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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 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. Resu

(1)-1 Strontuim-90 and Cesiumu-137 in Rain and Dry Fallout(for domestic program)
(form APR.1998 to Sep.1998)

-continued from No. 124 for this publication-

Table (1)-1 Strontuim-90 and Cesiumu-137 in Rain and Dry Fallout

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Apr,1998								
Sapporo,HOKKAIDOU	30	28	0.039	±	0.017	0	±	0
Aomori,AOMORI	30	58	0.036	±	0.015	0.035	±	0.014
Morioka,IWATE	30	47	0.013	±	0.011	0.024	±	0.012
Onagawa-machi,MIYAGI	30	108	0.028	±	0.0094	0.025	±	0.0097
Yamagata,YAMAGATA	30	95	0.017	±	0.0071	0.023	±	0.013
Ookuma-machi,FUKUSHIMA	30	142	0.009	±	0.015	0	±	0
Mito,IBARAKI	30	212	0.017	±	0.0079	0.006	±	0.011
Kawachi-machi,TOCHIGI	30	210	0.017	±	0.0071	0.0079	±	0.0096
Ichihara,CHIBA	30	160	0	±	0.013	0.019	±	0.01
Urawa,SAITAMA	30	188	0.022	±	0.026	0.028	±	0.014
Maebashi,GUNMA	30	174	0.016	±	0.016	0.016	±	0.0098
Shinjuku,TOKYO	30	202	0.047	±	0.016	0.028	±	0.0092
Yokohama,KANAGAWA	29	200	0.022	±	0.0099	0.041	±	0.013
Koufu,YAMANASHI	30	161	0.026	±	0.016	0.0047	±	0.0097
Kosugi-machi,TOYAMA	30	191	0.024	±	0.0076	0.012	±	0.011
Shizuoka,SHIZUOKA	30	468	0.0112	±	0.0069	0.029	±	0.011
Fukui,FUKUI	30	212	0	±	0.099	0	±	0
Gifu,GIFU	30	260	0.037	±	0.025	0	±	0.011
Nagoya,AICHI	30	204	0.021	±	0.014	0	±	0.012
Ootsu,SHIGA	30	279.8	0.009	±	0.014	0.034	±	0.017
Tsu,MIE	30	229.5	0.018	±	0.0089	0.044	±	0.015

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Kyoto, KYOTO	30	235.5	0.002	±	0.011	0.015	±	0.01
Nara, NARA	30	332.5	0.025	±	0.011	0.042	±	0.014
Tottori, TOTTORI	30	135.5	0.038	±	0.013	0.063	±	0.016
Kobe, HYOUGO	29	179.4	0.02	±	0.0089	0.015	±	0.01
Wakayama, WAKAYAMA	30	231	0.032	±	0.0093	0.041	±	0.014
Matsue, SHIMANE	29	60.5	0.021	±	0.0051	0.017	±	0.0071
Ishii-machi, TOKUSHIMA	33	377.3	0.039	±	0.01	0.014	±	0.011
Ishii-machi, TOKUSHIMA	28	177.2	0.046	±	0.011	0.12	±	0.021
Takamatsu, KAGAWA	30	80	0.005	±	0.016	0	±	0.011
Hiroshima, HIROSHIMA	32	176.4	0.011	±	0.017	0.012	±	0.011
Hiroshima, HIROSHIMA	29	103.2	0.028	±	0.018	0.037	±	0.016
Matsuyama, EHIME	30	141	0.017	±	0.012	0.012	±	0.012
Ooita, OOITA	30	156.2	0.029	±	0.0089	0.083	±	0.017
Saga, SAGA	30	206.2	0.027	±	0.011	0.062	±	0.012
Uto, KUMAMOTO	30	212.9	0.025	±	0.0078	0.17	±	0.022
Miyazaki, MIYAZAKI	30	289.7	0.029	±	0.0085	0.017	±	0.013
Nagasaki, NAGASAKI	30	223.5	0.031	±	0.02	0.026	±	0.013
Yonagusuku-machi, Okinawa	32	245.5	0.0064	±	0.0072	0	±	0.012
May, 1998								
Sapporo, HOKKAIDOU	31	57	0.016	±	0.016	0.028	±	0.013
Aomori, AOMORI	31	169	0.058	±	0.009	0.012	±	0.0093
Morioka, IWATE	31	87	0.016	±	0.0075	0.032	±	0.015
Onagawa-machi, MIYAGI	31	97	0.024	±	0.012	0.019	±	0.0098
Yamagata, YAMAGATA	31	62	0.021	±	0.0075	0.026	±	0.013
Ookuma-machi, FUKUSHIMA	31	80	0.045	±	0.034	0.036	±	0.021
Mito, IBARAKI	31	152	0.012	±	0.0076	0.033	±	0.013

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Kawachi-machi, TOCHIGI	31	203	0.015	±	0.0071	0	±	0.0088
Ichihara, CHIBA	31	111	0.003	±	0.014	0.014	±	0.0097
Urawa, SAITAMA	31	159	0.025	±	0.36	0.017	±	0.01
Maebashi, GUNMA	31	100	0.038	±	0.0087	0.011	±	0.01
Shinjuku, TOKYO	31	81	0.049	±	0.019	0.018	±	0.0086
Yokohama, KANAGAWA	32	205	0	±	0.014	0.005	±	0.013
Koufu, YAMANASHI	31	115	0.038	±	0.018	0	±	0.01
Kosugi-machi, TOYAMA	31	256	0.055	±	0.0093	0.0065	±	0.0098
Shizuoka, SHIZUOKA	31	366	0.014	±	0.0074	0.028	±	0.01
Fukui, FUKUI	31	263	0.032	±	0.041	0.093	±	0.058
Gifu, GIFU	31	300	0.031	±	0.019	0	±	0.012
Nagoya, AICHI	31	258	0.076	±	0.019	0.01	±	0.013
Ootsu, SHIGA	31	228.2	0	±	0.015	0.012	±	0.013
Tsu, MIE	31	362.5	0.022	±	0.018	0.014	±	0.013
Kyoto, KYOTO	32	245	0.013	±	0.013	0.0052	±	0.0094
Nara, NARA	31	317.8	0.035	±	0.021	0.025	±	0.012
Tottori, TOTTORI	31	138.4	0.063	±	0.019	0.038	±	0.014
Kobe, HYOUGO	32	174	0.011	±	0.0082	0	±	0.011
Wakayama, WAKAYAMA	31	336	0.019	±	0.008	0.007	±	0.012
Matsue, SHIMANE	31	221.8	0.0063	±	0.0045	0.008	±	0.0093
Takamatsu, KAGAWA	31	131.5	0.005	±	0.021	0.008	±	0.013
Matsuyama, EHIME	31	123.5	0.012	±	0.012	0	±	0.011
Ooita, OOITA	31	142.3	0	±	0.015	0.015	±	0.011
Saga, SAGA	31	222.5	0.012	±	0.011	0	±	0.0073
Uto, KUMAMOTO	31	163.1	0.014	±	0.014	0.005	±	0.013
Miyazaki, MIYAZAKI	31	302.7	0	±	0.0068	0.024	±	0.012

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Nagasaki, NAGASAKI	31	179	0	±	0.023	0.006	±	0.014
Jun, 1998								
Sapporo, HOKKAIDOU	30	85	0	±	0.016	0.016	±	0.011
Aomori, AOMORI	30	143	0.044	±	0.013	0.015	±	0.013
Morioka, IWATE	30	132	0.0055	±	0.089	0	±	0.01
Onagawa-machi, MIYAGI	30	128	0.032	±	0.014	0	±	0.0087
Yamagata, YAMAGATA	30	46	0.027	±	0.019	0	±	0.0092
Ookuma-machi, FUKUSHIMA	30	172	0.003	±	0.014	0.021	±	0.013
Mito, IBARAKI	30	140	0	±	0.0093	0	±	0.0086
Kawachi-machi, TOCHIGI	30	138	0.0094	±	0.0066	0	±	0.0098
Ichihara, CHIBA	30	143	0.041	±	0.017	0.008	±	0.0083
Urawa, SAITAMA	30	161	0.021	±	0.041	0	±	0.016
Maebashi, GUNMA	30	128	0.009	±	0.0081	0.001	±	0.011
Shinjuku, TOKYO	30	160	0.028	±	0.014	0	±	0.0076
Yokohama, KANAGAWA	31	270	0	±	0.0075	0	±	0.012
Koufu, YAMANASHI	30	126	0.024	±	0.017	0	±	0.0095
Kosugi-machi, TOYAMA	30	125	0.01	±	0.0072	0.0018	±	0.0088
Shizuoka, SHIZUOKA	30	362	0.043	±	0.018	0.008	±	0.011
Fukui, FUKUI	30	179	0.15	±	0.12	0	±	0.067
Gifu, GIFU	30	261	0.003	±	0.021	0.009	±	0.013
Nagoya, AICHI	30	202	0	±	0.013	0.041	±	0.014
Ootsu, SHIGA	30	301	0.01	±	0.016	0	±	0.01
Tsu, MIE	30	287	0	±	0.026	0.003	±	0.013
Kyoto, KYOTO	30	91.5	0.009	±	0.011	0	±	0.008
Kyoto, KYOTO	28	302.5	0.005	±	0.013	0.0018	±	0.0087
Nara, NARA	30	418.5	0.009	±	0.025	0	±	0.01

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Tottori,TOTTORI	30	128.5	0.04	±	0.017	0	±	0.0098
Kobe,HYOUGO	31	122.1	0.021	±	0.01	0.0023	±	0.0097
Wakayama,WAKAYAMA	30	291	0.035	±	0.019	0.011	±	0.013
Matsue,SHIMANE	30	153.3	0.012	±	0.005	0.0031	±	0.0093
Ishii-machi,TOKUSHIMA	27	271.3	0.046	±	0.011	0.22	±	0.02
Ishii-machi,TOKUSHIMA	36	98.6	0.013	±	0.015	0	±	0.01
Takamatsu,KAGAWA	30	81.5	0.033	±	0.019	0.005	±	0.011
Hiroshima,HIROSHIMA	30	266.4	0.26	±	0.31	0.047	±	0.027
Matsuyama,EHIME	30	249.5	0.032	±	0.015	0.074	±	0.016
Ooita,OOITA	30	377	0.029	±	0.019	0.021	±	0.012
Dazaifu,FUKUOKA	30	421.9	0.015	±	0.008	0.006	±	0.011
Saga,SAGA	30	482.9	0.01	±	0.01	0.0056	±	0.008
Uto,KUMAMOTO	30	567.3	0.006	±	0.012	0	±	0.011
Miyazaki,MIYAZAKI	30	673.5	0.013	±	0.0065	0.014	±	0.014
Nagasaki,NAGASAKI	30	618.5	0.01	±	0.015	0	±	0.013
Yonagusuku-machi,Okinawa	30	335	0.02	±	0.0088	0.003	±	0.011
Jul,1998								
Sapporo,HOKKAIDOU	32	106	0	±	0.01	0	±	0.011
Sapporo,HOKKAIDOU	30	67	0	±	0.012	0	±	0.01
Aomori,AOMORI	33	45	0.035	±	0.012	0.027	±	0.015
Morioka,IWATE	33	177	0.0056	±	0.009	0.008	±	0.014
Onagawa-machi,MIYAGI	33	186	0	±	0.018	0	±	0.0097
Yamagata,YAMAGATA	33	185	0.019	±	0.014	0.0012	±	0.0089
Okuma-machi,FUKUSHIMA	33	144	0.02	±	0.014	0.012	±	0.011
Mito,IBARAKI	33	222	0.008	±	0.017	0.025	±	0.012
Kawachi-machi,TOCHIGI	33	312	0.01	±	0.0083	0	±	0.0086

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Ichihara, CHIBA	33	133	0.025	±	0.016	0.014	±	0.0093
Urawa, SAITAMA	33	190	0.039	±	0.018	0.0043	±	0.0083
Maebashi, GUNMA	33	288	0.018	±	0.0078	0.005	±	0.01
Shinjuku, TOKYO	33	189	0.028	±	0.014	0.014	±	0.0091
Yokohama, KANAGAWA	31	243	0.02	±	0.013	0.007	±	0.011
Koufu, YAMANASHI	33	118	0.049	±	0.021	0	±	0.0088
Kosugi-machi, TOYAMA	32	560	0.014	±	0.013	0.0083	±	0.0086
Kosugi-machi, TOYAMA	30	157	0.02	±	0.0083	0.0074	±	0.009
Shizuoka, SHIZUOKA	33	322	0.018	±	0.013	0.0091	±	0.0099
Fukui, FUKUI	35	362	0.044	±	0.092	0.12	±	0.066
Gifu, GIFU	33	202	0	±	0.021	0.003	±	0.012
Nagoya, AICHI	33	227	0.012	±	0.014	0.038	±	0.014
Ootsu, SHIGA	31	114.4	0	±	0.0086	0	±	0.01
Tsu, MIE	31	115	0.0092	±	0.0078	0.018	±	0.01
Kyoto, KYOTO	33	90.5	0.007	±	0.011	0	±	0.0078
Nara, NARA	33	190.8	0	±	0.023	0.008	±	0.012
Tottori, TOTTORI	33	171.7	0.057	±	0.01	0.031	±	0.014
Kobe, HYOUGO	31	74.2	0	±	0.0086	0.012	±	0.012
Wakayama, WAKAYAMA	33	87.5	0.026	±	0.023	0.02	±	0.013
Matsue, SHIMANE	31	156.5	0.0089	±	0.0053	0.0057	±	0.0089
Matsue, SHIMANE	30	126.4	0.015	±	0.0053	0.0039	±	0.009
Takamatsu, KAGAWA	30	93	0.014	±	0.015	0	±	0.011
Takamatsu, KAGAWA	32	27	0.029	±	0.017	0	±	0.0092
Hiroshima, HIROSHIMA	32	61.6	0.027	±	0.014	0.009	±	0.015
Hiroshima, HIROSHIMA	30	126.9	0.031	±	0.018	0.013	±	0.016
Matsuyama, EHIME	33	113.5	0.01	±	0.0088	0	±	0.0074

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Ooita, OOITA	33	136.5	0.021	±	0.0084	0	±	0.0092
Dazaifu, FUKUOKA	33	181.4	0	±	0.0068	0.0062	±	0.0093
Saga, SAGA	33	136	0.014	±	0.011	0.0019	±	0.0078
Uto, KUMAMOTO	33	170.7	0	±	0.011	0	±	0.01
Miyazaki, MIYAZAKI	33	153.7	0.0021	±	0.0058	0	±	0.011
Nagasaki, NAGASAKI	33	254.5	0.036	±	0.01	0	±	0.011
Yonagusuku-machi, Okinawa	31	35.3	0.026	±	0.017	0	±	0.013
Yonagusuku-machi, Okinawa	30	212.9	0.027	±	0.015	0	±	0.011
Aug, 1998								
Aomori, AOMORI	29	276	0	±	0.0099	0.006	±	0.0016
Morioka, IWATE	29	224	0	±	0.01	0.017	±	0.015
Onagawa-machi, MIYAGI	29	428	0	±	0.032	0	±	0.013
Yamagata, YAMAGATA	29	467	0.033	±	0.01	0	±	0.0098
Ookuma-machi, FUKUSHIMA	29	641	0.045	±	0.01	0.013	±	0.014
Kawachi-machi, TOCHIGI	29	318	0.012	±	0.0073	0	±	0.0075
Ichihara, CHIBA	29	70	0.009	±	0.013	0	±	0.0072
Urawa, SAITAMA	29	283	0.024	±	0.021	0	±	0.01
Maebashi, GUNMA	29	226	0	±	0.009	0	±	0.0087
Shinjuku, TOKYO	29	274	0.031	±	0.015	0.0097	±	0.0088
Yokohama, KANAGAWA	30	232	0.043	±	0.0096	0.012	±	0.01
Koufu, YAMANASHI	29	182	0.004	±	0.011	0	±	0.013
Shizuoka, SHIZUOKA	29	486	0.016	±	0.011	0.0095	±	0.009
Fukui, FUKUI	27	369	0	±	0.046	0	±	0.043
Gifu, GIFU	29	160	0.019	±	0.0081	0	±	0.009
Nagoya, AICHI	29	176	0.022	±	0.01	0.0061	±	0.0093
Ootsu, SHIGA	31	82	0.02	±	0.0074	0.0078	±	0.0092

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Tsu,MIE	29	57	0.0038	±	0.0084	0	±	0.01
Nara,NARA	29	222.8	0.007	±	0.015	0	±	0.0092
Tottori,TOTTORI	29	121.1	0.09	±	0.012	0.03	±	0.016
Kobe,HYOUGO	30	284	0	±	0.016	0.0085	±	0.0086
Wakayama,WAKAYAMA	29	4	0.042	±	0.016	0.009	±	0.013
Matsue,SHIMANE	31	248.4	0.0022	±	0.0041	0.0035	±	0.0057
Ishii-machi,TOKUSHIMA	30	24.2	0.004	±	0.016	0.025	±	0.012
Matsuyama,EHIME	29	32.5	0.0009	±	0.0079	0	±	0.0098
Ooita,OOITA	29	70.5	0.013	±	0.0093	0	±	0.009
Dazaifu,FUKUOKA	29	105.7	0.014	±	0.009	0.01	±	0.011
Saga,SAGA	29	69	0.001	±	0.012	0	±	0.0075
Uto,KUMAMOTO	29	39.3	0.0083	±	0.0072	0.017	±	0.0096
Miyazaki,MIYAZAKI	29	14.5	0.01	±	0.0071	0	±	0.0089
Nagasaki,NAGASAKI	29	73.5	0.017	±	0.0071	0	±	0.0086
Yonagusuku-machi,Okinawa	30	198.8	0.078	±	0.018	0	±	0.011
Sep,1998								
Sapporo,HOKKAIDOU	30	208	0.025	±	0.0091	0.0013	±	0.0097
Aomori,AOMORI	30	146	0.026	±	0.014	0.016	±	0.014
Morioka,IWATE	30	216	0.081	±	0.016	0	±	0.013
Onagawa-machi,MIYAGI	30	212	0.016	±	0.024	0.004	±	0.012
Yamagata,YAMAGATA	30	154	0.026	±	0.0087	0	±	0.0085
Ookuma-machi,FUKUSHIMA	30	20	0.015	±	0.0084	0.014	±	0.014
Mito,IBARAKI	30	216	0.018	±	0.0072	0	±	0.0082
Kawachi-machi,TOCHIGI	30	291	0	±	0.0066	0.016	±	0.01
Ichihara,CHIBA	30	191	0	±	0.014	0.0012	±	0.0076
Urawa,SAITAMA	30	361	0	±	0.019	0.0041	±	0.0072

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Maebashi, GUNMA	30	322	0	±	0.015	0.018	±	0.0098
Shinjuku, TOKYO	30	270	0.004	±	0.011	0	±	0.0082
Yokohama, KANAGAWA	30	210	0.026	±	0.0085	0.023	±	0.01
Koufu, YAMANASHI	30	348	0.012	±	0.012	0	±	0.014
Kosugi-machi, TOYAMA	30	285	0.017	±	0.014	0.024	±	0.0096
Shizuoka, SHIZUOKA	30	480	0.015	±	0.011	0.0006	±	0.0083
Fukui, FUKUI	29	295	0.081	±	0.041	0	±	0.043
Fukui, FUKUI	33	213	0.072	±	0.036	0.12	±	0.069
Gifu, GIFU	30	340	0.03	±	0.021	0	±	0.0087
Nagoya, AICHI	30	298	0.001	±	0.015	0.023	±	0.011
Ootsu, SHIGA	30	223.6	0.023	±	0.01	0.0076	±	0.0091
Tsu, MIE	30	420.5	0.014	±	0.0094	0.02	±	0.023
Kyoto, KYOTO	30	235	0.005	±	0.011	0.0013	±	0.0086
Nara, NARA	30	239.4	0	±	0.015	0	±	0.0077
Tottori, TOTTORI	30	257.2	0.18	±	0.014	0.006	±	0.014
Kobe, HYOUGO	30	290.6	0	±	0.014	0	±	0.0084
Wakayama, WAKAYAMA	30	202	0.006	±	0.02	0	±	0.0087
Ishii-machi, TOKUSHIMA	34	336.6	0.029	±	0.02	0.045	±	0.013
Ishii-machi, TOKUSHIMA	26	297	0.01	±	0.018	0.014	±	0.012
Takamatsu, KAGAWA	30	314	0.006	±	0.017	0	±	0.0085
Hiroshima, HIROSHIMA	30	281.7	0.097	±	0.018	0.013	±	0.01
Hiroshima, HIROSHIMA	29	123.6	0.027	±	0.024	0.029	±	0.015
Matsuyama, EHIME	30	157.5	0.049	±	0.019	0.022	±	0.0099
Ooita, OOITA	30	296.3	0.005	±	0.013	0.006	±	0.013
Dazaifu, FUKUOKA	30	76	0	±	0.012	0.013	±	0.0096
Saga, SAGA	30	12.9	0.001	±	0.012	0	±	0.0079

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)	137Cs (MBq/km2)
Uto, KUMAMOTO	30	109.3	0.0017 ± 0.0071	0.0059 ± 0.0095
Miyazaki, MIYAZAKI	30	238.2	0.02 ± 0.0081	0 ± 0.0079
Nagasaki, NAGASAKI	30	93	0.042 ± 0.013	0.017 ± 0.017
Yonagusuku-machi, Okinawa	33	449.3	0.007 ± 0.013	0.004 ± 0.01

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(1)-2 Strontuim-90 and Cesiumu-137 in Rain and Dry Fallout(for WHO program)
(form APR. 1998 to Sep. 1998)

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Table (1)-2 Strontuim-90 and Cesiumu-137 in Rain and Dry Fallout(for WHO program)

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Apr, 1998								
Akita, AKITA	30	111	0.03	±	0.017	0.066	±	0.015
Niigata, NIIGATA	30	116	0.023	±	0.013	0.021	±	0.013
Ichihara, CHIBA	27	169	0.039	±	0.015	0.028	±	0.012
Ichihara, CHIBA	34	133	0.024	±	0.014	0.028	±	0.012
Nagano, NAGANO	30	126	0.014	±	0.017	0.04	±	0.014
Kanazawa, ISHIKAWA	29	286	0.014	±	0.0085	0.002	±	0.014
Kanazawa, ISHIKAWA	29	188	0.038	±	0.0096	0.011	±	0.014
Osaka, OSAKA	32	249	0.019	±	0.019	0	±	0.014
Okayama, OKAYAMA	30	96.5	0.009	±	0.01	0	±	0.012
Kochi, KOCHI	30	255.8	0.041	±	0.02	0	±	0
Yamaguchi, YAMAGUCHI	30	244	0.016	±	0.0094	0.093	±	0.017
Kagoshima, KAGOSHIMA	29	278	0.038	±	0.011	0.025	±	0.014
May, 1998								
Akita, AKITA	31	203	0.003	±	0.013	0	±	0.016
Niigata, NIIGATA	31	166	0.022	±	0.013	0.006	±	0.012
Nagano, NAGANO	32	89	0	±	0.014	0	±	0.011
Kanazawa, ISHIKAWA	32	192	0.03	±	0.0086	0	±	0.0072
Okayama, OKAYAMA	31	117.5	0.013	±	0.0097	0	±	0.011
Kochi, KOCHI	31	508.7	0.06	±	0.01	0.075	±	0.017
Yamaguchi, YAMAGUCHI	31	287	0.01	±	0.0064	0.003	±	0.011
Kagoshima, KAGOSHIMA	32	481	0.043	±	0.016	0.011	±	0.0098
Jun, 1998								

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Akita, AKITA	30	213	0.013	±	0.015	0.049	±	0.016
Niigata, NIIGATA	30	73	0.001	±	0.011	0.011	±	0.013
Ichihara, CHIBA	30	139	0.01	±	0.013	0.017	±	0.013
Nagano, NAGANO	30	51	0.006	±	0.016	0.0073	±	0.0083
Kanazawa, ISHIKAWA	30	166	0.02	±	0.0069	0	±	0.0076
Osaka, OSAKA	30	242.6	0.03	±	0.014	0.001	±	0.015
Okayama, OKAYAMA	30	143.8	0.005	±	0.014	0	±	0.009
Kochi, KOCHI	30	879.4	0.091	±	0.023	0.11	±	0.019
Yamaguchi, YAMAGUCHI	30	496	0.002	±	0.013	0.001	±	0.011
Kagoshima, KAGOSHIMA	31	217.5	0.034	±	0.016	0	±	0.0082
Jul, 1998								
Akita, AKITA	33	97	0.028	±	0.0084	0.015	±	0.0097
Niigata, NIIGATA	33	75	0.023	±	0.0078	90.001	±	0.012
Ichihara, CHIBA	31	132	0.016	±	0.015	0.008	±	0.012
Nagano, NAGANO	34	139	0.011	±	0.011	0.015	±	0.0097
Kanazawa, ISHIKAWA	32	421	0.038	±	0.0092	0.0065	±	0.0083
Osaka, OSAKA	33	115	0.009	±	0.026	0.031	±	0.013
Okayama, OKAYAMA	33	55.4	0.028	±	0.015	0.005	±	0.01
Kochi, KOCHI	30	318.2	0.038	±	0.011	0	±	0.011
Kochi, KOCHI	32	18.7	0.12	±	0.027	0.004	±	0.013
Yamaguchi, YAMAGUCHI	31	178	0.0061	±	0.0077	0.016	±	0.012
Kagoshima, KAGOSHIMA	31	60.5	0.018	±	0.016	0	±	0.0086
Aug, 1998								
Akita, AKITA	29	291	0.046	±	0.014	0	±	0.0098
Niigata, NIIGATA	29	623	0.011	±	0.0072	0.008	±	0.012
Ichihara, CHIBA	31	112	0.005	±	0.015	0.019	±	0.012
Nagano, NAGANO	28	161	0	±	0.012	0	±	0.0094
Kanazawa, ISHIKAWA	30	335	0.021	±	0.0075	0.008	±	0.008

Location	Duration (Days)	Precipitation (mm)	90Sr (MBq/km2)			137Cs (MBq/km2)		
Osaka, OSAKA	29	4834	0.018	±	0.017	0.002	±	0.013
Okayama, OKAYAMA	29	128.3	0.011	±	0.0083	0	±	0.009
Yamaguchi, YAMAGUCHI	31	115	0.016	±	0.0073	0.0024	±	0.0089
Kagoshima, KAGOSHIMA	31	146	0.016	±	0.011	0.032	±	0.014
Sep, 1998								
Akita, AKITA	30	184	0.032	±	0.012	0	±	0.009
Niigata, NIIGATA	30	123	0.03	±	0.0077	0.025	±	0.012
Ichihara, CHIBA	30	202	0.002	±	0.016	0.011	±	0.011
Nagano, NAGANO	31	154	0	±	0.011	0	±	0.0094
Kanazawa, ISHIKAWA	30	224	0.044	±	0.0093	0	±	0.0077
Osaka, OSAKA	30	165.3	0.021	±	0.011	0.011	±	0.01
Okayama, OKAYAMA	30	227.5	0.024	±	0.0092	0	±	0.0089
Kochi, KOCHI	30	1352.8	0.039	±	0.011	0.0099	±	0.0095
Yamaguchi, YAMAGUCHI	30	130	0.021	±	0.0086	0.0038	±	0.0084

(2) Strontuim-90 and Cesiumu-137 in Airborn Dust
(form APR. 1998 to Sep. 1998)

-continued from No. 124 for this publication-

Table (2) :Strontuim-90 and Cesiumu-137 in Airborn Dust

Location	Sampling period	Absorption (m2)	90Sr (mBq/m3)			137Cs (mBq/m3)		
April～June, 1998								
Morioka, IWATE	04 ～ 06	6484.0	0.00046	±	0.00046	0	±	0.00079
Yamagata, YAMAGATA	04 ～ 06	12960.0	0.0011	±	0.00051	0.00021	±	0.0043
Ookuma-machi, FUKUSHIMA	04 ～ 06	11777.0	0.00036	±	0.00033	0	±	0.00037
Niigata, NIIGATA	04 ～ 06	11716.0	0.00052	±	0.00053	0	±	0.0004
Kawachi-machi, TOCHIGI	04 ～ 06	14712.0	0.00066	±	0.00051	0.00022	±	0.00033
Ichihara, CHIBA	04 ～ 06	10212.0	0	±	0.00028	0.0006	±	0.00034
Maebashi, GUNMA	04 ～ 06	13875.0	0	±	0.00041	0.00008	±	0.00022
Nagano, NAGANO	04 ～ 06	12110.0	0	±	0.00043	0	±	0.00037
Yokohama, KANAGAWA	04 ～ 06	10096.0	0.00025	±	0.00037	0.00075	±	0.00055
Koufu, YAMANASHI	04 ～ 06	10059.0	0.00024	±	0.00065	0.0009	±	0.00047
Kosugi-machi, TOYAMA	04 ～ 06	18353.0	0.00008	±	0.00022	0.00026	±	0.00018
Hamaoka-machi, SHIZUOKA	04 ～ 06	10359.0	0.0011	±	0.0007	0.0014	±	0.0005
Fukui, FUKUI	04 ～ 06	11820.0	0.00079	±	0.00037	0	±	0.00039
Gifu, GIFU	04 ～ 06	11424.0	0.00039	±	0.00066	0.00014	±	0.00047
Nagoya, AICHI	04 ～ 06	9841.0	0.0012	±	0.00066	0.00008	±	0.00054
Ootsu, SHIGA	04 ～ 06	11715.0	0.00064	±	0.00049	0.00072	±	0.00052
Tsu, MIE	04 ～ 06	13630.0	0.00098	±	0.00028	0.00012	±	0.00044
Kyoto, KYOTO	04 ～ 06	10145.0	0.00086	±	0.00035	0.00081	±	0.00048
Nara, NARA	04 ～ 06	10676.0	0.00058	±	0.0031	0.00004	±	0.00053
Osaka, OSAKA	04 ～ 06	16042.0	0	±	0.00041	0	±	0.00033
Tottori, TOTTORI	04 ～ 06	15114.0	0.00044	±	0.00039	0.0012	±	0.00043

Location	Sampling period	Absorption (m2)	90Sr (mBq/m3)			137Cs (mBq/m3)		
Kobe, HYOUGO	04 ～ 06	10341.0	0.0011	±	0.00079	0.00053	±	0.00051
Wakayama, WAKAYAMA	04 ～ 06	10368.0	0.00014	±	0.00047	0.0012	±	0.00049
Okayama, OKAYAMA	04 ～ 06	13219.0	0	±	0.00055	0	±	0.00039
Tokushima, TOKUSHIMA	04 ～ 06	10080.0	0.0004	±	0.00054	0	±	0.00028
Takamatsu, KAGAWA	04 ～ 06	15825.0	0	±	0.0002	0.00013	±	0.00029
Hiroshima, HIROSHIMA	04 ～ 06	15854.0	0.00033	±	0.00024	0.00025	±	0.00029
Yamaguchi, YAMAGUCHI	04 ～ 06	21420.0	0.00043	±	0.00029	0.0005	±	0.00027
Ooita, OOITA	04 ～ 06	10402.0	0.00092	±	0.0007	0.0008	±	0.00044
Saga, SAGA	04 ～ 06	13277.0	0.00016	±	0.00041	0.00022	±	0.00037
Uto, KUMAMOTO	04 ～ 06	10736.0	0.00058	±	0.00059	0.0013	±	0.00056
Miyazaki, MIYAZAKI	04 ～ 06	13075.0	0	±	0.00051	0	±	0.00039
Nagasaki, NAGASAKI	04 ～ 06	10368.0	0.00094	±	0.00063	0.00041	±	0.00045
April～July, 1998								
Mito, IBARAKI	04 ～ 07	11232.0	0.00019	±	0.00057	0	±	0.00025
April～June, 1999								
Akita, AKITA	04 ～ 06	10920.0	0.00028	±	0.00064	0.00076	±	0.00054
July～September, 1998								
Morioka, IWATE	07 ～ 09	10372.0	0.0011	±	0.00058	0	±	0.00028
Akita, AKITA	07 ～ 09	11040.0	0	±	0.00047	0.0007	±	0.00056
Yamagata, YAMAGATA	07 ～ 09	12960.0	0.001	±	0.00056	0	±	0.00034
Ookuma-machi, FUKUSHIMA	07 ～ 09	11498.0	0.00033	±	0.00055	0	±	0.0004
Niigata, NIIGATA	07 ～ 09	11081.0	0.00098	±	0.00039	0.00002	±	0.00027
Kawachi-machi, TOCHIGI	07 ～ 09	14964.0	0.00027	±	0.00042	0.00011	±	0.00022
Ichihara, CHIBA	07 ～ 09	10479.0	0.00049	±	0.00033	0	±	0.00029
Maebashi, GUNMA	07 ～ 09	13785.0	0	±	0.00045	0.00002	±	0.00021
Nagano, NAGANO	07 ～ 09	10575.0	0	±	0.00051	0	±	0.0004
Yokohama, KANAGAWA	07 ～ 09	9933.0	0	±	0.0003	0.00018	±	0.00031
Koufu, YAMANASHI	07 ～ 09	10129.0	0.00035	±	0.00068	0.00045	±	0.00048

Location	Sampling period	Absorption (m2)	90Sr (mBq/m3)			137Cs (mBq/m3)		
Kosugi-machi, TOYAMA	07 ～ 09	18351.0	0.00089	±	0.00056	0.00045	±	0.00018
Hamaoka-machi, SHIZUOKA	07 ～ 09	10043.0	0	±	0.00056	0	±	0.00041
Gifu, GIFU	07 ～ 09	11414.0	0.00019	±	0.00056	0	±	0.00046
Nagoya, AICHI	07 ～ 09	10247.0	0	±	0.00052	0	±	0.00025
Ootsu, SHIGA	07 ～ 09	11451.0	0.00025	±	0.00049	0	±	0.00037
Tsu, MIE	07 ～ 09	13469.0	0.00023	±	0.00027	0	±	0.00021
Kyoto, KYOTO	07 ～ 09	10391.0	0.00019	±	0.00031	0.00011	±	0.00045
Nara, NARA	07 ～ 09	10869.0	0.00051	±	0.00046	0	±	0.00026
Osaka, OSAKA	07 ～ 09	16160.0	0.00068	±	0.00047	0.00008	±	0.0003
Tottori, TOTTORI	07 ～ 09	15114.0	0.00088	±	0.00027	0	±	0.00018
Kobe, HYOUGO	07 ～ 09	10400.0	0.001	±	0.00035	0.00022	±	0.00048
Wakayama, WAKAYAMA	07 ～ 09	0.0	0.00049	±	0.00047	0.00032	±	0.00046
Okayama, OKAYAMA	07 ～ 09	13233.0	0.001	±	0.0003	0	±	0.0002
Tokushima, TOKUSHIMA	07 ～ 09	10080.0	0.001	±	0.00062	0	±	0.00027
Takamatsu, KAGAWA	07 ～ 09	13412.0	0.00021	±	0.00041	0	±	0.00033
Hiroshima, HIROSHIMA	07 ～ 09	11474.0	0	±	0.0005	0	±	0.0004
Yamaguchi, YAMAGUCHI	07 ～ 09	20880.0	0	±	0.00031	0	±	0.00026
Ooita, OOITA	07 ～ 09	10375.0	0	±	0.00034	0	±	0.00027
Saga, SAGA	07 ～ 09	13881.0	0.00056	±	0.00047	0	±	0.00032
Uto, KUMAMOTO	07 ～ 09	10798.0	0	±	0.00052	0	±	0.00025
Miyazaki, MIYAZAKI	07 ～ 09	12963.0	0.00037	±	0.00026	0	±	0.00021
Nagasaki, NAGASAKI	07 ～ 09	10368.0	0.00021	±	0.00056	0	±	0.00026
July～October, 1998								
Mito, IBARAKI	07 ～ 10	10705.0	0.0011	±	0.0035	0.00011	±	0.00046
Fukui, FUKUI	07 ～ 10	9951.0	0	±	0.00064	0	±	0.00048

(3) Strontuim-90 and Cesiumu-137 in Service Water
(form APR. 1998 to Sep. 1998)

-continued from No. 124 for this publication-

Table (3) :Strontuim-90 and Cesiumu-137 in Service Water

Location	pH (pH)	90Sr (mBq/l)			137Cs (mBq/l)		
(Source Water)							
May, 1998							
Nagano, NAGANO	7.31	0.91	±	0.11	0.007	±	0.051
Jun, 1998							
Kisarazu, CHIBA	7.4	2	±	0.14	0.009	±	0.049
Urawa, SAITAMA	7.4	0	±	0.19	0.02	±	0.082
Katsushika, TOKYO	6.9	1.5	±	0.2	0.29	±	0.58
Tsukui-machi, KANAGAWA	8	0.54	±	0.1	0.006	±	0.053
Inuyama, AICHI	7	1.9	±	0.12	0.17	±	0.067
Moriguchi, OSAKA	7.2	3.3	±	0.23	0.084	±	0.054
Matsuyama, EHIME	7.5	1.5	±	0.1	0	±	0.059
Fukuoka, FUKUOKA	7.34	1.7	±	0.1	0.07	±	0.044
Jul, 1998							
Sapporo, HOKKAIDOU	7.1	1.4	±	0.11	0.011	±	0.068
Aug, 1998							
Kyoto, KYOTO	8.18	2.5	±	0.16	0.033	±	0.044
(Tap Water)							
May, 1998							
Yamagata, YAMAGATA	7.2	1.8	±	0.17	0.057	±	0.061
Nagano, NAGANO	6.78	0.41	±	0.083	0	±	0.038
Hiroshima, HIROSHIMA	7.01	1.7	±	0.18	0	±	0.047
Jun, 1998							

Location	pH (pH)	90Sr (mBq/l)			137Cs (mBq/l)		
Wakkanai,HOKKAIDOU	6.9	1.3	±	0.14	0	±	0.054
Aomori,AOMORI	7.9	1	±	0.07	0.18	±	0.053
Morioka,IWATE	6.8	0.88	±	0.08	0	±	0.047
Fukushima,FUKUSHIMA	7.74	2.4	±	0.18	0.062	±	0.052
Niigata,NIIGATA	7.47	2.3	±	0.13	0.14	±	0.077
Mito,IBARAKI	8.2	1.3	±	0.09	0.11	±	0.064
Kawachi-machi,TOCHIGI	7.4	0.38	±	0.048	0.038	±	0.039
Ichihara,CHIBA	7.5	2.2	±	0.17	0.043	±	0.045
Urawa,SAITAMA	6.8	1.5	±	0.17	0	±	0.53
Maebashi,GUNMA	7	1.1	±	0.13	0.09	±	0.047
Katsushika,TOKYO	6.9	1.4	±	0.17	0.14	±	0.055
Koufu,YAMANASHI	7.1	1.1	±	0.1	0.023	±	0.066
Kosugi-machi,TOYAMA	7.3	1.4	±	0.14	0	±	0.04
Kanazawa,ISHIKAWA	6.48	2.3	±	0.12	0.12	±	0.066
Shizuoka,SHIZUOKA	0	0.46	±	0.1	0	±	0.039
Fukui,FUKUI	6.34	0.52	±	0.11	0	±	0.046
Gifu,GIFU	7.13	1.4	±	0.19	0	±	0.05
Nagoya,AICHI	6.8	1.6	±	0.11	0.04	±	0.058
Ootsu,SHIGA	6.5	3.1	±	0.23	0.12	±	0.056
Nara,NARA	7.3	2.3	±	0.13	0	±	0.05
Osaka,OSAKA	7.4	2.1	±	0.2	0	±	0.043
Tottori,TOTTORI	7	3.8	±	0.38	0	±	0.056
Tottori,TOTTORI	0	2.3	±	0.16	0.01	±	0.044
Kobe,HYOUGO	7.42	2.7	±	0.2	0	±	0.048
Okayama,OKAYAMA	6.84	2.1	±	0.32	0.058	±	0.056
Tokushima,TOKUSHIMA	7.4	1.3	±	0.14	0.041	±	0.042

Location	pH (pH)	90Sr (mBq/l)			137Cs (mBq/l)		
Takamatsu,KAGAWA	7.53	2	±	0.14	0	±	0.062
Kochi,KOCHI	7.26	1.6	±	0.17	0	±	0.046
Ube,YAMAGUCHI	7.7	1.4	±	0.17	0.1	±	0.06
Ooita,OOITA	8.37	1	±	0.13	0.098	±	0.06
Fukuoka,FUKUOKA	7.01	2.8	±	0.18	0.034	±	0.042
Saga,SAGA	7.8	1.5	±	0.15	0	±	0.038
Uto,KUMAMOTO	7.3	0.035	±	0.033	0	±	0.055
Miyazaki,MIYAZAKI	7.31	1.3	±	0.09	0	±	0.048
Nagasaki,NAGASAKI	7.4	1.3	±	0.1	0.06	±	0.084
Kagoshima,KAGOSHIMA	7.05	0.44	±	0.049	0.12	±	0.047
Jul,1998							
Akita,AKITA	6.38	2.7	±	0.13	0.14	±	0.071
Sendai,MIYAGI	0	0.9	±	0.12	0.057	±	0.042
Yokohama,KANAGAWA	7.5	0.78	±	0.11	0	±	0.048
Shinguu,WAKAYAMA	6.8	1.4	±	0.18	0.086	±	0.048
Aug,1998							
Kyoto,KYOTO	7.91	2.8	±	0.2	0.11	±	0.046
Naha,Okinawa	7.73	3.5	±	0.28	0.024	±	0.047

(4) Strontuim-90 and Cesiumu-137 in Freshwater
(form APR. 1998 to Sep. 1998)

-continued from No. 124 for this publication-

Table (4) :Strontuim-90 and Cesiumu-137 in Freshwater

Location	pH (pH)	90Sr (mBq/l)			137Cs (mBq/l)		
(Fresh Water)							
May, 1998							
Kasumigaura-lake, IBARAKI	9.2	2.4	±	0.12	0.49	±	0.095
Jul, 1998							
Ishikari-machi, HOKKAIDOU	7.2	2.6	±	0.13	0.26	±	0.084
Aug, 1998							
Akita, AKITA	6.46	2.5	±	0.13	0.15	±	0.13
Tsuruga, FUKUI	8.43	3.7	±	0.14	2.1	±	0.12
Sep, 1998							
Fukushima, FUKUSHIMA	7.53	0.23	±	0.069	0.003	±	0.038

(5) Strontuim-90 and Cesiumu-137 in Soil
(form APR. 1998 to Sep. 1998)

-continued from No. 124 for this publication-

Table (5) :Strontuim-90 and Cesiumu-137 in Soil

Location	Sampling period	90Sr (Bq/kg)	90Sr (MBq/km2)	137Cs (Bq/kg)	137Cs (MBq/km2)
August～,					
Sapporo, HOKKAIDOU	5 ～ 20	5.7 ± 0.27	1100 ± 50	8.5 ± 0.34	1600 ± 60
Sapporo, HOKKAIDOU	0 ～ 5	7.9 ± 0.03	290 ± 11	24 ± 0.5	890 ± 20
Takizawa-mura, IWATE	5 ～ 20	9.3 ± 0.34	1000 ± 40	9.6 ± 0.35	1100 ± 40
Takizawa-mura, IWATE	0 ～ 5	14 ± 0.4	460 ± 14	56 ± 0.8	1800 ± 30
Yamagata, YAMAGATA	5 ～ 20	1.3 ± 0.14	140 ± 15	3.3 ± 0.22	350 ± 23
Yamagata, YAMAGATA	0 ～ 5	2.4 ± 0.18	120 ± 9	15 ± 0.5	750 ± 22
Ichihara, CHIBA	5 ～ 20	0.32 ± 0.081	56 ± 14	1.3 ± 0.13	220 ± 23
Ichihara, CHIBA	0 ～ 5	0.22 ± 0.074	8.8 ± 2.9	2 ± 0.16	81 ± 6.3
Urawa, SAITAMA	5 ～ 20	0.61 ± 0.14	60 ± 13	0.72 ± 0.11	71 ± 11
Urawa, SAITAMA	0 ～ 5	1.3 ± 0.16	34 ± 4.3	7.8 ± 0.32	200 ± 8
Yokohama, KANAGAWA	5 ～ 20	5.1 ± 0.28	620 ± 34	8.2 ± 0.33	1000 ± 40
Yokohama, KANAGAWA	0 ～ 5	6 ± 0.31	190 ± 10	16 ± 0.5	520 ± 15
Takane-machi, YAMANASHI	0 ～ 5	6.8 ± 0.31	230 ± 10	31 ± 0.6	1100 ± 20
Takane-machi, YAMANASHI	5 ～ 20	8 ± 0.35	640 ± 28	17 ± 0.5	1400 ± 40
Fukui, FUKUI	0 ～ 5	0.35 ± 0.087	14 ± 3.5	4.2 ± 0.24	170 ± 10
Fukui, FUKUI	5 ～ 20	0.47 ± 0.094	77 ± 15	1.9 ± 0.17	310 ± 29
Tsu, MIE	5 ～ 20	0.051 ± 0.0556	10 ± 11	0.97 ± 0.12	190 ± 24
Tsu, MIE	0 ～ 5	0.14 ± 0.063	12 ± 5.7	0.62 ± 0.1	56 ± 9.2
Osaka, OSAKA	5 ～ 20	0.49 ± 0.1	84 ± 18	2.1 ± 0.18	360 ± 31
Osaka, OSAKA	0 ～ 5	0.44 ± 0.1	22 ± 5.2	3.3 ± 0.22	170 ± 11
Hiroshima, HIROSHIMA	5 ～ 20	1.6 ± 0.15	340 ± 32	7 ± 0.3	1500 ± 60

Location	Sampling period	90Sr (Bq/kg)	90Sr (MBq/km2)	137Cs (Bq/kg)	137Cs (MBq/km2)
Hiroshima,HIROSHIMA	0 ～ 5	0.64 ± 0.099	27 ± 4.2	2.1 ± 0.16	89 ± 6.9
July～,					
Aomori,AOMORI	0 ～ 5	0.53 ± 0.11	21 ± 4.2	1.1 ± 0.14	44 ± 5.7
Aomori,AOMORI	5 ～ 20	0.5 ± 0.097	63 ± 12	0.4 ± 0.1	49 ± 13
Mutsu,AOMORI	0 ～ 5	6.7 ± 0.28	140 ± 6	37 ± 0.7	770 ± 14
Mutsu,AOMORI	5 ～ 20	7.1 ± 0.3	590 ± 25	28 ± 0.6	2300 ± 50
Kashiwazaki,NIIGATA	5 ～ 20	0.77 ± 0.12	1990 ± 28	11 ± 0.4	2600 ± 90
Kashiwazaki,NIIGATA	0 ～ 5	0.65 ± 0.11	46 ± 7.6	10 ± 0.4	720 ± 26
Imaichi,TOCHIGI	0 ～ 5	17 ± 0.6	290 ± 10	52 ± 0.8	900 ± 14
Imaichi,TOCHIGI	5 ～ 20	8.9 ± 0.38	190 ± 8	17 ± 0.5	370 ± 10
Maebashi,GUNMA	5 ～ 20	0.88 ± 0.12	140 ± 20	2.1 ± 0.17	340 ± 27
Maebashi,GUNMA	0 ～ 5	0.41 ± 0.085	29 ± 5.9	1.3 ± 0.13	87 ± 9.3
Nagano,NAGANO	5 ～ 20	3.3 ± 0.23	260 ± 18	18 ± 0.5	1400 ± 40
Nagano,NAGANO	0 ～ 5	4.3 ± 0.26	110 ± 6	92 ± 1	2300 ± 30
Kosugi-machi,TOYAMA	0 ～ 5	0.18 ± 0.068	13 ± 5	0.85 ± 0.12	62 ± 8.7
Kosugi-machi,TOYAMA	5 ～ 20	0.1 ± 0.061	20 ± 12	0.28 ± 0.082	57 ± 17
Kanazawa,ISHIKAWA	5 ～ 20	6.9 ± 0.39	1100 ± 60	17 ± 0.5	2600 ± 70
Kanazawa,ISHIKAWA	0 ～ 5	9 ± 0.42	410 ± 19	35 ± 0.7	1600 ± 30
Gotenba,SHIZUOKA	5 ～ 20	0.22 ± 0.047	21 ± 4.5	2.7 ± 0.2	260 ± 19
Gotenba,SHIZUOKA	0 ～ 5	0.87 ± 0.078	29 ± 2.5	8.6 ± 0.32	280 ± 11
Gifu,GIFU	0 ～ 5	0.81 ± 0.13	18 ± 2.8	12 ± 0.4	260 ± 8
Gifu,GIFU	5 ～ 20	0.92 ± 0.13	50 ± 7.3	8.6 ± 0.33	470 ± 18
Yasu-machi,SHIGA	0 ～ 5	0.15 ± 0.066	8.5 ± 3.7	0.47 ± 0.087	26 ± 4.8
Yasu-machi,SHIGA	5 ～ 20	0.25 ± 0.074	29 ± 8.7	0.25 ± 0.076	29 ± 8.9
Kyoto,KYOTO	5 ～ 20	0.33 ± 0.086	23 ± 6.2	0.79 ± 0.13	56 ± 9.4
Kyoto,KYOTO	0 ～ 5	0.71 ± 0.11	17 ± 2.6	2.7 ± 0.2	64 ± 4.8
Kashihara,NARA	0 ～ 5	0.57 ± 0.11	74 ± 14	5.7 ± 0.28	730 ± 36
Kashihara,NARA	5 ～ 20	0.71 ± 0.12	140 ± 23	5.5 ± 0.28	1100 ± 50

Location	Sampling period	90Sr (Bq/kg)	90Sr (MBq/km2)	137Cs (Bq/kg)	137Cs (MBq/km2)
Kokufu-machi,TOTTORI	5 ～ 20	0.81 ± 0.072	7.6 ± 3	0.45 ± 0.089	19 ± 3.7
Kokufu-machi,TOTTORI	0 ～ 5	0.061 ± 0.59	2.8 ± 2.7	2.1 ± 0.17	95 ± 7.5
Kasai,HYOUGO	0 ～ 5	2.2 ± 0.18	130 ± 10	20 ± 0.5	1200 ± 30
Kasai,HYOUGO	5 ～ 20	0.25 ± 0.076	32 ± 10	2.4 ± 0.18	320 ± 23
Asahi-machi,OKAYAMA	0 ～ 5	0.75 ± 0.11	35 ± 5.2	1.8 ± 0.18	86 ± 8.3
Asahi-machi,OKAYAMA	5 ～ 20	0.5 ± 0.091	61 ± 11	0.9 ± 0.14	110 ± 17
Oota,SHIMANE	5 ～ 20	7 ± 0.33	400 ± 19	59 ± 0.9	3300 ± 50
Oota,SHIMANE	0 ～ 5	12 ± 0.4	210 ± 7	67 ± 0.9	1200 ± 20
Kamiita-machi,TOKUSHIM	0 ～ 5	1.8 ± 0.16	80 ± 6.9	4.2 ± 0.25	190 ± 11
Kamiita-machi,TOKUSHIM	5 ～ 20	1.3 ± 0.14	86 ± 9.1	5.2 ± 0.27	340 ± 18
Sakaide,KAGAWA	0 ～ 5	1.8 ± 0.16	61 ± 5.4	15 ± 0.4	490 ± 14
Sakaide,KAGAWA	5 ～ 20	2.5 ± 0.19	140 ± 11	2.7 ± 0.19	160 ± 11
Kochi,KOCHI	0 ～ 5	4.7 ± 0.25	120 ± 6	22 ± 0.5	550 ± 14
Kochi,KOCHI	5 ～ 20	4.3 ± 0.24	230 ± 13	15 ± 0.5	800 ± 24
Matsuyama,EHIME	0 ～ 5	4 ± 0.25	52 ± 3.3	26 ± 0.6	340 ± 8
Matsuyama,EHIME	5 ～ 20	0.48 ± 0.088	23 ± 4.2	24 ± 0.6	1200 ± 30
Hagi,YAMAGUCHI	5 ～ 20	0.97 ± 0.13	210 ± 28	4.7 ± 0.25	1000 ± 50
Hagi,YAMAGUCHI	0 ～ 5	1.3 ± 0.14	71 ± 7.6	6.6 ± 0.29	360 ± 16
Kujuu-machi,OOITA	5 ～ 20	2.2 ± 0.18	110 ± 9	23 ± 0.5	1100 ± 30
Kujuu-machi,OOITA	0 ～ 5	2.3 ± 0.18	26 ± 2.1	75 ± 1	870 ± 12
Fukuoka,FUKUOKA	5 ～ 20	2.1 ± 0.18	290 ± 25	0.28 ± 0.081	39 ± 11
Fukuoka,FUKUOKA	0 ～ 5	4.8 ± 0.26	270 ± 14	3.1 ± 0.2	170 ± 11
Nishihara-mura,KUMAMOT	5 ～ 20	4.9 ± 0.26	310 ± 16	16 ± 0.5	990 ± 29
Nishihara-mura,KUMAMOT	0 ～ 5	4.1 ± 0.23	85 ± 4.8	57 ± 0.9	1200 ± 20
Sadohara-machi,MIYAZAK	0 ～ 5	0.57 ± 0.1	26 ± 4.7	5.3 ± 0.27	250 ± 13
Sadohara-machi,MIYAZAK	5 ～ 20	0.5 ± 0.1	72 ± 15	6.3 ± 0.3	890 ± 42
Obama-machi,NAGASAKI	0 ～ 5	3 ± 0.21	160 ± 11	38 ± 0.7	2000 ± 40
Obama-machi,NAGASAKI	5 ～ 20	3.8 ± 0.23	380 ± 23	8.8 ± 0.35	900 ± 36

Location	Sampling period	90Sr (Bq/kg)	90Sr (MBq/km2)	137Cs (Bq/kg)	137Cs (MBq/km2)
June～,					
Fukushima, FUKUSHIMA	5 ～ 20	2.6 ± 0.2	360 ± 27	6.3 ± 0.3	860 ± 41
Fukushima, FUKUSHIMA	0 ～ 5	5.9 ± 0.28	230 ± 11	22 ± 0.5	830 ± 20
Katsushika, TOKYO	5 ～ 20	0.57 ± 0.093	67 ± 11	1.8 ± 0.16	210 ± 18
Katsushika, TOKYO	0 ～ 5	0.58 ± 0.057	24 ± 2.4	2.9 ± 0.2	120 ± 8
Naha, Okinawa	0 ～ 5	0.7 ± 0.1	41 ± 6.3	4.9 ± 0.27	290 ± 16
Naha, Okinawa	5 ～ 20	1.2 ± 0.13	160 ± 18	4.8 ± 0.27	670 ± 38
May～,					
Tokai-mura, IBARAKI	0 ～ 5	8.3 ± 0.34	490 ± 20	50 ± 0.8	2900 ± 50
Tokai-mura, IBARAKI	5 ～ 20	5.9 ± 0.29	1100 ± 50	5.3 ± 0.27	950 ± 48
Akabane-machi, AICHI	5 ～ 20	0.8 ± 0.12	86 ± 13	14 ± 0.4	1500 ± 40
Akabane-machi, AICHI	0 ～ 5	1.2 ± 0.14	29 ± 3.3	1 ± 0.4	320 ± 10
September～,					
Iwadeyama-machi, MIYAGI	0 ～ 5	2.2 ± 0.18	84 ± 6.9	4.8 ± 0.26	180 ± 10
Iwadeyama-machi, MIYAGI	5 ～ 20	1.5 ± 0.15	260 ± 26	1.7 ± 0.16	300 ± 28
Kaimon-machi, KAGOSHIMA	5 ～ 20	0.45 ± 0.098	65 ± 14	1.2 ± 0.14	170 ± 21
Kaimon-machi, KAGOSHIMA	0 ～ 5	0.19 ± 0.076	13 ± 5.3	0.9 ± 0.13	62 ± 8.9
September～September,					
Akita, AKITA	5 ～ 20	2.7 ± 0.2	220 ± 17	9.8 ± 0.35	82 ± 29
Akita, AKITA	0 ～ 5	3.4 ± 0.21	110 ± 7	19 ± 0.5	650 ± 17

(6) Strontuim-90 and Cesiumu-137 in Seawater
(form APR. 1998 to Sep. 1998)
-continued from No. 124 for this publication-

Table (6) :Strontuim-90 and Cesiumu-137 in Seawater

Location	Sample volume analyzed (l)	Cl (l)	90Sr (mBq/l)	137Cs (mBq/l)
Jul, 1998				
Yoichi-bay, HOKKAIDOU	40	18.3	1.9 ± 0.23	2.5 ± 0.24
Mutsu, AOMORI	60	15.7	1.4 ± 0.13	2.3 ± 0.22
Souma, FUKUSHIMA	40	15.7	1.8 ± 0.23	1.8 ± 0.21
Niigata, NIIGATA	40	18.2	1.4 ± 0.13	2.5 ± 0.24
Tokai, IBARAKI	40	13.3	1.5 ± 0.14	2.2 ± 0.22
Ichihara, CHIBA	40	14.4	1.8 ± 0.21	2.1 ± 0.22
Yokosuka, KANAGAWA	40	16.1	1.9 ± 0.21	2.5 ± 0.26
Tokoname, AICHI	40	17.3	1.7 ± 0.22	2.3 ± 0.23
Osaka-Port, OSAKA	40	12.5	1.8 ± 0.14	1.4 ± 0.18
Aug, 1998				

Location	Sample volume analyzed (l)	Cl (l)	90Sr (mBq/l)	137Cs (mBq/l)
Mutsu-bay, AOMORI	60	14.5	1.7 ± 0.2	1.9 ± 0.21
Moji-Port, FUKUOKA	40	15.5	1.6 ± 0.2	2.5 ± 0.24
Sep, 1998				
Yamaguchi-bay, YAMAGUCHI	40	18.1	1.7 ± 0.21	2.4 ± 0.23
Kaseda, KAGOSHIMA	40	18	1.6 ± 0.2	2.1 ± 0.22

(7) Strontuim-90 and Cesiumu-137 in Sea Sediments
(form APR. 1998 to Sep. 1998)

-continued from No. 124 for this publication-

Table (7) :Strontuim-90 and Cesiumu-137 in Sea Sediments

Location	(m)	90Sr (Bq/kg)		137Cs (Bq/kg)	
Jul, 1998					
Yoichi-bay, HOKKAIDOU	13	0	0.043	0.43	0.087
Mutsu, AOMORI	15	0.062	0.049	0.11	0.065
Souma, FUKUSHIMA	5	0.15	0.065	0.95	0.11
Niigata, NIIGATA	27	0.083	0.056	1.4	0.14
Tokai-mura, IBARAKI	10	0.006	0.047	0.092	0.065
Ichihara, CHIBA	15	0.13	0.062	3.4	0.2
Yokosuka, KANAGAWA	7	0.066	0.056	2.3	0.17
Tokoname, AICHI	24	0.1	0.06	4.1	0.22
Osaka-Port, OSAKA	13.9	0.043	0.054	1.2	0.13
Aug, 1998					
Mutsu-bay, AOMORI	12	0.41	0.087	6.2	0.27
Moji-Port, FUKUOKA	8	0.1	0.056	3.3	0.2
Sep, 1998					
Yamaguchi-bay, YAMAGUCHI	10	0.11	0.059	3	0.19
Kaseda, KAGOSHIMA	7	0.048	0.056	0.43	0.088

* * 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