, NAGASAKI	35	3.5	0.019 ± 0.014	0.013 ± 0.013
Uto, KUMAMOTO	35	6.3	0.000 ± 0.013	0.012 ± 0.013
Ooita, OOITA	35	37.5	0.0071 ± 0.0060	0.000 ± 0.015
Miyazaki, MIYAZAKI	35	219.8	0.014 ± 0.012	0.014 ± 0.011
Yonagusuku-machi, Okinawa	37	325.6	0.009 ± 0.016	0.006 ± 0.013
November, 1997				
Sapporo, HOKKAIDOU	32	99.0	0.026 ± 0.0077	0.0000 ± 0.010
Aomori, AOMORI	32	66.9	0.018 ± 0.010	0.021 ± 0.012
Morioka, IWATE	27	138.6	0.015 ± 0.0093	0.002 ± 0.012
Onagawa-machi, MIYAGI	28	165.0	0.017 ± 0.0073	0.000 ± 0.011
Yamagata, YAMAGATA	28	101.4	0.011 ± 0.0074	0.005 ± 0.014
Ookuma-machi, FUKUSHIMA	28	142.5	0.027 ± 0.029	0.005 ± 0.017
Mito, IBARAKI	28	114.5	0.021 ± 0.0088	0.055 ± 0.017
Kawachi-machi, TOCHIGI	28	122.3	0.0000 ± 0.010	0.014 ± 0.012
Maebashi, GUNMA	28	58.0	0.0000 ± 0.0094	0.025 ± 0.011
Urawa, SAITAMA	28	122.7	0.093 ± 0.033	0.007 ± 0.011
Ichihara, CHIBA	28	92.0	0.000 ± 0.014	0.013 ± 0.014
Shinjuku, TOKYO	26	116.9	0.036 ± 0.014	0.0000 ± 0.0081
Yokohama, KANAGAWA	30	70.1	0.021 ± 0.013	0.007 ± 0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Kosugi-machi, TOYAMA	32	221.2	0.019 ± 0.0089	0.003 ± 0.010
Fukui, FUKUI	28	223.2	0.067 ± 0.073	0.000 ± 0.056
Koufu, YAMANASHI	28	125.5	0.000 ± 0.011	0.008 ± 0.011
Gifu, GIFU	28	263.3	0.025 ± 0.013	0.008 ± 0.011
Shizuoka, SHIZUOKA	28	337.5	0.0098 ± 0.0074	0.0000 ± 0.0095
Nagoya, AICHI	28	208.5	0.026 ± 0.016	0.028 ± 0.018
Ootsu, SHIGA	28	130.8	0.0007 ± 0.0081	0.015 ± 0.010
Tsu, MIE	32	225.5	0.025 ± 0.0082	0.026 ± 0.018
Kyoto, KYOTO	28	157.0	0.058 ± 0.018	0.009 ± 0.012
Kobe, HYOUGO	29	92.1	0.022 ± 0.013	0.000 ± 0.011
Nara, NARA	28	141.2	0.016 ± 0.0076	0.0000 ± 0.0090
Wakayama, WAKAYAMA	28	145.5	0.017 ± 0.012	0.005 ± 0.010
Tottori, TOTTORI	28	128.1	0.077 ± 0.012	0.022 ± 0.015
Matsue, SHIMANE	28	153.9	0.017 ± 0.0098	0.0086 ± 0.0074
Hiroshima, HIROSHIMA	28	120.6	0.0000 ± 0.0084	0.003 ± 0.010
Takamatsu, KAGAWA	32	84.0	0.000 ± 0.014	0.000 ± 0.011
Matsuyama, EHIME	28	107.0	0.001 ± 0.013	0.000 ± 0.011
Dazaifu, FUKUOKA	28	153.4	0.021 ± 0.0078	0.000 ± 0.011
Saga, SAGA	28	188.5	0.013 ± 0.011	0.003 ± 0.010
Nagasaki, NAGASAKI	28	190.0	0.002 ± 0.013	0.0000 ± 0.0097
Uto, KUMAMOTO	28	129.4	0.000 ± 0.011	0.020 ± 0.013
Ooita, OOITA	28	97.5	0.0000 ± 0.0085	0.000 ± 0.010
Miyazaki, MIYAZAKI	27	100.0	0.007 ± 0.013	0.009 ± 0.010
Yonagusuku-machi, Okinawa	28	141.2	0.016 ± 0.011	0.020 ± 0.019
December, 1997				
Sapporo, HOKKAIDOU	26	57.0	0.0000 ± 0.0060	0.012 ± 0.025
Aomori, AOMORI	36	104.4	0.027 ± 0.011	0.017 ± 0.013

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Morioka, IWATE	36	65.2	0.0000 ± 0.014	0.010 ± 0.011
Onagawa-machi, MIYAGI	37	63.5	0.016 ± 0.014	0.005 ± 0.010
Yamagata, YAMAGATA	36	59.2	0.013 ± 0.0077	0.0000 ± 0.0085
Ookuma-machi, FUKUSHIMA	36	60.0	0.014 ± 0.011	0.016 ± 0.016
Mito, IBARAKI	37	40.5	0.0076 ± 0.0078	0.008 ± 0.015
Kawachi-machi, TOCHIGI	36	28.7	0.0099 ± 0.0078	0.000 ± 0.014
Maebashi, GUNMA	36	9.0	0.012 ± 0.011	0.044 ± 0.015
Urawa, SAITAMA	36	37.8	0.030 ± 0.022	0.003 ± 0.014
Ichihara, CHIBA	36	73.0	0.016 ± 0.014	0.004 ± 0.011
Shinjuku, TOKYO	36	51.7	0.014 ± 0.012	0.0000 ± 0.0092
Yokohama, KANAGAWA	29	94.8	0.012 ± 0.013	0.026 ± 0.013
Kosugi-machi, TOYAMA	36	168.9	0.0098 ± 0.0094	0.005 ± 0.010
Fukui, FUKUI	36	227.0	0.000 ± 0.043	0.000 ± 0.057
Koufu, YAMANASHI	36	40.5	0.013 ± 0.012	0.007 ± 0.011
Gifu, GIFU	36	67.5	0.046 ± 0.016	0.017 ± 0.013
Nagoya, AICHI	36	77.0	0.019 ± 0.017	0.000 ± 0.015
Ootsu, SHIGA	36	85.2	0.005 ± 0.012	0.000 ± 0.015
Tsu, MIE	36	63.5	0.0000 ± 0.0068	0.0070 ± 0.0095
Kyoto, KYOTO	26	33.0	0.000 ± 0.012	0.000 ± 0.011
Kobe, HYOUGO	29	75.7	0.030 ± 0.015	0.012 ± 0.012
Nara, NARA	36	132.6	0.020 ± 0.0072	0.0000 ± 0.0095
Wakayama, WAKAYAMA	36	51.5	0.048 ± 0.028	0.0000 ± 0.0087
Tottori, TOTTORI	36	169.5	0.040 ± 0.0093	0.068 ± 0.019
Matsue, SHIMANE	36	103.3	0.022 ± 0.010	0.014 ± 0.0080
Hiroshima, HIROSHIMA	37	80.0	0.0000 ± 0.0099	0.000 ± 0.012
Ishii-machi, TOKUSHIMA	37	13.3	0.065 ± 0.013	0.46 ± 0.037
Takamatsu, KAGAWA	36	53.0	0.010 ± 0.013	0.000 ± 0.011

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Matsuyama, EHIME	36	86.5	0.022 ± 0.015	0.000 ± 0.010
Dazaifu, FUKUOKA	36	130.5	0.0084 ± 0.0068	0.015 ± 0.011
Saga, SAGA	36	153.3	0.0000 ± 0.0088	0.010 ± 0.011
Nagasaki, NAGASAKI	36	113.5	0.022 ± 0.011	0.000 ± 0.010
Uto, KUMAMOTO	36	68.2	0.018 ± 0.014	0.020 ± 0.010
Ooita, OOITA	36	72.8	0.020 ± 0.012	0.0000 ± 0.0079
Miyazaki, MIYAZAKI	36	116.1	0.0000 ± 0.0052	0.0000 ± 0.0088
Yonagusuku-machi, Okinawa	37	133.4	0.016 ± 0.022	0.000 ± 0.011
January, 1998				
Sapporo, HOKKAIDOU	36	83.5	0.011 ± 0.012	0.0092 ± 0.0092
Aomori, AOMORI	29	125.3	0.0000 ± 0.0091	0.041 ± 0.014
Morioka, IWATE	28	11.3	0.0000 ± 0.028	0.013 ± 0.011
Onagawa-machi, MIYAGI	33	81.0	0.041 ± 0.024	0.018 ± 0.012
Yamagata, YAMAGATA	29	149.8	0.016 ± 0.0067	0.021 ± 0.012
Ookuma-machi, FUKUSHIMA	29	116.5	0.0050 ± 0.0052	0.000 ± 0.011
Mito, IBARAKI	29	86.5	0.027 ± 0.015	0.019 ± 0.012
Kawachi-machi, TOCHIGI	29	92.9	0.011 ± 0.0091	---- ± ----
Maebashi, GUNMA	25	108.5	0.014 ± 0.013	0.029 ± 0.011
Urawa, SAITAMA	29	110.7	0.000 ± 0.018	0.0000 ± 0.0092
Ichihara, CHIBA	28	162.7	0.005 ± 0.012	0.0000 ± 0.0089
Shinjuku, TOKYO	29	145.6	0.016 ± 0.0078	0.006 ± 0.010
Yokohama, KANAGAWA	37	159.5	0.002 ± 0.013	0.018 ± 0.016
Kosugi-machi, TOYAMA	29	242.5	0.021 ± 0.012	0.026 ± 0.013
Fukui, FUKUI	29	367.0	0.026 ± 0.066	0.000 ± 0.048
Koufu, YAMANASHI	29	128.0	0.018 ± 0.010	---- ± ----
Gifu, GIFU	29	132.5	0.024 ± 0.022	---- ± ----
Shizuoka, SHIZUOKA	28	2.0	0.0055 ± 0.0072	0.030 ± 0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Nagoya, AICHI	29	144.2	0.016 ± 0.012	0.000 ± 0.012
Ootsu, SHIGA	29	177.0	0.0027 ± 0.0073	0.0000 ± 0.0088
Tsu, MIE	29	121.5	0.0087 ± 0.0065	---- ± ----
Kyoto, KYOTO	36	146.0	0.024 ± 0.0088	0.004 ± 0.010
Kobe, HYOUGO	36	158.3	0.019 ± 0.012	0.0000 ± 0.0095
Nara, NARA	29	217.2	0.000 ± 0.011	0.022 ± 0.011
Wakayama, WAKAYAMA	30	124.0	0.018 ± 0.012	0.008 ± 0.010
Tottori, TOTTORI	29	265.6	0.044 ± 0.013	0.035 ± 0.019
Matsue, SHIMANE	29	202.6	0.021 ± 0.010	0.057 ± 0.012
Hiroshima, HIROSHIMA	28	122.0	0.011 ± 0.012	0.018 ± 0.011
Ishii-machi, TOKUSHIMA	27	91.9	0.035 ± 0.0097	0.23 ± 0.034
Takamatsu, KAGAWA	29	74.0	0.000 ± 0.013	0.014 ± 0.011
Matsuyama, EHIME	29	94.5	0.044 ± 0.0090	0.050 ± 0.014
Dazaifu, FUKUOKA	29	149.7	0.0011 ± 0.0066	0.040 ± 0.013
Saga, SAGA	29	107.1	0.025 ± 0.012	0.017 ± 0.0091
Nagasaki, NAGASAKI	29	94.5	0.002 ± 0.012	---- ± ----
Uto, KUMAMOTO	29	161.1	0.030 ± 0.020	0.010 ± 0.0085
Ooita, OOITA	29	172.6	0.012 ± 0.011	0.017 ± 0.012
Miyazaki, MIYAZAKI	29	416.6	0.004 ± 0.010	0.019 ± 0.012
Yonagusuku-machi, Okinawa	28	150.5	0.016 ± 0.016	0.000 ± 0.012
Febraly, 1998				
Sapporo, HOKKAIDOU	32	40.0	0.007 ± 0.010	0.002 ± 0.010
Aomori, AOMORI	29	44.4	0.012 ± 0.011	0.005 ± 0.010
Morioka, IWATE	28	28.2	0.052 ± 0.023	0.008 ± 0.011
Onagawa-machi, MIYAGI	29	74.5	0.015 ± 0.015	0.0000 ± 0.0086
Yamagata, YAMAGATA	29	41.1	0.0081 ± 0.0062	0.002 ± 0.010
Ookuma-machi, FUKUSHIMA	29	71.0	0.008 ± 0.011	0.020 ± 0.010

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Mito, IBARAKI	29	76.5	0.0063 ± 0.0098	0.001 ± 0.011
Kawachi-machi, TOCHIGI	29	91.0	0.035 ± 0.012	---- ± ----
Maebashi, GUNMA	28	108.5	0.0097 ± 0.0071	0.031 ± 0.012
Urawa, SAITAMA	29	164.2	0.000 ± 0.020	0.016 ± 0.011
Ichihara, CHIBA	29	151.7	0.000 ± 0.011	0.011 ± 0.012
Shinjuku, TOKYO	29	173.0	0.013 ± 0.013	0.018 ± 0.011
Yokohama, KANAGAWA	28	126.0	0.018 ± 0.0063	0.049 ± 0.014
Kosugi-machi, TOYAMA	29	138.0	0.016 ± 0.012	0.021 ± 0.013
Fukui, FUKUI	35	137.0	0.28 ± 0.14	0.000 ± 0.047
Koufu, YAMANASHI	29	85.5	0.016 ± 0.010	---- ± ----
Gifu, GIFU	31	96.5	0.0099 ± 0.0067	---- ± ----
Shizuoka, SHIZUOKA	33	76.0	0.016 ± 0.0080	0.039 ± 0.014
Nagoya, AICHI	29	86.2	0.041 ± 0.015	0.009 ± 0.012
Ootsu, SHIGA	29	91.8	0.0000 ± 0.0071	0.001 ± 0.011
Tsu, MIE	29	108.5	0.000 ± 0.011	---- ± ----
Kyoto, KYOTO	32	64.0	0.016 ± 0.0073	0.007 ± 0.010
Kobe, HYOUGO	29	59.1	0.014 ± 0.013	0.009 ± 0.011
Nara, NARA	31	136.1	0.020 ± 0.014	0.0000 ± 0.0090
Wakayama, WAKAYAMA	27	118.0	0.002 ± 0.014	0.001 ± 0.011
Tottori, TOTTORI	29	110.2	0.021 ± 0.015	0.040 ± 0.014
Matsue, SHIMANE	29	110.9	0.019 ± 0.0054	0.027 ± 0.0084
Hiroshima, HIROSHIMA	29	63.2	0.021 ± 0.013	0.001 ± 0.012
Ishii-machi, TOKUSHIMA	29	56.5	0.049 ± 0.0093	0.16 ± 0.011
Takamatsu, KAGAWA	29	64.5	0.000 ± 0.013	0.013 ± 0.011
Matsuyama, EHIME	29	45.0	0.023 ± 0.0075	0.0000 ± 0.0097
Dazaifu, FUKUOKA	29	76.6	0.0043 ± 0.0067	0.026 ± 0.011

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Saga, SAGA	29	12.6	0.033 ± 0.013	0.021 ± 0.010
Nagasaki, NAGASAKI	29	119.0	0.026 ± 0.018	---- ± ----
Uto, KUMAMOTO	29	95.8	0.000 ± 0.013	0.023 ± 0.012
Ooita, OOITA	29	100.9	0.0000 ± 0.0095	0.004 ± 0.011
Miyazaki, MIYAZAKI	29	326.4	0.023 ± 0.013	0.032 ± 0.013
Yonagusuku-machi, Okinawa	29	344.9	0.025 ± 0.018	0.009 ± 0.012
March,1998				
Sapporo, HOKKAIDOU	31	49.5	0.012 ± 0.013	0.024 ± 0.012
Aomori, AOMORI	31	13.6	0.057 ± 0.016	0.024 ± 0.011
Morioka, IWATE	30	13.9	0.038 ± 0.019	---- ± ----
Onagawa-machi, MIYAGI	30	31.5	0.039 ± 0.00088	0.029 ± 0.013
Yamagata, YAMAGATA	31	35.8	0.023 ± 0.0076	0.058 ± 0.016
Ookuma-machi, FUKUSHIMA	31	40.5	0.025 ± 0.014	0.014 ± 0.012
Mito, IBARAKI	31	55.5	0.024 ± 0.011	---- ± ----
Kawachi-machi, TOCHIGI	31	43.1	0.0065 ± 0.0085	---- ± ----
Maebashi, GUNMA	30	34.5	0.033 ± 0.0087	0.028 ± 0.014
Urawa, SAITAMA	31	53.8	0.012 ± 0.015	0.046 ± 0.012
Ichihara, CHIBA	31	70.2	0.006 ± 0.015	0.064 ± 0.016
Shinjuku, TOKYO	31	81.4	0.027 ± 0.015	0.020 ± 0.012
Yokohama, KANAGAWA	34	144.2	0.031 ± 0.016	0.13 ± 0.019
Kosugi-machi, TOYAMA	31	94.6	0.053 ± 0.015	0.035 ± 0.015
Fukui, FUKUI	24	113.8	0.000 ± 0.078	0.084 ± 0.057

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
Koufu, YAMANASHI	30	72.5	0.025 ± 0.011	---- ± ----
Gifu, GIFU	30	157.0	0.040 ± 0.017	---- ± ----
Shizuoka, SHIZUOKA	30	145.5	0.058 ± 0.011	0.017 ± 0.011
Nagoya, AICHI	31	94.9	0.015 ± 0.012	0.009 ± 0.013
Ootsu, SHIGA	30	126.6	0.002 ± 0.012	0.017 ± 0.013
Tsu, MIE	31	81.5	0.0000 ± 0.0073	0.027 ± 0.013
Kyoto, KYOTO	30	85.0	0.018 ± 0.0075	0.000 ± 0.010
Kobe, HYOUGO	33	61.8	0.036 ± 0.014	0.025 ± 0.011
Nara, NARA	30	106.8	0.013 ± 0.015	0.007 ± 0.010
Wakayama, WAKAYAMA	30	69.0	0.030 ± 0.0098	0.012 ± 0.012
Tottori, TOTTORI	31	68.5	0.055 ± 0.017	0.050 ± 0.015
Matsue, SHIMANE	32	136.0	0,0069 ± 0.0045	0.025 ± 0.0090
Hiroshima, HIROSHIMA	33	174.3	0.023 ± 0.013	0.022 ± 0.013
Ishii-machi, TOKUSHIMA	31	56.8	0.050 ± 0.0096	0.11 ± 0.020
Takamatsu, KAGAWA	31	70.5	0.000 ± 0.012	0.029 ± 0.012
Matsuyama, EHIME	31	72.0	0.022 ± 0.0074	0.015 ± 0.012
Dazaifu, FUKUOKA	31	131.1	0.028 ± 0.013	0.0000 ± 0.0095
Saga, SAGA	31	125.7	0.040 ± 0.016	0.0011 ± 0.0094
Nagasaki, NAGASAKI	30	99.0	0.040 ± 0.020	---- ± ----
Uto, KUMAMOTO	31	99.9	0.004 ± 0.010	0.0000 ± 0.0095
Ooita, OOITA	31	109.4	0.019 ± 0.013	0.030 ± 0.012
Miyazaki, MIYAZAKI	31	158.8	0.024 ± 0.010	0.001 ± 0.012
Yonagusuku-machi, Okinawa	30	177.5	0.017 ± 0.0080	0.000 ± 0.010

6. Results

(1)-2 Strontuim-90 and Cesium-137 in Rain and Dry Fallout(for WHO program) (from Oct.1997 to Mar.1998)

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

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
October, 1997				
Akita, AKITA	35	284.2	0.020 ± 0.011	0.013 ± 0.013
Chiba, CHIBA	31	33.6	0.021 ± 0.015	0.0073 ± 0.0099
Niigata, NIIGATA	35	151.2	0.023 ± 0.0064	0.0000 ± 0.0092
Kanazawa, ISHIKAWA	32	159.5	0.027 ± 0.015	0.000 ± 0.012
Nagano, NAGANO	31	5.0	0.003 ± 0.011	0.000 ± 0.013
Osaka, OSAKA	34	27.7	0.013 ± 0.0083	0.013 ± 0.0098
Okayama, OKAYAMA	35	35.8	0.0081 ± 0.0064	0.013 ± 0.014
Yamaguchi, YAMAGUCHI	35	23.0	0.0098 ± 0.0068	0.039 ± 0.019
Kochi, KOCHI	35	35.4	0.053 ± 0.012	0.0000 ± 0.0094
Kagoshima, KAGOSHIMA	32	21.5	0.027 ± 0.012	0.010 ± 0.015
November, 1997				
Akita, AKITA	28	135.0	0.0000 ± 0.0064	0.0000 ± 0.0095
Chiba, CHIBA	32	81.3	0.013 ± 0.013	0.0000 ± 0.0091
Niigata, NIIGATA	28	139.6	0.0087 ± 0.0052	0.000 ± 0.010
Kanazawa, ISHIKAWA	29	301.0	0.017 ± 0.014	0.016 ± 0.013
Nagano, NAGANO	31	56.8	0.019 ± 0.014	0.0000 ± 0.0097
Osaka, OSAKA	28	126.7	0.033 ± 0.015	0.001 ± 0.012
Okayama, OKAYAMA	31	44.9	0.004 ± 0.012	0.0000 ± 0.0095
Yamaguchi, YAMAGUCHI	28	271.0	0.001 ± 0.012	0.020 ± 0.011
Kochi, KOCHI	28	206.2	0.056 ± 0.017	0.000 ± 0.011
Kagoshima, KAGOSHIMA	29	118.0	0.037 ± 0.014	0.022 ± 0.015
December, 1997				
Akita, AKITA	36	205.9	0.022 ± 0.019	0.027 ± 0.012
Chiba, CHIBA	36	64.2	0.062 ± 0.022	0.007 ± 0.010
Niigata, NIIGATA	36	229.8	0.022 ± 0.0065	0.007 ± 0.010
Nagano, NAGANO	36	69.3	0.010 ± 0.017	0.007 ± 0.011

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km^2)	^{137}Cs (MBq/km^2)
Osaka, OSAKA	36	97.9	0.000 ± 0.016	0.002 ± 0.012
Okayama, OKAYAMA	36	19.3	0.002 ± 0.014	0.006 ± 0.011
Yamaguchi, YAMAGUCHI	36	69.0	0.000 ± 0.011	0.000 ± 0.011
Kochi, KOCHI	36	57.8	0.064 ± 0.011	0.001 ± 0.011
Kagoshima, KAGOSHIMA	30	54.0	0.051 ± 0.016	0.032 ± 0.016
January, 1998				
Akita, AKITA	29	125.5	0.018 ± 0.013	0.018 ± 0.012
Chiba, CHIBA	29	128.1	0.021 ± 0.012	0.012 ± 0.0081
Niigata, NIIGATA	29	197.5	0.0013 ± 0.0099	0.015 ± 0.012
Kanazawa, ISHIKAWA	36	282.0	0.044 ± 0.014	0.013 ± 0.013
Nagano, NAGANO	30	50.0	0.010 ± 0.012	0.020 ± 0.0085
Osaka, OSAKA	28	84.1	0.014 ± 0.013	0.010 ± 0.011
Okayama, OKAYAMA	29	146.1	0.011 ± 0.012	0.0000 ± 0.0093
Yamaguchi, YAMAGUCHI	29	152.0	0.003 ± 0.011	0.029 ± 0.013
Kochi, KOCHI	29	142.3	0.059 ± 0.0096	0.053 ± 0.016
Kagoshima, KAGOSHIMA	36	174.0	0.075 ± 0.018	0.027 ± 0.014
Febraly, 1998				
Akita, AKITA	29	78.6	0.035 ± 0.017	0.040 ± 0.013
Chiba, CHIBA	29	113.4	0.040 ± 0.014	0.018 ± 0.0099
Niigata, NIIGATA	29	82.3	0.020 ± 0.012	0.003 ± 0.012
Kanazawa, ISHIKAWA	32	176.5	0.027 ± 0.014	0.016 ± 0.014
Nagano, NAGANO	29	54.5	0.016 ± 0.013	0.0000 ± 0.0085
Osaka, OSAKA	29	96.7	0.005 ± 0.014	0.0023 ± 0.0093
Okayama, OKAYAMA	29	82.8	0.013 ± 0.014	0.015 ± 0.012
Yamaguchi, YAMAGUCHI	29	82.0	0.003 ± 0.011	0.0044 ± 0.0091
Kochi, KOCHI	29	193.6	0.069 ± 0.018	0.032 ± 0.012
Kagoshima, KAGOSHIMA	30	107.5	0.046 ± 0.017	0.004 ± 0.012

Location	Duration (days)	Precipitation (mm)	^{90}Sr (MBq/km²)	^{137}Cs (MBq/km²)
March, 1998				
Akita, AKITA	31	71.8	0.018 ± 0.0069	0.037 ± 0.012
Chiba, CHIBA	32	96.9	0.024 ± 0.012	0.024 ± 0.011
Niigata, NIIGATA	31	73.4	0.033 ± 0.013	0.035 ± 0.014
Kanazawa, ISHIKAWA	31	131.0	0.032 ± 0.0091	0.000 ± 0.011
Nagano, NAGANO	31	69.7	0.024 ± 0.0089	0.035 ± 0.015
Osaka, OSAKA	31	57.9	0.0000 ± 0.0097	0.005 ± 0.011
Okayama, OKAYAMA	31	56.0	0.026 ± 0.017	0.013 ± 0.012
Yamaguchi, YAMAGUCHI	31	134.0	0.017 ± 0.014	0.007 ± 0.011
Kochi, KOCHI	31	177.5	0.060 ± 0.017	0.000 ± 0.010
Kagoshima, KAGOSHIMA	32	143.5	0.021 ± 0.014	0.037 ± 0.014

(2) Strontium-90 and Cesium-137 in Airborne Dust
(from Oct. 1997 to Mar. 1998)

-continued from No. 122 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, 1997				
Morioka, IWATE	10～12	6,737.0	0.00049 ± 0.00077	0.00000 ± 0.00057
Akita, AKITA	10～12	10,800.0	0.00085 ± 0.00055	0.00000 ± 0.00026
Yamagata, YAMAGATA	10～12	12,960.0	0.00000 ± 0.00046	0.00012 ± 0.00034
Ookuma-machi, FUKUSHIMA	10～12	11,736.8	0.00000 ± 0.00046	0.00000 ± 0.00031
Mito, IBARAKI	10～12	11,788.8	0.00021 ± 0.00060	0.00010 ± 0.00029
Kawachi-machi, TOCHIGI	10～12	15,174.0	0.00063 ± 0.00044	0.00003 ± 0.00025
Ichihara, CHIBA	10～12	10,188.1	0.00041 ± 0.00028	0.00008 ± 0.00030
Yokohama, KANAGAWA	10～12	10,241.0	0.00061 ± 0.00059	0.00000 ± 0.00029
Niigata, NIIGATA	10～12	10,813.0	0.00000 ± 0.00029	0.00000 ± 0.00035
Kosugi-machi, TOYAMA	10～12	18,033.0	0.00016 ± 0.00026	0.00007 ± 0.00021
Fukui, FUKUI	10～12	13,381.6	0.00000 ± 0.00042	0.00000 ± 0.00026
Koufu, YAMANASHI	10～12	9,059.0	0.00087 ± 0.00067	0.00022 ± 0.00043
Nagano, NAGANO	10～12	11,787.0	0.00048 ± 0.00050	0.00045 ± 0.00035
Gifu, GIFU	10～12	11,581.0	0.0010 ± 0.00058	0.00000 ± 0.00029
Hamaoka-machi, SHIZUOKA	10～12	10,153.0	0.00008 ± 0.00066	0.00000 ± 0.00029
Nagoya, AICHI	10～12	11,767.4	0.00029 ± 0.00043	0.00049 ± 0.00029
Ootsu, SHIGA	10～12	11,847.0	0.00031 ± 0.00055	0.00029 ± 0.00028
Tsu, MIE	10～12	13,684.0	0.0012 ± 0.00059	0.00020 ± 0.00024
Kyoto, KYOTO	10～12	10,337.0	0.00054 ± 0.00037	0.00000 ± 0.00027
Osaka, OSAKA	10～12	17,686.0	0.00000 ± 0.00035	0.00000 ± 0.00019
Kobe, HYOUGO	10～12	10,375.0	0.00000 ± 0.00061	0.00033 ± 0.00033
Nara, NARA	10～12	10,731.5	0.0014 ± 0.00069	0.00000 ± 0.00036
Wakayama, WAKAYAMA	10～12	10,368.0	0.00088 ± 0.00064	0.00015 ± 0.00036
Tottori, TOTTORI	10～12	15,238.0	0.00035 ± 0.00045	0.00000 ± 0.00021

Location	Sampling period	Absorption volume (m^2)	^{90}Sr (mBq/m^3)	^{137}Cs (mBq/m^3)
Okayama, OKAYAMA	10～12	12,470.0	0.00051 ± 0.00046	0.00000 ± 0.00031
Hiroshima, HIROSHIMA	10～12	11,208.0	0.00043 ± 0.00047	0.00000 ± 0.00032
Yamaguchi, YAMAGUCHI	10～12	24,480.0	0.00000 ± 0.00026	0.00002 ± 0.00013
Tokushima, TOKUSHIMA	10～12	10,080.0	0.00007 ± 0.00050	0.00000 ± 0.00034
Takamatsu, KAGAWA	10～12	15,448.4	0.00021 ± 0.00050	0.00000 ± 0.00018
Saga, SAGA	10～12	13,014.3	0.00055 ± 0.00048	0.00000 ± 0.00027
Nagasaki, NAGASAKI	10～12	10,368.0	0.00029 ± 0.00067	0.00007 ± 0.00037
Uto, KUMAMOTO	10～12	10,758.0	0.00000 ± 0.00044	0.00000 ± 0.00039
Ooita, OOITA	10～12	10,448.0	0.00005 ± 0.00032	0.00004 ± 0.00031
Miyazaki, MIYAZAKI	10～12	13,026.0	0.00017 ± 0.00041	0.00012 ± 0.00029
January-December, 1997				
Maebashi, GUNMA	11～12	12,695.0	0.00052 ± 0.00048	0.00000 ± 0.00034
January-March, 1998				
Morioka, IWATE	1～ 3	10,648.0	0.00080 ± 0.00050	0.00007 ± 0.00032
Akita, AKITA	1～ 3	10,800.0	0.00014 ± 0.00034	0.00053 ± 0.00036
Yamagata, YAMAGATA	1～ 3	12,960.0	0.0022 ± 0.0014	0.00033 ± 0.00063
Ookuma-machi, FUKUSHIMA	2～ 3	12,287.5	0.00006 ± 0.00041	0.00000 ± 0.00031
Mito, IBARAKI	1～ 3	9,941.0	0.0010 ± 0.00055	0.00080 ± 0.00039
Kawachi-machi, TOCHIGI	1～ 3	13,690.0	0.00035 ± 0.00034	0.00006 ± 0.00021
Ichihara, CHIBA	1～ 3	10,050.4	0.00085 ± 0.00034	0.00000 ± 0.00037
Yokohama, KANAGAWA	1～ 3	10,303.0	0.00000 ± 0.00030	0.00069 ± 0.00038
Niigata, NIIGATA	1～ 3	11,205.0	0.00070 ± 0.00098	0.00023 ± 0.00037
Kosugi-machi, TOYAMA	1～ 3	18,471.0	0.00047 ± 0.00019	0.00000 ± 0.00020
Fukui, FUKUI	1～ 3	13,527.4	0.00000 ± 0.00035	0.00000 ± 0.00025
Koufu, YAMANASHI	1～ 3	11,439.0	0.00006 ± 0.00035	0.00025 ± 0.00032

Location	Sampling period	Absorption volume (m^2)	^{90}Sr (mBq/m^3)		^{137}Cs (mBq/m^3)	
Nagano, NAGANO	1～ 3	12,272.0	0.00057	± 0.00041	0.00076	± 0.00032
Gifu, GIFU	1～ 3	11,745.0	0.00017	± 0.00056	0.00026	± 0.00030
Hamaoka-machi, SHIZUOKA	1～ 3	10,280.0	0.00021	± 0.00056	0.00023	± 0.00039
Nagoya, AICHI	1～ 3	10,334.0	0.00021	± 0.00062	0.00016	± 0.00038
Ootsu, SHIGA	1～ 3	12,243.0	0.00000	± 0.00023	0.00000	± 0.00034
Tsu, MIE	1～ 3	13,830.0	0.00024	± 0.00041	0.00046	± 0.00031
Kyoto, KYOTO	1～ 3	10,324.0	0.00083	± 0.00039	0.00000	± 0.00033
Osaka, OSAKA	1～ 3	16,538.0	0.00023	± 0.00021	0.00019	± 0.00022
Kobe, HYOUGO	1～ 3	10,264.0	0.00044	± 0.00046	0.00060	± 0.00037
Nara, NARA	1～ 3	10,936.0	0.00067	± 0.00048	0.00000	± 0.00028
Wakayama, WAKAYAMA	1～ 3	10,368.0	0.00036	± 0.00059	0.00019	± 0.00039
Tottori, TOTTORI	1～ 3	15,697.0	0.00023	± 0.00040	0.00000	± 0.00023
Okayama, OKAYAMA	1～ 3	12,680.0	0.00010	± 0.00027	0.00003	± 0.00026
Hiroshima, HIROSHIMA	1～ 3	11,698.0	0.00011	± 0.00029	0.00025	± 0.00036
Yamaguchi, YAMAGUCHI	1～ 3	24,885.0	0.00040	± 0.00026	0.00000	± 0.00015
Tokushima, TOKUSHIMA	1～ 3	10,080.0	0.00022	± 0.00066	0.00016	± 0.00036
Takamatsu, KAGAWA	1～ 3	14,691.7	0.00026	± 0.00024	0.00027	± 0.00027
Saga, SAGA	1～ 3	13,289.7	0.00000	± 0.00038	0.00000	± 0.00027
Nagasaki, NAGASAKI	1～ 3	10,368.0	0.00048	± 0.00050	0.00000	± 0.00035
Uto, KUMAMOTO	1～ 3	12,348.0	0.00000	± 0.00026	0.00000	± 0.00035
Ooita, OOITA	1～ 3	10,458.0	0.00041	± 0.00034	0.00023	± 0.00036
Miyazaki, MIYAZAKI	1～ 3	13,080.0	0.00044	± 0.00046	0.00000	± 0.00026
Febraly～March 1998						
Maebashi, GUNMA	2～ 3	12,996.0	0.00050	± 0.00054	0.00000	± 0.00025

(3) Strontium-90 and cesium-137 in Service Water (20)
(from Oct. 1997 to Mar. 1998)

-continued from No, 122 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)					
November, 1997					
Kisarazu, CHIBA	7.4	2.8	± 0.21	0.077	± 0.058
December, 1997					
Urawa, SAITAMA	7.4	0.12	± 0.24	0.024	± 0.045
Katsushika, TOKYO	6.9	1.1	± 0.16	0.000	± 0.049
Tsukui-machi, KANAGAWA	7.0	0.48	± 0.090	0.038	± 0.064
Nagano, NAGANO	6.91	1.1	± 0.17	0.062	± 0.067
Inuyama, AICHI	6.9	1.6	± 0.18	0.052	± 0.062
Moriguchi, OSAKA	7.2	2.5	± 0.20	0.071	± 0.060
Fukuoka, FUKUOKA	7.22	1.9	± 0.17	0.063	± 0.063
January, 1998					
Kyoto, KYOTO	8.32	2.6	± 0.17	0.013	± 0.060
(Tap Water)					
October, 1997					
Sendai, MIYAGI	—	1.3	± 0.17	0.080	± 0.062
November, 1997					
Fukushima, FUKUSHIMA	7.79	2.4	± 0.21	0.000	± 0.049
Ichihara, CHIBA	---	1.4	± 0.16	0.006	± 0.047
Nagano, NAGANO	7.24	0.55	± 0.095	0.000	± 0.056
Shinguu, WAKAYAMA	7.0	1.5	± 0.19	0.13	± 0.070
Hiroshima, HIROSHIMA	6.85	1.4	± 0.16	0.039	± 0.058
Tokushima, TOKUSHIMA	7.30	1.4.	± 0.19	0.025	± 0.057
Kagoshima, KAGOSHIMA	7.45	0.43	± 0.090	0.11	± 0.065
December, 1997					
Wakkanai, HOKKAIDOU	6.8	1.2	± 0.13	0.017	± 0.055

Location	pH	^{90}Sr (mBq/ ℓ)		^{137}Cs (mBq/ ℓ)	
Aomori, AOMORI	8.1	0.98	± 0.15	0.15	± 0.066
Akita, AKITA	6.79	2.3	± 0.20	0.11	± 0.057
Yamagata, YAMAGATA	7.1	2.0	± 0.18	0.10	± 0.075
Mito, IBARAKI	8.51	1.1	± 0.13	0.062	± 0.058
Kawachi-machi, TOCHIGI	7.23	0.28	± 0.079	0.000	± 0.050
Urawa, SAITAMA	6.8	0.63	± 0.20	0.092	± 0.050
Katsushika, TOKYO	6.7	0.78	± 0.12	0.065	± 0.056
Yokohama, KANAGAWA	7.5	0.50	± 0.11	0.000	± 0.052
Niigata, NIIGATA	7.18	2.4	± 0.13	0.006	± 0.057
Kosugi-machi, TOYAMA	6.80	1.6	± 0.17	0.029	± 0.051
Kanazawa, ISHIKAWA	7.27	2.5	± 0.22	0.085	± 0.053
Fukui, FUKUI	6.54	0.71	± 0.11	0.000	± 0.066
Koufu, YAMANASHI	7.8	0.97	± 0.084	0.068	± 0.057
Gifu, GIFU	7.08	1.1	± 0.014	0.000	± 0.050
Nagoya, AICHI	6.9	1.5	± 0.18	0.21	± 0.068
Ootsu, SHIGA	6.6	3.2	± 0.25	0.12	± 0.061
Tsu, MIE	6.9	2.3	± 0.20	0.000	± 0.047
Osaka, OSAKA	7.1	2.6	± 0.21	0.000	± 0.048
Kobe, HYOUGO	7.10	2.0	± 0.17	0.040	± 0.046
Nara, NARA	7.2	2.7	± 0.21	0.017	± 0.059
Matsue, SHIMANE	—	2.6	± 0.21	0.028	± 0.046
Okayama, OKAYAMA	6.40	1.9	± 0.18	0.086	± 0.050
Ube, YAMAGUCHI	7.0	2.6	± 0.31	0.070	± 0.045
Takamatsu, KAGAWA	7.60	2.7	± 0.23	0.000	± 0.045
Matsuyama, EHIME	7.5	1.1	± 0.15	0.011	± 0.056
Kochi, KOCHI	7.34	1.7	± 0.18	0.000	± 0.049

Location	pH	^{90}Sr (mBq/ ℓ)		^{137}Cs (mBq/ ℓ)	
Fukuoka, FUKUOKA	6.88	2.4	± 0.18	0.000	± 0.053
Saga, SAGA	7.40	1.1	± 0.15	0.000	± 0.051
Nagasaki, NAGASAKI	6.98	1.6	± 0.21	0.053	± 0.055
Uto, KUMAMOTO	7.62	0.000	± 0.053	0.006	± 0.048
Ooita, OOITA	5.72	0.81	± 0.13	0.061	± 0.069
Miyazaki, MIYAZAKI	6.85	1.2	± 0.14	0.000	± 0.049
,1997					
Naha, Okinawa	7.42	4.6	± 0.37	0.023	± 0.051
January,1998					
Morioka, IWATE	7.0	0.86	± 0.089	0.000	± 0.051
Kyoto, KYOTO	8.23	2.4	± 0.14	0.038	± 0.050
Tottori, TOTTORI	6.8	2.1	± 0.20	0.000	± 0.052

(4) Strontium-90 and cesium-137 in Freshwater
(from Oct. 1997 to Mar. 1998)

-continued from No. 122 of this publication-

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

Location	pH	^{90}Sr (mBq/ ℓ)		^{137}Cs (mBq/ ℓ)	
(Source Water)					
November, 1997					
Kisarazu, CHIBA	7.4	2.8	± 0.21	0.077	± 0.058
December, 1997					
Urawa, SAITAMA	7.4	0.12	± 0.24	0.024	± 0.045
Katsushika, TOKYO	6.9	1.1	± 0.16	0.000	± 0.049
Tsukui-machi, KANAGAWA	7.0	0.48	± 0.090	0.038	± 0.064
Nagano, NAGANO	6.91	1.1	± 0.17	0.062	± 0.067
Inuyama, AICHI	6.9	1.6	± 0.18	0.052	± 0.062
Moriguchi, OSAKA	7.2	2.5	± 0.20	0.071	± 0.060
Fukuoka, FUKUOKA	7.22	1.9	± 0.17	0.063	± 0.063
January, 1998					
Sapporo, HOKKAIDOU	7.2	1.4	± 0.09	0.077	± 0.055
Kyoto, KYOTO	8.32	2.6	± 0.17	0.013	± 0.060

(5) Strontium-90 and Cesium-137 in Soil (24)
(from Oct. 1997 to Mar. 1998)
-continued from No. 122 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/km²)	^{137}Cs (Bq/kg) (dried Soil)	^{137}Cs (MBq/km²)
October, 1997					
Akita, AKITA	0～ 5	5.5 ± 0.18	150 ± 5	36 ± 0.6	980 ± 18
	5～20	5.4 ± 0.18	610 ± 20	32 ± 0.6	3600 ± 70
Shinguu, WAKAYAMA	0～ 5	0.10 ± 0.065	28 ± 1.8	2.8 ± 0.19	77 ± 5.1
	5～20	0.006 ± 0.051	0.7 ± 5.3	0.56 ± 0.093	59 ± 9.8
Kamiita-machi, TOKUSHIMA	0～ 5	0.38 ± 0.089	15 ± 3.5	1.5 ± 0.16	58 ± 6.2
	5～20	0.39 ± 0.091	40 ± 9.2	2.2 ± 0.18	220 ± 18

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

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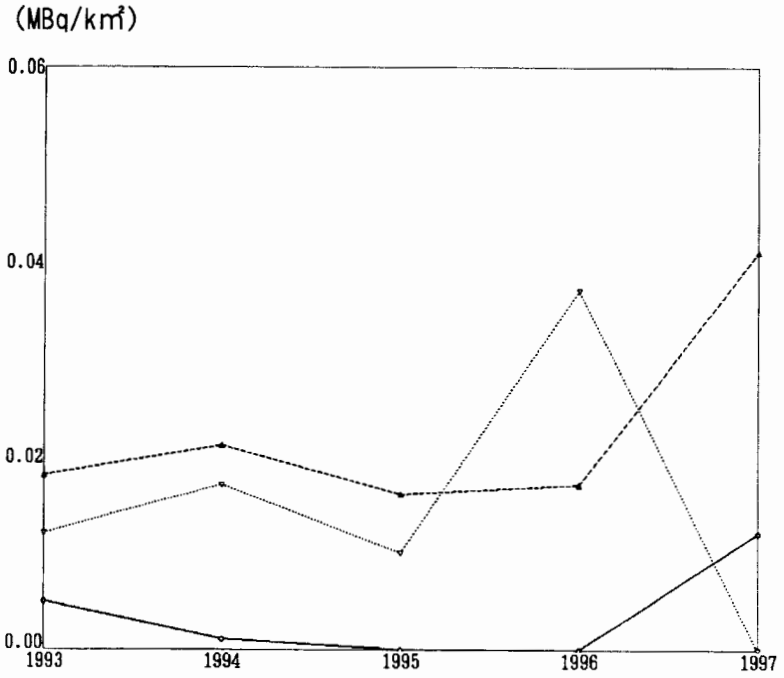

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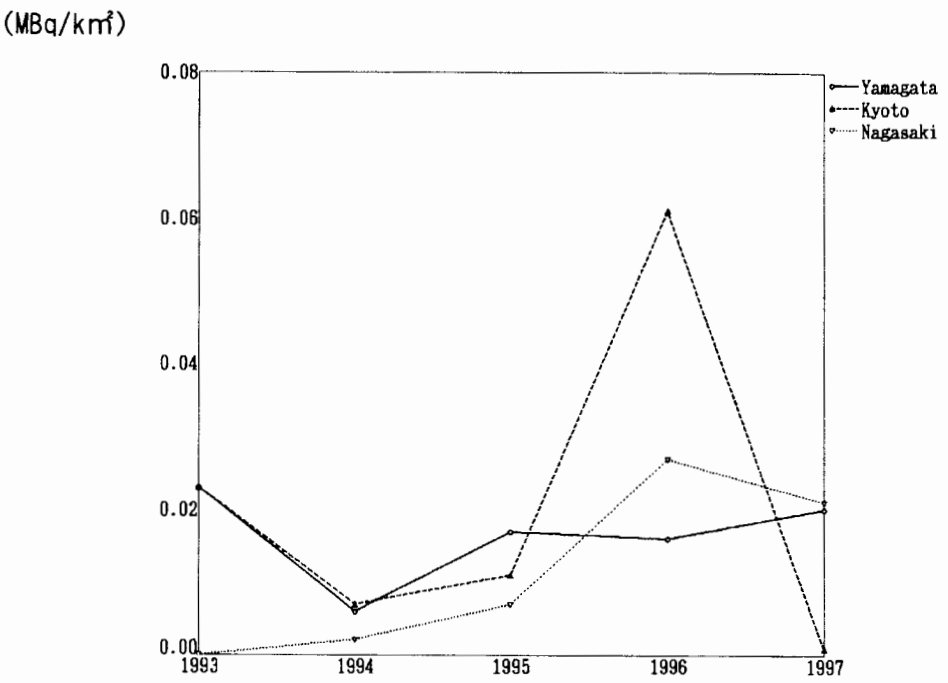

Fig. 1—1

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

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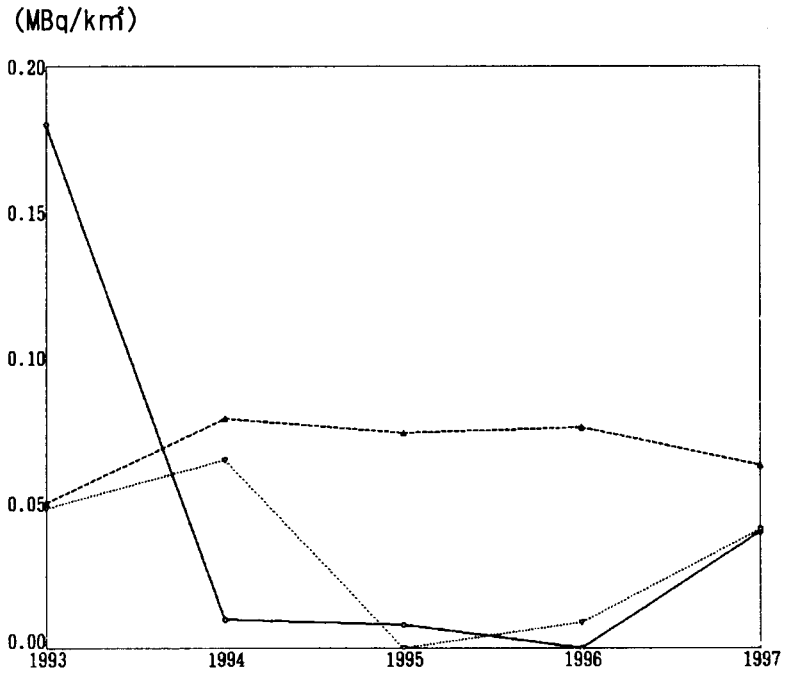

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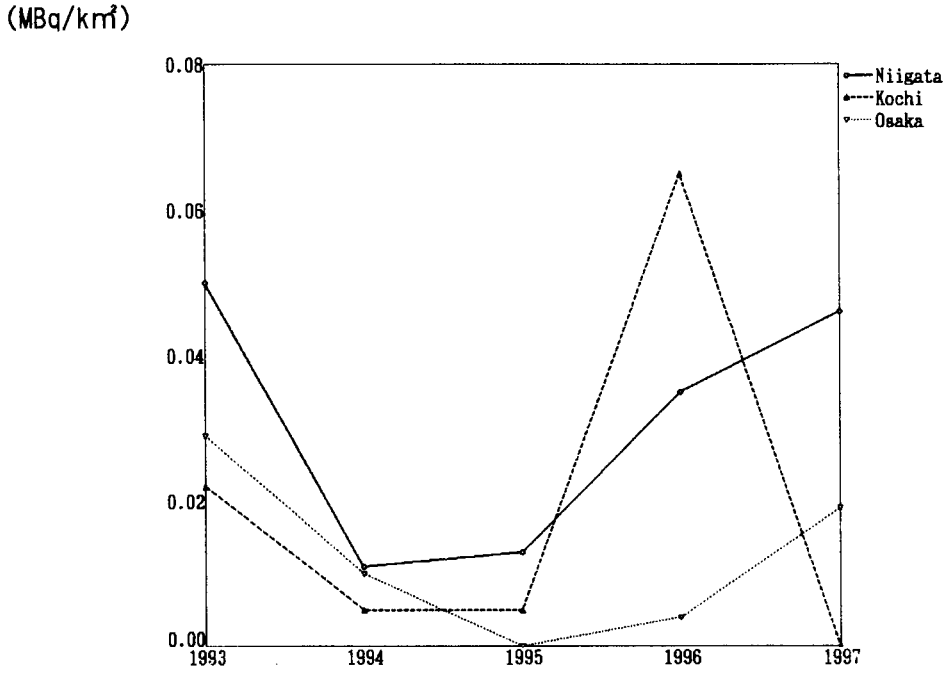

Fig. 1—2

* * Airborne Dust * *

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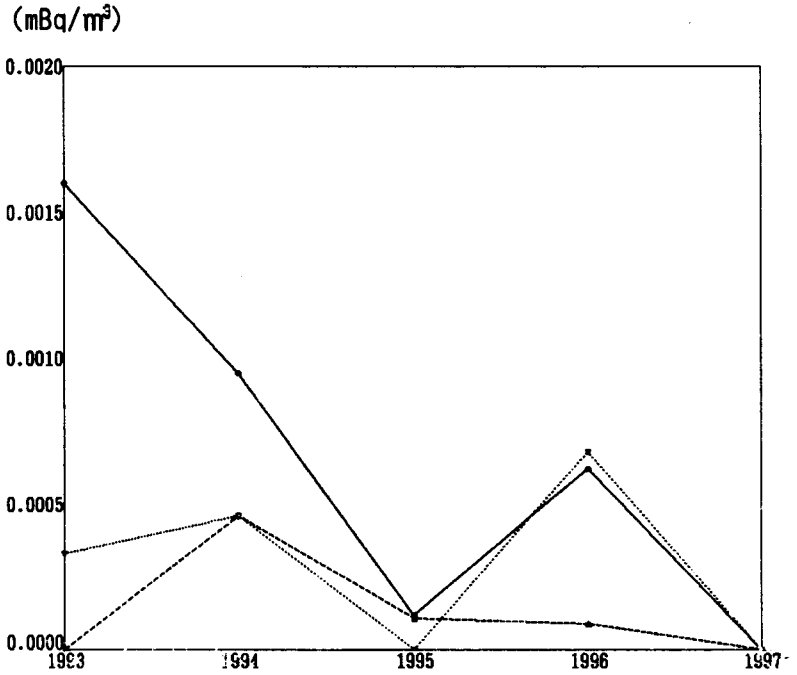

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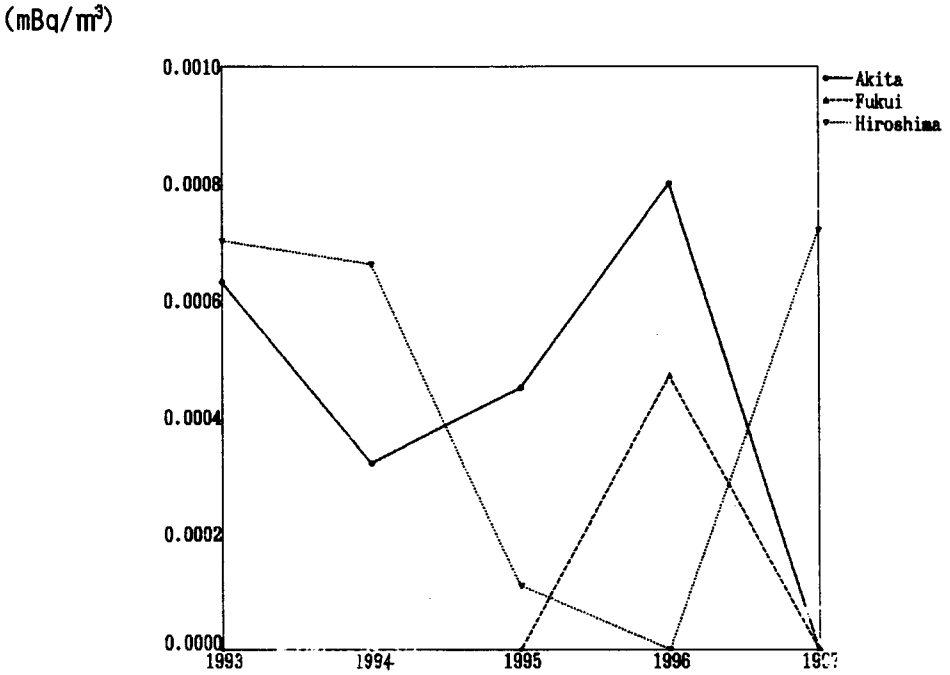

Fig. 2

＊ ＊ Service Water (Source Water) ＊ ＊

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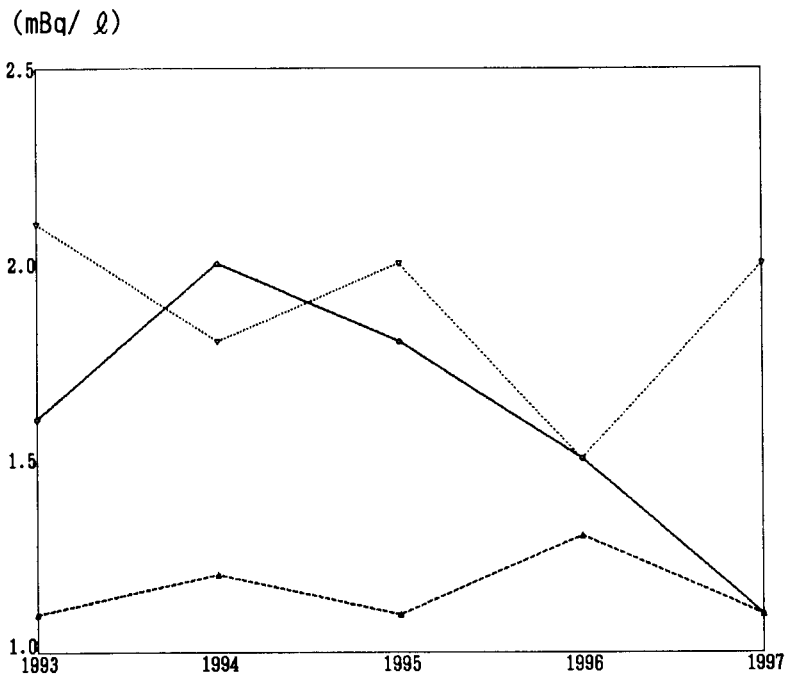

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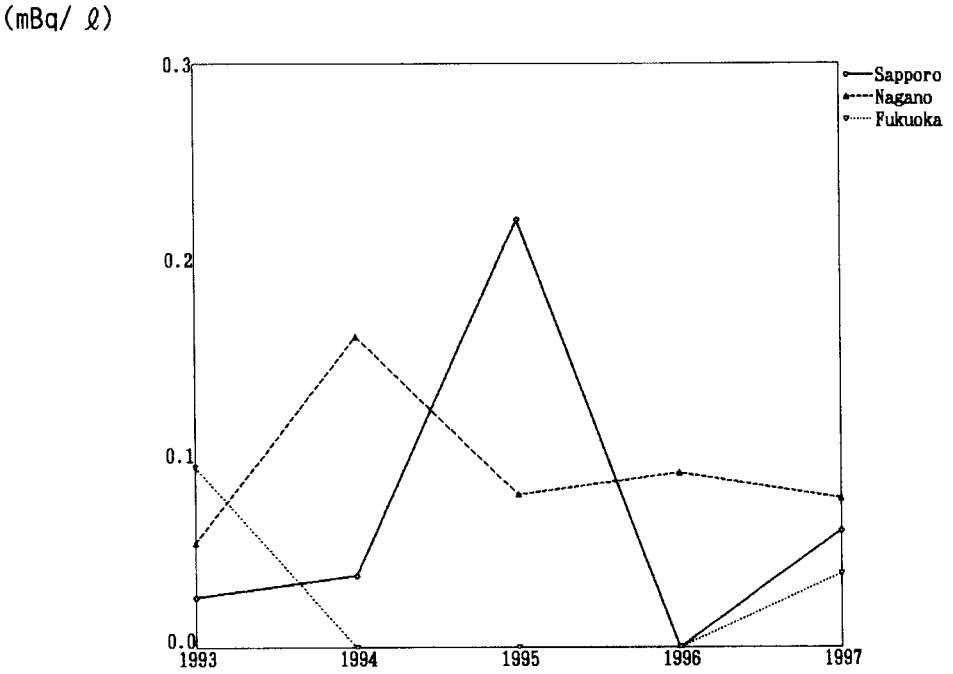
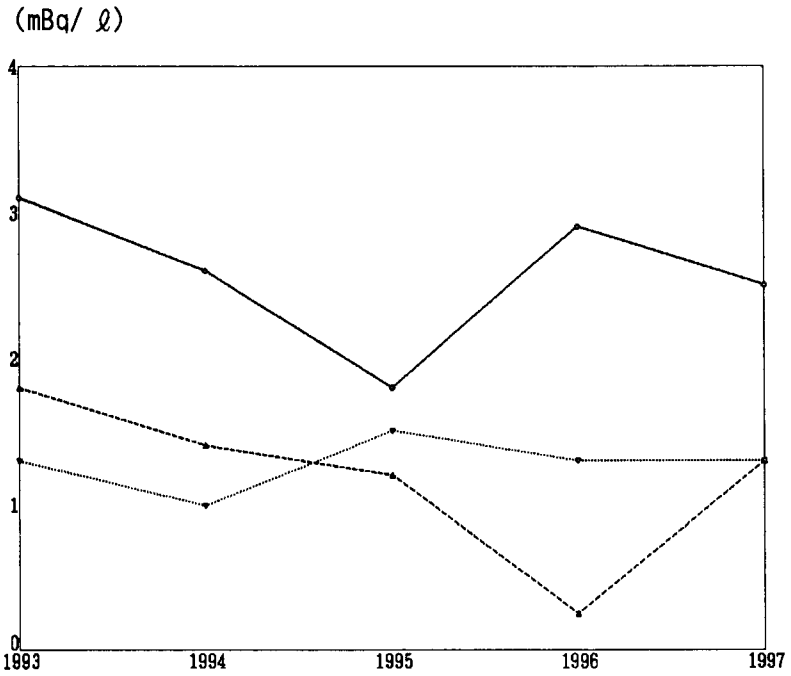


Fig. 3—1

* * Service Water (Tap Water) * *

<Strontium-90>



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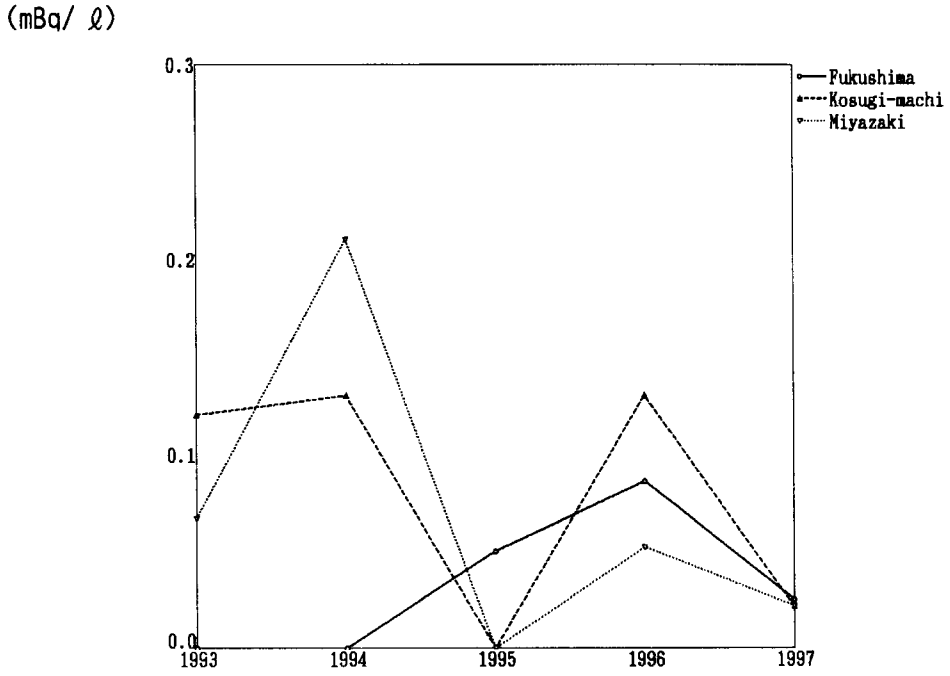
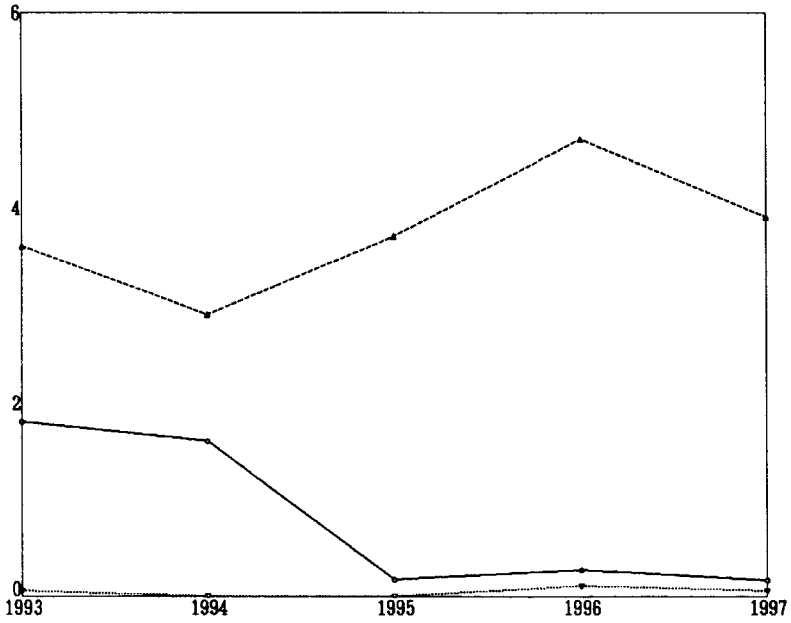


Fig. 3—2

* * Fresh Water * *

<Strontium-90>

(mBq/ ℓ)



<Cesium-137>

(mBq/ ℓ)

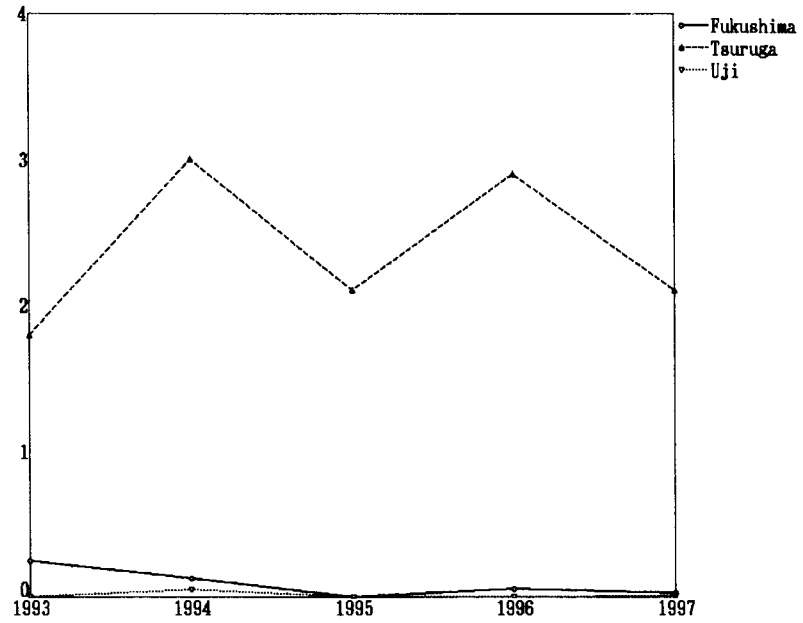


Fig. 4

＊ ＊ Soil ＊ ＊

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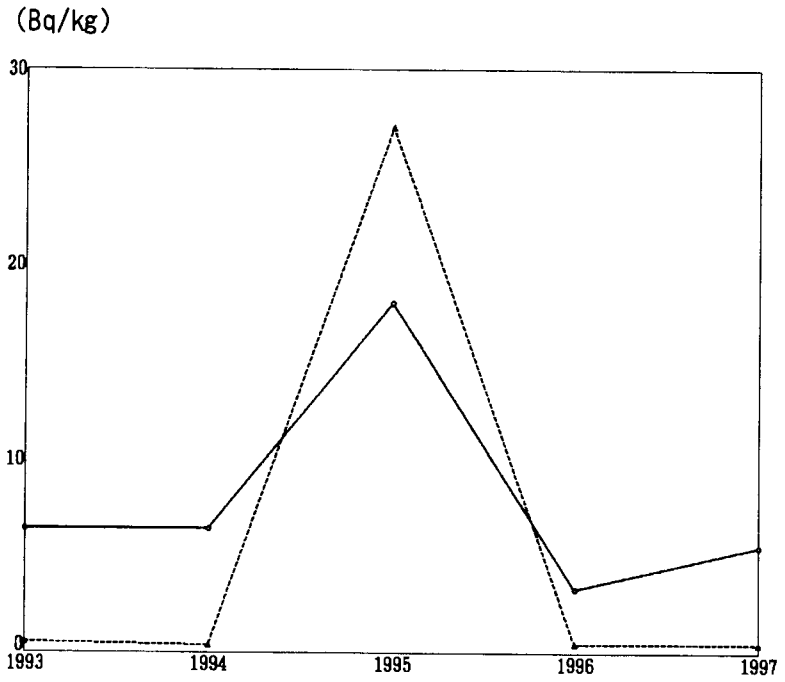

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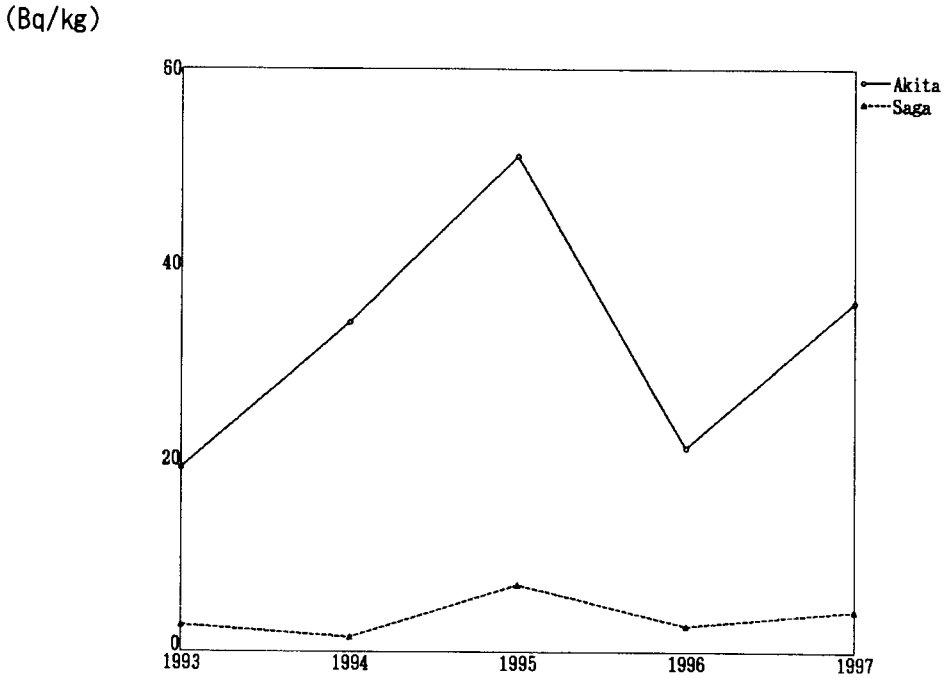
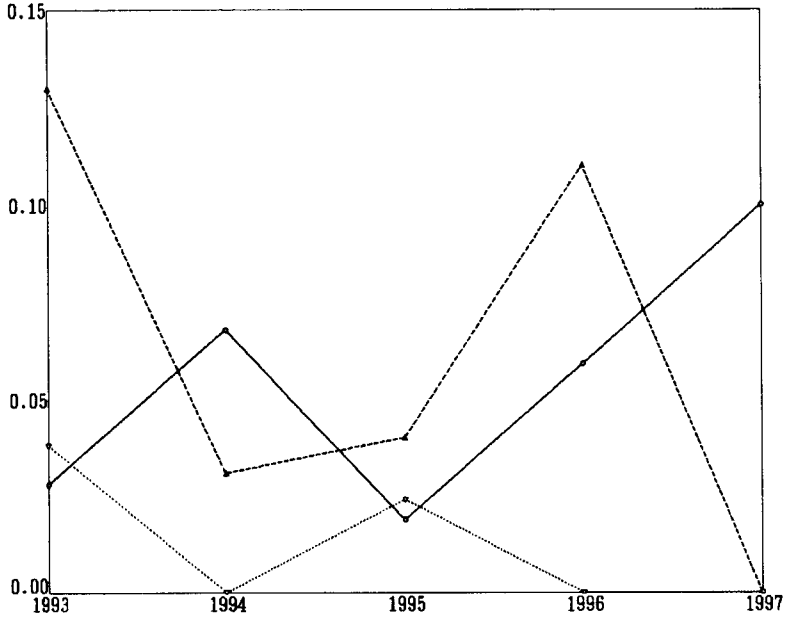


Fig. 5

* * Sea Sediments * *

<Strontium-90>

(Bq/kg·dried Soi



<Cesium-137>

(Bq/kg·dried Soi

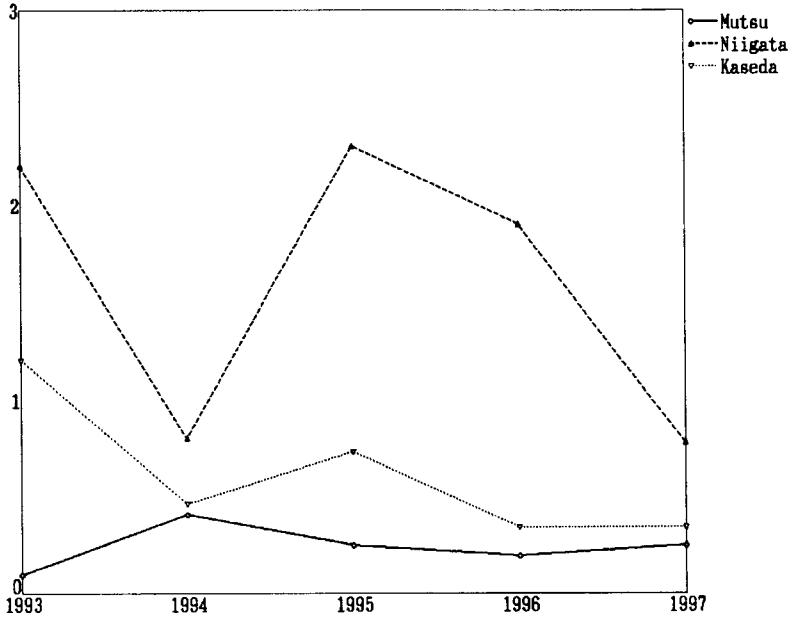


Fig. 6

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