

ISSN 0441-2516

NIRS-RSD-93

RADIOACTIVITY SURVEY DATA in Japan

Part 2

= dietary Materials =

NUMBER 93

April 1991

National Institute of Radiological Sciences
Chiba, Japan

Radioactivity Survey Data in Japan

Number 93

April 1991 part 2 = dietary Materials =

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Edited by National Institute of Radiological Sciences, under the supervision
of Science and Technology Agency of Japanese Government.

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 cm² 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 m³ 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 °C. 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:

- The depth of water exceeds 1 m at low tide.
- No significant sedimental movement is observed in the vicinity of concern.
- 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.

* 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 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 0.25 mm in size by a crusher. The sieved sample was ashed in an electric muffle furnace regulated at 450°C. 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 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 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) Strontium-90 and Cesium-137 in Total Diet
(from Jun. 1989 to Jul. 1990)

-continued from NO. 91 of this publication-

Table (1): Strontium-90 and Cesium-137 in Total Diet

| Location | Ash | Ca | K | ⁹⁰ Sr | | ¹³⁷ Cs | |
|--------------------------|---------|----------|----------|------------------|--------------|-------------------|----------------|
| | (g/p·d) | (mg/p·d) | (mg/p·d) | (Bq/p·d) | (Bq/gCa) | (Bq/p·d) | (Bq/gK) |
| June, 1989 | | | | | | | |
| Morioka, IWATE | 15.6 | 403 | 1980 | 0.05 ± 0.010 | 0.12 ± 0.026 | 0.06 ± 0.009 | 0.032 ± 0.0046 |
| Nishikawa-machi, NIIGATA | 20.1 | 536 | 2640 | 0.11 ± 0.018 | 0.21 ± 0.033 | 0.07 ± 0.010 | 0.026 ± 0.0040 |
| Nagoya, AICHI | 16.0 | 597 | 2800 | 0.07 ± 0.011 | 0.12 ± 0.018 | 0.09 ± 0.010 | 0.033 ± 0.0035 |
| Wakayama, WAKAYAMA | 11.5 | 483 | 1540 | 0.03 ± 0.010 | 0.07 ± 0.021 | 0.05 ± 0.007 | 0.035 ± 0.0048 |
| Matsue, SHIMANE | 18.5 | 631 | 2970 | 0.07 ± 0.012 | 0.11 ± 0.019 | 0.06 ± 0.009 | 0.019 ± 0.0031 |
| July, 1989 | | | | | | | |
| Ishinomaki, MIYAGI | 14.9 | 476 | 1880 | 0.04 ± 0.009 | 0.08 ± 0.019 | 0.04 ± 0.007 | 0.021 ± 0.0039 |
| Hiratsuka, KANAGAWA | 16.9 | 659 | 2870 | 0.06 ± 0.011 | 0.10 ± 0.017 | 0.07 ± 0.010 | 0.024 ± 0.0034 |
| August, 1989 | | | | | | | |
| Hiroshima, HIROSHIMA | 13.3 | 493 | 1570 | 0.06 ± 0.012 | 0.12 ± 0.024 | 0.04 ± 0.010 | 0.024 ± 0.0065 |
| November, 1989 | | | | | | | |
| Ishinomaki, MIYAGI | 15.9 | 528 | 2320 | 0.09 ± 0.011 | 0.17 ± 0.021 | 0.11 ± 0.010 | 0.047 ± 0.0042 |
| Yamagata, YAMAGATA | 14.4 | 348 | 1390 | 0.06 ± 0.011 | 0.17 ± 0.030 | 0.03 ± 0.006 | 0.024 ± 0.0046 |
| Nishikawa-machi, NIIGATA | 20.3 | 480 | 2660 | 0.14 ± 0.022 | 0.30 ± 0.045 | 0.04 ± 0.009 | 0.015 ± 0.0035 |
| Toyama-ken, TOYAMA | 13.1 | 447 | 1970 | 0.06 ± 0.010 | 0.15 ± 0.022 | 0.12 ± 0.010 | 0.061 ± 0.0049 |
| Shizuoka, SHIZUOKA | 19.4 | 837 | 2550 | 0.08 ± 0.012 | 0.09 ± 0.015 | 0.09 ± 0.011 | 0.035 ± 0.0042 |
| Nagoya, AICHI | 16.9 | 507 | 2130 | 0.13 ± 0.012 | 0.25 ± 0.025 | 0.08 ± 0.008 | 0.038 ± 0.0038 |
| Tsu, MIE | 13.7 | 447 | 1310 | 0.04 ± 0.008 | 0.10 ± 0.017 | 0.03 ± 0.006 | 0.022 ± 0.0043 |
| Fukube-mura, TOTTORI | 16.1 | 463 | 2430 | 0.13 ± 0.012 | 0.27 ± 0.026 | 0.10 ± 0.009 | 0.041 ± 0.0036 |
| Matsue, SHIMANE | 22.5 | 1330 | 2620 | 0.16 ± 0.017 | 0.12 ± 0.013 | 0.09 ± 0.011 | 0.034 ± 0.0043 |
| Okayama, OKAYAMA | 18.1 | 595 | 2570 | 0.06 ± 0.012 | 0.10 ± 0.020 | 0.12 ± 0.013 | 0.047 ± 0.0049 |
| Matsuyama, EHIME | 14.1 | 606 | 1890 | 0.07 ± 0.009 | 0.11 ± 0.015 | 0.05 ± 0.007 | 0.027 ± 0.0036 |
| Kochi, KOCHI | 18.0 | 815 | 2620 | 0.09 ± 0.012 | 0.11 ± 0.014 | 0.06 ± 0.009 | 0.023 ± 0.0033 |
| Dazaifu, FUKUOKA | 16.7 | 505 | 2070 | 0.06 ± 0.011 | 0.12 ± 0.021 | 0.07 ± 0.009 | 0.033 ± 0.0044 |
| Saga, SAGA | 14.1 | 474 | 2140 | 0.07 ± 0.011 | 0.16 ± 0.024 | 0.05 ± 0.008 | 0.024 ± 0.0036 |
| Nagasaki, NAGASAKI | 14.1 | 516 | 1750 | 0.03 ± 0.009 | 0.05 ± 0.017 | 0.08 ± 0.008 | 0.045 ± 0.0048 |
| Ookuchi, KAGOSHIMA | 13.0 | 219 | 1410 | 0.09 ± 0.013 | 0.41 ± 0.060 | 0.04 ± 0.008 | 0.028 ± 0.0056 |
| December, 1989 | | | | | | | |
| Sapporo, HOKKAIDO | 21.4 | 873 | 3180 | 0.11 ± 0.014 | 0.13 ± 0.016 | 0.20 ± 0.014 | 0.064 ± 0.0045 |
| Aomori, AOMORI | 21.9 | 736 | 2480 | 0.09 ± 0.014 | 0.12 ± 0.019 | 0.11 ± 0.012 | 0.046 ± 0.0050 |

| Location | Ash | Ca | K | ^{90}Sr | | ^{137}Cs | |
|--------------------------|---------|----------|----------|------------------|--------------|-------------------|----------------|
| | (g/p·d) | (mg/p·d) | (mg/p·d) | (Bq/p·d) | (Bq/gCa) | (Bq/p·d) | (Bq/gK) |
| Akita, AKITA | 15.9 | 642 | 2110 | 0.09 ± 0.013 | 0.14 ± 0.021 | 0.13 ± 0.012 | 0.059 ± 0.0057 |
| Morioka, IWATE | 18.6 | 604 | 2170 | 0.11 ± 0.014 | 0.19 ± 0.024 | 0.05 ± 0.008 | 0.025 ± 0.0039 |
| Fukushima, FUKUSHIMA | 20.9 | 1050 | 2290 | 0.09 ± 0.013 | 0.09 ± 0.012 | 0.10 ± 0.011 | 0.045 ± 0.0048 |
| Mito, IBARAGI | 15.4 | 553 | 2040 | 0.07 ± 0.009 | 0.13 ± 0.017 | 0.07 ± 0.008 | 0.033 ± 0.0040 |
| Shinjuku, TOKYO | 10.6 | 268 | 1350 | 0.05 ± 0.007 | 0.19 ± 0.027 | 0.05 ± 0.005 | 0.034 ± 0.0040 |
| Hiratsuka, KANAGAWA | 17.9 | 613 | 2950 | 0.09 ± 0.013 | 0.15 ± 0.021 | 0.08 ± 0.010 | 0.027 ± 0.0034 |
| Tochigi-ken, TOCHIGI | 14.8 | 400 | 2310 | 0.09 ± 0.012 | 0.23 ± 0.029 | 0.06 ± 0.008 | 0.026 ± 0.0034 |
| Kanazawa, ISHIKAWA | 18.2 | 626 | 2780 | 0.11 ± 0.012 | 0.17 ± 0.019 | 0.31 ± 0.015 | 0.11 ± 0.005 |
| Koufu, YAMANASHI | 14.8 | 577 | 1910 | 0.05 ± 0.012 | 0.09 ± 0.020 | 0.07 ± 0.010 | 0.039 ± 0.0052 |
| Ootsu, SHIGA | 17.0 | 414 | 2070 | 0.06 ± 0.011 | 0.16 ± 0.026 | 0.13 ± 0.011 | 0.062 ± 0.0053 |
| Kyoto, KYOTO | 18.9 | 831 | 2540 | 0.07 ± 0.012 | 0.08 ± 0.014 | 0.17 ± 0.013 | 0.068 ± 0.0053 |
| Neyagawa, OSAKA | 17.0 | 739 | 2340 | 0.09 ± 0.012 | 0.13 ± 0.017 | 0.07 ± 0.009 | 0.031 ± 0.0038 |
| Kakogawa, HYOGO | 14.3 | 696 | 1940 | 0.07 ± 0.010 | 0.09 ± 0.015 | 0.06 ± 0.007 | 0.029 ± 0.0038 |
| Wakayama, WAKAYAMA | 9.37 | 377 | 1040 | 0.04 ± 0.006 | 0.12 ± 0.017 | 0.04 ± 0.005 | 0.038 ± 0.0048 |
| Yamaguchi, YAMAGUCHI | 15.0 | 635 | 2130 | 0.08 ± 0.011 | 0.13 ± 0.017 | 0.07 ± 0.009 | 0.033 ± 0.0041 |
| Takamatsu, KAGAWA | 15.8 | 700 | 2150 | 0.07 ± 0.011 | 0.11 ± 0.015 | 0.07 ± 0.009 | 0.033 ± 0.0040 |
| Kumamoto, KUMAMOTO | 13.3 | 471 | 2060 | 0.05 ± 0.009 | 0.10 ± 0.018 | 0.07 ± 0.008 | 0.035 ± 0.0037 |
| Miyazaki, MIYAZAKI | 17.2 | 531 | 2230 | 0.08 ± 0.011 | 0.15 ± 0.021 | 0.11 ± 0.010 | 0.050 ± 0.0047 |
| January, 1990 | | | | | | | |
| Fukui, FUKUI | 16.0 | 472 | 1570 | 0.07 ± 0.010 | 0.14 ± 0.021 | 0.04 ± 0.007 | 0.025 ± 0.0043 |
| Nagano, NAGANO | 17.2 | 775 | 2500 | 0.11 ± 0.013 | 0.14 ± 0.017 | 0.08 ± 0.009 | 0.031 ± 0.0036 |
| Hiroshima-ken, HIROSHIMA | 15.9 | 480 | 2040 | 0.06 ± 0.010 | 0.12 ± 0.020 | 0.06 ± 0.008 | 0.031 ± 0.0039 |
| Ooita, OOITA | 16.4 | 598 | 2350 | 0.05 ± 0.010 | 0.09 ± 0.017 | 0.06 ± 0.008 | 0.025 ± 0.0035 |
| Naha, OKINAWA | 12.6 | 381 | 1720 | 0.06 ± 0.009 | 0.15 ± 0.023 | 0.03 ± 0.005 | 0.016 ± 0.0029 |
| February, 1990 | | | | | | | |
| Tokushima, TOKUSHIMA | 20.3 | 696 | 2660 | 0.10 ± 0.015 | 0.15 ± 0.021 | 0.10 ± 0.011 | 0.036 ± 0.0042 |
| March, 1990 | | | | | | | |
| Nara, NARA | 13.5 | 565 | 1820 | 0.05 ± 0.009 | 0.10 ± 0.016 | 0.08 ± 0.008 | 0.045 ± 0.0046 |
| June, 1990 | | | | | | | |
| Sapporo, HOKKAIDO | 17.5 | 514 | 2710 | 0.12 ± 0.013 | 0.24 ± 0.025 | 0.12 ± 0.011 | 0.043 ± 0.0040 |
| Iwanai-machi, HOKKAIDO | 14.7 | 429 | 1950 | 0.09 ± 0.010 | 0.20 ± 0.023 | 0.07 ± 0.008 | 0.037 ± 0.0041 |
| Morioka, IWATE | 15.3 | 484 | 1960 | 0.09 ± 0.011 | 0.19 ± 0.024 | 0.10 ± 0.010 | 0.050 ± 0.0049 |
| Iwaizumi-machi, IWATE | 17.3 | 919 | 2430 | 0.14 ± 0.014 | 0.15 ± 0.015 | 0.13 ± 0.011 | 0.055 ± 0.0046 |
| Yamagata, YAMAGATA | 14.1 | 406 | 1300 | 0.05 ± 0.009 | 0.12 ± 0.022 | 0.10 ± 0.009 | 0.076 ± 0.0069 |
| Yamagata-ken, YAMAGATA | 14.0 | 554 | 1730 | 0.07 ± 0.010 | 0.13 ± 0.017 | 0.09 ± 0.009 | 0.054 ± 0.0050 |
| Toyama, TOYAMA | 13.1 | 503 | 1810 | 0.04 ± 0.008 | 0.09 ± 0.016 | 0.09 ± 0.008 | 0.049 ± 0.0043 |
| Toyama-ken, TOYAMA | 17.5 | 827 | 1870 | 0.08 ± 0.011 | 0.09 ± 0.014 | 0.08 ± 0.009 | 0.043 ± 0.0050 |
| Kanazawa, ISHIKAWA | 15.6 | 555 | 1500 | 0.04 ± 0.009 | 0.07 ± 0.017 | 0.06 ± 0.008 | 0.037 ± 0.0050 |

| Location | Ash | Ca | K | ⁸⁷ Sr | | ¹³⁷ Cs | |
|----------------------------|---------|----------|----------|------------------|--------------|-------------------|----------------|
| | (g/p·d) | (mg/p·d) | (mg/p·d) | (Bq/p·d) | (Bq/gCa) | (Bq/p·d) | (Bq/gK) |
| Yoshinodani-mura, ISHIKAWA | 13.7 | 388 | 1600 | 0.06 ± 0.009 | 0.16 ± 0.024 | 0.05 ± 0.007 | 0.032 ± 0.0042 |
| Fukui, FUKUI | 13.6 | 526 | 1710 | 0.05 ± 0.009 | 0.09 ± 0.017 | 0.04 ± 0.006 | 0.024 ± 0.0036 |
| Shizuoka, SHIZUOKA | 14.3 | 498 | 2160 | 0.06 ± 0.010 | 0.13 ± 0.020 | 0.07 ± 0.008 | 0.034 ± 0.0037 |
| Kyoto, KYOTO | 16.9 | 754 | 2350 | 0.07 ± 0.011 | 0.09 ± 0.015 | 0.03 ± 0.007 | 0.015 ± 0.0030 |
| Maizuru, KYOTO | 13.7 | 471 | 1760 | 0.05 ± 0.009 | 0.11 ± 0.019 | 0.03 ± 0.005 | 0.015 ± 0.0031 |
| Neyagawa, OSAKA | 13.7 | 599 | 1990 | 0.08 ± 0.010 | 0.14 ± 0.017 | 0.06 ± 0.007 | 0.030 ± 0.0036 |
| Kakogawa, HYOGO | 13.7 | 655 | 1890 | 0.06 ± 0.009 | 0.09 ± 0.014 | 0.03 ± 0.006 | 0.018 ± 0.0032 |
| Hamasaka-machi, HYOGO | 13.0 | 866 | 1630 | 0.05 ± 0.009 | 0.06 ± 0.010 | 0.04 ± 0.006 | 0.023 ± 0.0038 |
| July, 1990 | | | | | | | |
| Turuga, FUKUI | 11.5 | 445 | 1290 | 0.04 ± 0.008 | 0.10 ± 0.017 | 0.03 ± 0.005 | 0.027 ± 0.0040 |

(2)-1 Strontium-90 and Cesium-137 in Milk(producing districts for domestic program)
(from Feb. 1990 to Jun. 1990)

-continued from NO. 91 of this publication-

Table (2)-1: Strontium-90 and Cesium-137 in Milk

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|----------------------------|-----------|---------|--------|------------------|--------------|-------------------|---------------|
| | Ash(g/ℓ) | Ca(g/ℓ) | K(g/ℓ) | Bq/ℓ | Bq/gCa | Bq/ℓ | Bq/gK |
| February, 1990 | | | | | | | |
| Aomori, AOMORI | 7.86 | 1.21 | 1.86 | 0.07 ± 0.009 | 0.06 ± 0.008 | 0.07 ± 0.008 | 0.04 ± 0.004 |
| Takisawa-mura, IWATE | 7.32 | 1.05 | 1.74 | 0.04 ± 0.010 | 0.04 ± 0.009 | 0.11 ± 0.009 | 0.06 ± 0.005 |
| Mito, IBARAGI | 7.63 | 1.24 | 1.77 | 0.05 ± 0.008 | 0.04 ± 0.007 | 0.03 ± 0.006 | 0.02 ± 0.003 |
| Nishinasuno-machi, TOCHIGI | 7.68 | 1.33 | 1.84 | 0.04 ± 0.008 | 0.03 ± 0.006 | 0.02 ± 0.006 | 0.01 ± 0.003 |
| Tonami, TOYAMA | 7.36 | 1.13 | 1.57 | 0.02 ± 0.008 | 0.02 ± 0.007 | 0.08 ± 0.008 | 0.05 ± 0.005 |
| Oshimizu-machi, ISHIKAWA | 6.93 | 1.10 | 1.78 | 0.05 ± 0.008 | 0.04 ± 0.007 | 0.39 ± 0.016 | 0.22 ± 0.009 |
| Oouchiyama-mura, MIE | 7.35 | 1.14 | 1.71 | 0.03 ± 0.008 | 0.03 ± 0.007 | 0.01 ± 0.004 | 0.007 ± 0.003 |
| Hino-machi, SHIGA | 7.19 | 1.11 | 1.65 | 0.03 ± 0.007 | 0.02 ± 0.007 | 0.01 ± 0.004 | 0.007 ± 0.003 |
| Mihara-machi, HYOGO | 7.25 | 1.14 | 1.71 | 0.04 ± 0.008 | 0.04 ± 0.007 | 0.02 ± 0.005 | 0.009 ± 0.003 |
| Oouda-machi, NARA | 7.11 | 1.12 | 1.47 | 0.03 ± 0.007 | 0.03 ± 0.007 | 0.01 ± 0.004 | 0.009 ± 0.003 |
| Matsuyama, EHIME | 7.14 | 1.15 | 1.57 | 0.03 ± 0.009 | 0.02 ± 0.008 | 0.009 ± 0.004 | 0.006 ± 0.003 |
| Kamiita-machi, TOKUSHIMA | 7.36 | 1.15 | 1.65 | 0.02 ± 0.006 | 0.02 ± 0.005 | 0.02 ± 0.005 | 0.01 ± 0.003 |
| Takasa-machi, KAGAWA | 7.31 | 1.11 | 1.66 | 0.03 ± 0.007 | 0.03 ± 0.006 | 0.01 ± 0.005 | 0.009 ± 0.003 |
| Koushi-machi, KUMAMOTO | 7.11 | 1.13 | 1.58 | 0.03 ± 0.006 | 0.02 ± 0.006 | 0.006 ± 0.004 | 0.004 ± 0.002 |
| Takahara-machi, MIYAZAKI | 6.66 | 1.03 | 1.64 | 0.02 ± 0.006 | 0.02 ± 0.006 | 0.15 ± 0.010 | 0.09 ± 0.006 |
| March, 1990 | | | | | | | |
| Takane-machi, YAMANASHI | 7.45 | 1.19 | 1.62 | 0.03 ± 0.009 | 0.02 ± 0.007 | 0.009 ± 0.004 | 0.006 ± 0.003 |
| Kujuu-machi, OOITA | 7.26 | 1.14 | 1.63 | 0.03 ± 0.006 | 0.02 ± 0.005 | 0.15 ± 0.010 | 0.09 ± 0.006 |
| June, 1990 | | | | | | | |
| Yamato-machi, SAGA | 7.10 | 1.06 | 1.60 | 0.03 ± 0.008 | 0.03 ± 0.008 | 0.006 ± 0.004 | 0.004 ± 0.003 |

(2)-2 Strontium-90 and Cesium-137 in Milk(producing districts for WHO program)
(from May 1989 to May 1990)

-continued from NO. 91 of this publication-

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

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|---------------------------|-----------|---------|--------|------------------|--------------|-------------------|---------------|
| | Ash(g/ℓ) | Ca(g/ℓ) | K(g/ℓ) | Bq/ℓ | Bq/gCa | Bq/ℓ | Bq/gK |
| May, 1989 | | | | | | | |
| Nishikawa-machi, NIIGATA | 7.60 | 1.12 | 1.74 | 0.02 ± 0.006 | 0.02 ± 0.005 | 0.04 ± 0.006 | 0.02 ± 0.003 |
| August, 1989 | | | | | | | |
| Nishikawa-machi, NIIGATA | 7.68 | 1.17 | 1.78 | 0.02 ± 0.007 | 0.02 ± 0.006 | 0.05 ± 0.007 | 0.03 ± 0.004 |
| November, 1989 | | | | | | | |
| Nishikawa-machi, NIIGATA | 7.57 | 1.17 | 1.74 | 0.02 ± 0.009 | 0.02 ± 0.007 | 0.05 ± 0.007 | 0.03 ± 0.004 |
| December, 1989 | | | | | | | |
| Hachijo-Island, TOKYO | 6.78 | 0.936 | 1.29 | 0.09 ± 0.010 | 0.09 ± 0.011 | 1.0 ± 0.03 | 0.79 ± 0.020 |
| Hikawa-machi, SHIMANE | 7.80 | 1.11 | 1.83 | 0.02 ± 0.008 | 0.02 ± 0.007 | 0.02 ± 0.005 | 0.01 ± 0.003 |
| January, 1990 | | | | | | | |
| Takamiya-machi, HIROSHIMA | 7.13 | 1.08 | 1.61 | 0.02 ± 0.008 | 0.02 ± 0.007 | 0.02 ± 0.005 | 0.01 ± 0.003 |
| February, 1990 | | | | | | | |
| Hokudainoujou, HOKKAIDO | 7.62 | 1.23 | 1.92 | 0.05 ± 0.008 | 0.04 ± 0.007 | 0.09 ± 0.009 | 0.05 ± 0.005 |
| Hachijo-Island, TOKYO | 7.26 | 1.06 | 1.36 | 0.08 ± 0.009 | 0.07 ± 0.008 | 0.36 ± 0.016 | 0.27 ± 0.011 |
| Nishikawa-machi, NIIGATA | 7.43 | 1.06 | 1.78 | 0.03 ± 0.010 | 0.02 ± 0.009 | 0.05 ± 0.007 | 0.03 ± 0.004 |
| Katsuyama, FUKUI | 7.52 | 1.24 | 1.70 | 0.03 ± 0.008 | 0.03 ± 0.006 | 0.06 ± 0.007 | 0.04 ± 0.004 |
| Hikawa-machi, SHIMANE | 7.95 | 1.42 | 1.62 | 0.03 ± 0.010 | 0.02 ± 0.007 | 0.02 ± 0.006 | 0.01 ± 0.003 |
| Kochi, KOCHI | 7.36 | 1.15 | 1.74 | 0.06 ± 0.009 | 0.05 ± 0.008 | 0.005 ± 0.004 | 0.003 ± 0.002 |
| Fukuma-machi, FUKUOKA | 7.46 | 1.15 | 1.60 | 0.03 ± 0.008 | 0.02 ± 0.007 | 0.07 ± 0.008 | 0.04 ± 0.005 |
| Kajiki-machi, KAGOSHIMA | 7.44 | 1.14 | 1.67 | 0.03 ± 0.008 | 0.02 ± 0.007 | 0.02 ± 0.006 | 0.01 ± 0.003 |
| May, 1990 | | | | | | | |
| Hokudainoujou, HOKKAIDO | 7.43 | 1.25 | 1.64 | 0.08 ± 0.010 | 0.06 ± 0.008 | 0.36 ± 0.015 | 0.22 ± 0.009 |
| Hachijo-Island, TOKYO | 6.80 | 0.991 | 1.44 | 0.10 ± 0.011 | 0.10 ± 0.011 | 0.29 ± 0.013 | 0.20 ± 0.009 |
| Katsuyama, FUKUI | 7.25 | 1.12 | 1.62 | 0.04 ± 0.009 | 0.03 ± 0.008 | 0.13 ± 0.010 | 0.08 ± 0.006 |
| Nose-machi, OSAKA | 7.41 | 1.12 | 1.70 | 0.02 ± 0.008 | 0.01 ± 0.008 | 0.02 ± 0.006 | 0.01 ± 0.003 |
| Kochi, KOCHI | 7.19 | 1.14 | 1.61 | 0.07 ± 0.010 | 0.06 ± 0.009 | 0.02 ± 0.005 | 0.02 ± 0.003 |

(2)-3 Strontium-90 and Cesium-137 in Milk(consuming districts)
(from Aug. 1989 to May 1990)

-continued from NO. 91 of this publication-

Table (2)-3: Strontium-90 and Cesium-137 in Milk

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|----------------------|-----------|---------|--------|------------------|--------------|-------------------|--------------|
| | Ash(g/ℓ) | Ca(g/ℓ) | K(g/ℓ) | Bq/ℓ | Bq/gCa | Bq/ℓ | Bq/gK |
| August, 1989 | | | | | | | |
| Niigata, NIIGATA | 7.76 | 1.17 | 1.81 | 0.05 ± 0.010 | 0.04 ± 0.009 | 0.07 ± 0.008 | 0.04 ± 0.004 |
| January, 1990 | | | | | | | |
| Hiroshima, HIROSHIMA | 7.22 | 1.15 | 1.70 | 0.03 ± 0.007 | 0.03 ± 0.006 | 0.03 ± 0.005 | 0.02 ± 0.003 |
| Nagasaki, NAGASAKI | 6.51 | 0.976 | 1.47 | 0.03 ± 0.007 | 0.03 ± 0.007 | 0.04 ± 0.006 | 0.03 ± 0.004 |
| February, 1990 | | | | | | | |
| Sapporo, HOKKAIDO | 7.32 | 1.16 | 1.70 | 0.06 ± 0.008 | 0.05 ± 0.007 | 0.14 ± 0.010 | 0.08 ± 0.006 |
| Yamagata, YAMAGATA | 7.41 | 1.18 | 1.86 | 0.04 ± 0.008 | 0.03 ± 0.006 | 0.03 ± 0.006 | 0.01 ± 0.003 |
| Fukushima, FUKUSHIMA | 7.48 | 1.17 | 1.75 | 0.03 ± 0.007 | 0.03 ± 0.006 | 0.04 ± 0.006 | 0.03 ± 0.004 |
| Shinjuku, TOKYO | 7.11 | 1.04 | 1.50 | 0.03 ± 0.007 | 0.03 ± 0.007 | 0.03 ± 0.005 | 0.02 ± 0.003 |
| Niigata, NIIGATA | 7.67 | 1.13 | 1.72 | 0.03 ± 0.009 | 0.03 ± 0.008 | 0.04 ± 0.006 | 0.02 ± 0.004 |
| Nagano, NAGANO | 7.02 | 1.06 | 1.57 | 0.02 ± 0.008 | 0.02 ± 0.008 | 0.03 ± 0.006 | 0.02 ± 0.004 |
| Shizuoka, SHIZUOKA | 7.19 | 1.12 | 1.71 | 0.02 ± 0.007 | 0.02 ± 0.006 | 0.03 ± 0.006 | 0.02 ± 0.003 |
| Nagoya, AICHI | 7.45 | 1.09 | 1.50 | 0.03 ± 0.007 | 0.03 ± 0.006 | 0.01 ± 0.005 | 0.01 ± 0.003 |
| Yonago, TOTTORI | 7.51 | 1.11 | 1.83 | 0.04 ± 0.009 | 0.04 ± 0.008 | 0.06 ± 0.007 | 0.03 ± 0.004 |
| Matsue, SHIMANE | 7.44 | 1.14 | 1.62 | 0.02 ± 0.009 | 0.02 ± 0.008 | 0.03 ± 0.006 | 0.02 ± 0.004 |
| Okayama, OKAYAMA | 7.31 | 1.11 | 1.58 | 0.04 ± 0.008 | 0.04 ± 0.008 | 0.05 ± 0.007 | 0.03 ± 0.004 |
| Yamaguchi, YAMAGUCHI | 7.11 | 1.06 | 1.64 | 0.04 ± 0.008 | 0.04 ± 0.007 | 0.04 ± 0.006 | 0.02 ± 0.004 |
| Matsuyama, EHIME | 7.21 | 1.09 | 1.57 | 0.03 ± 0.009 | 0.03 ± 0.008 | 0.02 ± 0.005 | 0.01 ± 0.003 |
| Kochi, KOCHI | 7.14 | 1.12 | 1.68 | 0.03 ± 0.007 | 0.02 ± 0.006 | 0.03 ± 0.005 | 0.02 ± 0.003 |
| Chikushino, FUKUOKA | 7.56 | 1.15 | 1.71 | 0.03 ± 0.008 | 0.03 ± 0.007 | 0.04 ± 0.007 | 0.02 ± 0.004 |
| Kagoshima, KAGOSHIMA | 7.25 | 1.08 | 1.65 | 0.03 ± 0.008 | 0.03 ± 0.007 | 0.03 ± 0.005 | 0.02 ± 0.003 |
| March, 1990 | | | | | | | |
| Yokohama, KANAGAWA | 7.46 | 1.10 | 1.65 | 0.01 ± 0.007 | 0.01 ± 0.006 | 0.05 ± 0.007 | 0.03 ± 0.004 |
| Fukui, FUKUI | 7.42 | 1.14 | 1.71 | 0.08 ± 0.010 | 0.07 ± 0.008 | 0.09 ± 0.008 | 0.05 ± 0.005 |
| Shinguu, WAKAYAMA | 6.54 | 1.02 | 1.38 | 0.03 ± 0.007 | 0.02 ± 0.007 | 0.02 ± 0.005 | 0.01 ± 0.004 |
| May, 1990 | | | | | | | |
| Sendai, MIYAGI | 7.15 | 1.10 | 1.68 | 0.03 ± 0.008 | 0.03 ± 0.007 | 0.02 ± 0.005 | 0.01 ± 0.003 |
| Kyoto, KYOTO | 7.24 | 1.12 | 1.62 | 0.02 ± 0.007 | 0.02 ± 0.007 | 0.04 ± 0.006 | 0.02 ± 0.004 |

(2)-4 Strontium-90 and Cesium-137 in Milk(powderd milk)

-continued from NO. 91 of this publication-

Table (2)-4: Strontium-90 and Cesium-137 in Milk

| Market Milk | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|----------------|-----------|----------|---------|------------------|----------------|-------------------|----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwet | Bq/gCa | Bq/Kgwet | Bq/gK |
| December, 1989 | | | | | | | |
| Sample A | 8.10 | 12.6 | 18.2 | 0.19 ± 0.017 | 0.015 ± 0.0013 | 0.82 ± 0.026 | 0.045 ± 0.0014 |
| Sample B | 2.46 | 3.32 | 6.72 | 0.10 ± 0.013 | 0.029 ± 0.0038 | 0.55 ± 0.020 | 0.082 ± 0.0030 |
| Sample C | 8.05 | 12.4 | 18.8 | 0.81 ± 0.030 | 0.066 ± 0.0024 | 4.4 ± 0.06 | 0.23 ± 0.003 |
| Sample D | 2.48 | 3.97 | 5.43 | 0.10 ± 0.013 | 0.026 ± 0.0033 | 0.51 ± 0.020 | 0.094 ± 0.0037 |
| Sample E | 2.52 | 4.01 | 5.57 | 0.09 ± 0.014 | 0.022 ± 0.0034 | 0.38 ± 0.017 | 0.068 ± 0.0031 |
| Sample F | 2.52 | 3.81 | 5.72 | 0.07 ± 0.011 | 0.017 ± 0.0030 | 0.54 ± 0.020 | 0.094 ± 0.0035 |

*Skim milk

(3)-1 Strontium-90 and Cesium-137 in Vegetables(producing districts)
(from Jul. 1989 to Mar. 1990)

(12)

-continued from NO. 91 of this publication-

Table (3)-1: Strontium-90 and Cesium-137 in Vegetables

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|-------------------------|-----------|----------|---------|------------------|--------------|-------------------|-----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwet | Bq/gCa | Bq/Kgwet | Bq/gK |
| (Japanese radish) | | | | | | | |
| July, 1989 | | | | | | | |
| Oota, SHIMANE | 0.676 | 0.194 | 3.17 | 0.55 ± 0.026 | 2.9 ± 0.14 | 0.09 ± 0.011 | 0.028 ± 0.0033 |
| October, 1989 | | | | | | | |
| Fukui, FUKUI | 0.518 | 0.173 | 2.10 | 0.04 ± 0.010 | 0.23 ± 0.059 | 0.001 ± 0.006 | 0.0005 ± 0.0030 |
| Koushi-machi, KUMAMOTO | 0.583 | 0.226 | 1.63 | 0.07 ± 0.016 | 0.32 ± 0.072 | 0.007 ± 0.007 | 0.005 ± 0.0042 |
| November, 1989 | | | | | | | |
| Sannohe-machi, AOMORI | 0.550 | 0.217 | 2.13 | 0.10 ± 0.013 | 0.44 ± 0.061 | 0.02 ± 0.007 | 0.010 ± 0.0034 |
| Gotenba, SHIZUOKA | 0.438 | 0.204 | 1.75 | 0.12 ± 0.015 | 0.59 ± 0.072 | 0.21 ± 0.013 | 0.12 ± 0.008 |
| Shime-machi, FUKUOKA | 0.563 | 0.263 | 2.38 | 0.04 ± 0.011 | 0.14 ± 0.044 | 0.008 ± 0.008 | 0.003 ± 0.0033 |
| Usa, OOITA | 0.805 | 0.222 | 3.86 | 0.08 ± 0.013 | 0.35 ± 0.060 | 0.005 ± 0.007 | 0.001 ± 0.0019 |
| Kaimon-machi, KAGOSHIMA | 0.782 | 0.275 | 3.58 | 0.18 ± 0.017 | 0.66 ± 0.060 | 0.03 ± 0.009 | 0.009 ± 0.0024 |
| December, 1989 | | | | | | | |
| Azuchi-machi, SHIGA | 0.473 | 0.181 | 1.90 | 0.05 ± 0.011 | 0.27 ± 0.059 | 0.00 ± 0.005 | 0.000 ± 0.0027 |
| Ishii-machi, TOKUSHIMA | 0.638 | 0.260 | 2.63 | 0.04 ± 0.017 | 0.14 ± 0.066 | 0.003 ± 0.008 | 0.001 ± 0.0030 |
| January, 1990 | | | | | | | |
| Yuya-machi, YAMAGUCHI | 0.525 | 0.201 | 2.01 | 0.03 ± 0.013 | 0.12 ± 0.063 | 0.001 ± 0.006 | 0.0007 ± 0.0029 |
| Kubokawa-machi, KOCHI | 0.660 | 0.257 | 2.87 | 0.34 ± 0.027 | 1.3 ± 0.11 | 0.00 ± 0.007 | 0.000 ± 0.0026 |
| February, 1990 | | | | | | | |
| Kashihara, NARA | 0.667 | 0.211 | 2.62 | 0.07 ± 0.015 | 0.34 ± 0.072 | 0.00 ± 0.008 | 0.000 ± 0.0029 |
| Hiroshima, HIROSHIMA | 0.453 | 0.165 | 1.80 | 0.02 ± 0.012 | 0.13 ± 0.072 | 0.01 ± 0.008 | 0.006 ± 0.0047 |
| March, 1990 | | | | | | | |
| Shinguu, WAKAYAMA | 0.463 | 0.199 | 1.88 | 0.05 ± 0.014 | 0.25 ± 0.070 | 0.00 ± 0.006 | 0.000 ± 0.0030 |
| (Cabbage) | | | | | | | |
| November, 1989 | | | | | | | |
| Sannohe-machi, AOMORI | 0.673 | 0.409 | 2.77 | 0.27 ± 0.018 | 0.66 ± 0.045 | 0.15 ± 0.011 | 0.054 ± 0.0041 |
| January, 1990 | | | | | | | |
| Kumatori-machi, OSAKA | 0.555 | 0.398 | 2.06 | 0.07 ± 0.014 | 0.19 ± 0.035 | 0.02 ± 0.007 | 0.009 ± 0.0035 |
| (Spinach) | | | | | | | |
| July, 1989 | | | | | | | |
| Oota, SHIMANE | 2.00 | 0.849 | 7.64 | 0.35 ± 0.023 | 0.42 ± 0.027 | 0.17 ± 0.014 | 0.023 ± 0.0018 |

| Location | Component | | | ⁸⁷ Sr | | ¹³⁷ Cs | |
|--------------------------|-----------|----------|---------|------------------|--------------|-------------------|-----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwt | Bq/gCa | Bq/Kgwt | Bq/gK |
| October, 1989 | | | | | | | |
| Fukui, FUKUI | 1.97 | 0.457 | 9.17 | 0.06 ± 0.013 | 0.14 ± 0.027 | 0.02 ± 0.008 | 0.002 ± 0.0009 |
| Koushi-machi, KUMAMOTO | 1.79 | 0.554 | 6.94 | 0.06 ± 0.013 | 0.11 ± 0.024 | 0.01 ± 0.006 | 0.002 ± 0.0009 |
| November, 1989 | | | | | | | |
| Gotenba, SHIZUOKA | 1.24 | 0.435 | 5.21 | 0.03 ± 0.011 | 0.06 ± 0.024 | 0.07 ± 0.010 | 0.014 ± 0.0020 |
| Kusu-chou, MIE | 1.59 | 0.867 | 6.86 | 0.11 ± 0.013 | 0.12 ± 0.015 | 0.03 ± 0.007 | 0.004 ± 0.0010 |
| Matsuyama, EHIME | 2.13 | 0.717 | 8.88 | 0.05 ± 0.013 | 0.07 ± 0.018 | 0.003 ± 0.006 | 0.0003 ± 0.0007 |
| Shime-machi, FUKUOKA | 1.47 | 0.704 | 6.20 | 0.06 ± 0.012 | 0.08 ± 0.018 | 0.009 ± 0.008 | 0.001 ± 0.0013 |
| Kaimon-machi, KAGOSHIMA | 1.60 | 1.16 | 4.79 | 0.34 ± 0.022 | 0.29 ± 0.019 | 1.2 ± 0.03 | 0.25 ± 0.007 |
| December, 1989 | | | | | | | |
| Azuchi-machi, SHIGA | 1.64 | 0.528 | 6.72 | 0.07 ± 0.017 | 0.13 ± 0.032 | 0.01 ± 0.010 | 0.001 ± 0.0015 |
| Takanabe-machi, MIYAZAKI | 2.17 | 0.859 | 8.99 | 0.42 ± 0.024 | 0.49 ± 0.028 | 0.15 ± 0.013 | 0.016 ± 0.0015 |
| January, 1990 | | | | | | | |
| Takane-machi, YAMANASHI | 2.51 | 1.10 | 8.64 | 0.29 ± 0.021 | 0.26 ± 0.019 | 0.01 ± 0.008 | 0.001 ± 0.0009 |
| Kubokawa-machi, KOCHI | 1.56 | 0.546 | 6.33 | 0.41 ± 0.028 | 0.75 ± 0.051 | 0.01 ± 0.007 | 0.002 ± 0.0012 |
| Ishii-machi, TOKUSHIMA | 1.99 | 0.694 | 7.55 | 0.03 ± 0.013 | 0.04 ± 0.019 | 0.00 ± 0.006 | 0.000 ± 0.0008 |
| (Chinese cabbage) | | | | | | | |
| March, 1990 | | | | | | | |
| Shinguu, WAKAYAMA | 0.544 | 0.219 | 1.64 | 0.10 ± 0.017 | 0.44 ± 0.077 | 0.008 ± 0.007 | 0.005 ± 0.0040 |

(3)-2 Strontium-90 and Cesium-137 in Vegetables (consuming districts)
(from Jun. 1989 to Mar. 1990)

-continued from NO. 91 of this publication-

Table (3)-2: Strontium-90 and Cesium-137 in Vegetables

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|--------------------------|-----------|----------|---------|------------------|---------------|-------------------|-----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kg wet | Bq/gCa | Bq/Kg wet | Bq/gK |
| (Japanese radish) | | | | | | | |
| October, 1989 | | | | | | | |
| Kyoto, KYOTO | 0.461 | 0.193 | 1.90 | 0.007 ± 0.009 | 0.036 ± 0.045 | 0.02 ± 0.007 | 0.009 ± 0.0039 |
| November, 1989 | | | | | | | |
| Shinjuku, TOKYO | 0.733 | 0.244 | 3.21 | 0.21 ± 0.015 | 0.87 ± 0.061 | 0.00 ± 0.004 | 0.000 ± 0.0013 |
| Niigata, NIIGATA | 0.381 | 0.161 | 1.50 | 0.09 ± 0.013 | 0.53 ± 0.081 | 0.01 ± 0.005 | 0.010 ± 0.0035 |
| Okayama, OKAYAMA | 0.403 | 0.241 | 1.78 | 0.17 ± 0.016 | 0.71 ± 0.066 | 0.04 ± 0.008 | 0.023 ± 0.0046 |
| Saga, SAGA | 0.584 | 0.187 | 2.87 | 0.03 ± 0.009 | 0.15 ± 0.050 | 0.005 ± 0.006 | 0.002 ± 0.0022 |
| December, 1989 | | | | | | | |
| Yonagusuku-mura, OKINAWA | 0.898 | 0.424 | 3.00 | 0.20 ± 0.016 | 0.48 ± 0.037 | 0.004 ± 0.005 | 0.001 ± 0.0018 |
| January, 1990 | | | | | | | |
| Nagasaki, NAGASAKI | 0.416 | 0.195 | 1.63 | 0.04 ± 0.013 | 0.22 ± 0.067 | 0.00 ± 0.008 | 0.000 ± 0.0050 |
| March, 1990 | | | | | | | |
| Yokohama, KANAGAWA | 0.442 | 0.196 | 1.47 | 0.005 ± 0.007 | 0.027 ± 0.035 | 0.007 ± 0.006 | 0.004 ± 0.0041 |
| (Spinach) | | | | | | | |
| June, 1989 | | | | | | | |
| Niigata, NIIGATA | 2.14 | 0.766 | 9.22 | 0.34 ± 0.023 | 0.45 ± 0.031 | 0.008 ± 0.006 | 0.0008 ± 0.0007 |
| November, 1989 | | | | | | | |
| Kyoto, KYOTO | 1.48 | 0.876 | 4.93 | 0.09 ± 0.013 | 0.10 ± 0.015 | 0.05 ± 0.009 | 0.009 ± 0.0019 |
| Okayama, OKAYAMA | 1.35 | 0.411 | 5.87 | 0.02 ± 0.011 | 0.05 ± 0.026 | 0.02 ± 0.008 | 0.003 ± 0.0014 |
| Matsuyama, EHIME | 1.46 | 0.710 | 5.15 | 0.04 ± 0.013 | 0.05 ± 0.018 | 0.008 ± 0.007 | 0.001 ± 0.0013 |
| January, 1990 | | | | | | | |
| Nagasaki, NAGASAKI | 1.22 | 0.322 | 4.75 | 0.02 ± 0.010 | 0.07 ± 0.031 | 0.01 ± 0.008 | 0.003 ± 0.0017 |
| March, 1990 | | | | | | | |
| Yokohama, KANAGAWA | 0.905 | 0.311 | 2.86 | 0.005 ± 0.008 | 0.02 ± 0.025 | 0.00 ± 0.005 | 0.000 ± 0.0018 |

(4) Strontium-90 and Cesium-137 in Sea Fish
(from Jun. 1989 to Dec. 1989)

-continued from NO. 91 of this publication-

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

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|---|-----------|----------|---------|------------------|----------------|-------------------|----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwet | Bq/gCa | Bq/Kgwet | Bq/gK |
| (Hexagrammos otakii) August, 1989 Souma, FUKUSHIMA | 1.85 | 2.53 | 4.02 | 0.00 ± 0.008 | 0.000 ± 0.0030 | 0.18 ± 0.012 | 0.045 ± 0.0030 |
| (Trachurus japonicus) November, 1989 Shizuoka, SHIZUOKA | 3.17 | 7.78 | 1.87 | 0.00 ± 0.008 | 0.000 ± 0.0011 | 0.13 ± 0.012 | 0.069 ± 0.0066 |
| (Branchiostegus sp.) November, 1989 Nagasaki, NAGASAKI | 1.35 | 0.736 | 3.93 | 0.00 ± 0.020 | 0.00 ± 0.027 | 0.25 ± 0.026 | 0.063 ± 0.0066 |
| (Sardinops melanosticta) August, 1989 Yamagata, YAMAGATA | 2.60 | 6.12 | 2.52 | 0.00 ± 0.008 | 0.000 ± 0.0014 | 0.10 ± 0.010 | 0.039 ± 0.0039 |
| (Limanda herzensteini) June, 1989 Sendai, MIYAGI | 3.00 | 6.89 | 2.72 | 0.02 ± 0.010 | 0.002 ± 0.0015 | 0.10 ± 0.010 | 0.035 ± 0.0036 |
| November, 1989 Mutsu, AOMORI | 1.39 | 0.666 | 3.95 | 0.007 ± 0.009 | 0.010 ± 0.014 | 0.14 ± 0.012 | 0.035 ± 0.0031 |
| Mikuni-machi, FUKUI | 1.46 | 1.80 | 3.05 | 0.01 ± 0.010 | 0.008 ± 0.0055 | 0.15 ± 0.013 | 0.048 ± 0.0041 |
| (Sillago sihama) June, 1989 Minamichita-machi, AICHI | 3.54 | 8.20 | 3.86 | 0.00 ± 0.008 | 0.000 ± 0.0009 | 0.10 ± 0.010 | 0.026 ± 0.0025 |
| (Spratelloides gracilis) December, 1989 Akune, KAGOSHIMA | 3.10 | 5.78 | 3.23 | 0.007 ± 0.010 | 0.001 ± 0.0017 | 0.17 ± 0.014 | 0.054 ± 0.0042 |
| (Oncorhynchus keta) October, 1989 Urakawa-machi, HOKKAIDO | 1.39 | 0.591 | 3.88 | 0.01 ± 0.010 | 0.024 ± 0.017 | 0.15 ± 0.013 | 0.039 ± 0.0033 |
| (Scomber japonicus) August, 1989 Matsuyama, EHIME | 1.40 | 0.390 | 4.51 | 0.009 ± 0.010 | 0.023 ± 0.025 | 0.23 ± 0.013 | 0.050 ± 0.0029 |

| Location | Component | | | ⁸⁷ Sr | | ¹³⁷ Cs | |
|--------------------------|-----------|----------|---------|------------------|----------------|-------------------|----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwet | Bq/gCa | Bq/Kgwet | Bq/gK |
| November, 1989 | | | | | | | |
| Kyoto, KYOTO | 1.06 | 0.245 | 3.12 | 0.02 ± 0.011 | 0.099 ± 0.046 | 0.19 ± 0.014 | 0.060 ± 0.0045 |
| Osaka, OSAKA | 1.04 | 0.133 | 2.81 | 0.00 ± 0.007 | 0.00 ± 0.053 | 0.16 ± 0.011 | 0.058 ± 0.0040 |
| December, 1989 | | | | | | | |
| Sakaiminato, TOTTORI | 1.48 | 1.29 | 3.26 | 0.003 ± 0.009 | 0.002 ± 0.0071 | 0.20 ± 0.014 | 0.063 ± 0.0042 |
| (Chrysophrys major) | | | | | | | |
| July, 1989 | | | | | | | |
| Fukuoka, FUKUOKA | 1.35 | 0.182 | 4.29 | 0.00 ± 0.007 | 0.00 ± 0.039 | 0.24 ± 0.013 | 0.056 ± 0.0031 |
| (Seriola quinqueradiata) | | | | | | | |
| October, 1989 | | | | | | | |
| Togi-machi, ISHIKAWA | 1.46 | 1.06 | 3.98 | 0.006 ± 0.009 | 0.006 ± 0.0083 | 0.25 ± 0.014 | 0.062 ± 0.0035 |
| (Mugil cephalus) | | | | | | | |
| August, 1989 | | | | | | | |
| Morodomi-machi, SAGA | 1.21 | 0.736 | 3.58 | 0.00 ± 0.008 | 0.00 ± 0.011 | 0.12 ± 0.009 | 0.032 ± 0.0027 |
| November, 1989 | | | | | | | |
| Ushimado-machi, OKAYAMA | 1.21 | 0.439 | 3.79 | 0.004 ± 0.008 | 0.010 ± 0.019 | 0.14 ± 0.011 | 0.037 ± 0.0030 |
| (Decapterus muroadsi) | | | | | | | |
| October, 1989 | | | | | | | |
| Miyake-Island, TOKYO | 1.73 | 1.95 | 3.96 | 0.004 ± 0.008 | 0.002 ± 0.0041 | 0.20 ± 0.013 | 0.051 ± 0.0034 |

Sea Fish

| Japanese name | English name | Scientific name |
|---------------|---------------------|------------------------|
| Ainame | Greenling | Hexagrammos otakii |
| Aji | Horse mackerel | Trachurus japonicus |
| Amadai | Tilefish | Branchiostegus sp. |
| Iwashi | Sardine | Sardinops melanosticta |
| Karei | Flatfish | Limanda herzensteini |
| Kisu | Sillago | Sillago sihama |
| Kibinago | Banded blue-sprat | Spratelloides gracilis |
| Sake | Salmon | Oncorhynchus keta |
| Saba | Common mackerel | Scomber japonicus |
| Tai | Sea bream | Chrysophrys major |
| Fukuragi | Yellow-tail | Seriola quinqueradiata |
| Bora | Gray mullet | Mugil cephalus |
| Muroaji | Horse-scad mackerel | Decapterus muroadsi |

(5) Strontium-90 and Cesium-137 in Freshwater Fish
(from Jul. 1989 to Dec. 1989)

-continued from NO. 91 of this publication-

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

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|-----------------------|-----------|----------|---------|------------------|----------------|-------------------|----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwt | Bq/gCa | Bq/Kgwt | Bq/gK |
| (Cyprinus carpio) | | | | | | | |
| July, 1989 | | | | | | | |
| Akita, AKITA | 6.67 | 18.5 | 5.97 | 5.5 ± 0.09 | 0.30 ± 0.005 | 0.82 ± 0.033 | 0.14 ± 0.006 |
| September, 1989 | | | | | | | |
| Fukushima, FUKUSHIMA | 3.58 | 9.25 | 2.81 | 0.96 ± 0.032 | 0.10 ± 0.003 | 0.17 ± 0.012 | 0.059 ± 0.0043 |
| November, 1989 | | | | | | | |
| Shobara, HIROSHIMA | 1.08 | 0.519 | 3.43 | 0.06 ± 0.012 | 0.12 ± 0.022 | 0.19 ± 0.012 | 0.056 ± 0.0036 |
| (Carassius auratus) | | | | | | | |
| July, 1989 | | | | | | | |
| Barato-lake, HOKKAIDO | 4.67 | 12.3 | 3.02 | 0.75 ± 0.032 | 0.061 ± 0.0026 | 0.17 ± 0.013 | 0.058 ± 0.0043 |
| December, 1989 | | | | | | | |
| Mikata-lake, FUKUI | 1.54 | 2.26 | 3.20 | 0.21 ± 0.021 | 0.091 ± 0.0091 | 0.44 ± 0.023 | 0.14 ± 0.007 |
| Uji, KYOTO | 3.98 | 10.1 | 2.64 | 0.68 ± 0.031 | 0.067 ± 0.0031 | 0.00 ± 0.008 | 0.000 ± 0.0031 |

Freshwater Fish

| Japanese name | English name | Scientific name |
|---------------|----------------|-------------------|
| Koi | Carp | Cyprinus carpio |
| Funa | A crucian carp | Carassius auratus |

(6) Strontium-90 and Cesium-137 in Shellfish
(from Jun. 1989 to Nov. 1989)

-continued from NO. 91 of this publication-

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

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|--------------------------|-----------|----------|---------|------------------|----------------|-------------------|----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwt | Bq/gCa | Bq/Kgwt | Bq/gK |
| (Saxidomuspurpuratus) | | | | | | | |
| June, 1989 | | | | | | | |
| Minamichita-machi, AICHI | 1.53 | 0.592 | 2.61 | 0.00 ± 0.015 | 0.00 ± 0.025 | 0.04 ± 0.010 | 0.015 ± 0.0038 |
| (Turbo cornutus) | | | | | | | |
| August, 1989 | | | | | | | |
| Togi-machi, ISHIKAWA | 3.02 | 1.85 | 2.50 | 0.01 ± 0.010 | 0.006 ± 0.0056 | 0.06 ± 0.008 | 0.023 ± 0.0036 |
| (Pecten Yessoensis) | | | | | | | |
| November, 1989 | | | | | | | |
| Mutsu, AOMORI | 2.12 | 0.396 | 3.21 | 0.008 ± 0.009 | 0.020 ± 0.023 | 0.06 ± 0.009 | 0.019 ± 0.0029 |
| (Mytilus edulis) | | | | | | | |
| June, 1989 | | | | | | | |
| Mutsu, AOMORI | 2.70 | 1.33 | 2.44 | 0.00 ± 0.007 | 0.000 ± 0.0056 | 0.04 ± 0.007 | 0.016 ± 0.0028 |

Shellfish

| Japanese name | English name | Scientific name |
|---------------|--------------|---------------------|
| Ohasari | | Saxidomuspurpuratus |
| Sazae | Wreath shell | Turbo cornutus |
| Hotategai | Scallop | Pecten Yessoensis |
| Murasakiigai | Mussel | Mytilus edulis |

(7) Strontium-90 and Cesium-137 in Seaweeds
(May 1989)

-continued from NO. 91 of this publication-

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

| Location | Component | | | ⁹⁰ Sr | | ¹³⁷ Cs | |
|-----------------------|-----------|----------|---------|------------------|----------------|-------------------|----------------|
| | Ash(%) | Ca(g/Kg) | K(g/Kg) | Bq/Kgwet | Bq/gCa | Bq/Kgwet | Bq/gK |
| (Undaria pinnatifida) | | | | | | | |
| May, 1989 | | | | | | | |
| Fukaura-machi, AOMORI | 1.40 | 0.772 | 2.66 | 0.03 ± 0.009 | 0.033 ± 0.012 | 0.03 ± 0.006 | 0.009 ± 0.0022 |
| Mutsu, AOMORI | 2.08 | 0.865 | 3.22 | 0.02 ± 0.007 | 0.018 ± 0.0083 | 0.02 ± 0.006 | 0.006 ± 0.0017 |

Seaweeds

| Japanese name | English name | Scientific name |
|---------------|----------------|---------------------|
| Wakame | Wakame seaweed | Undaria pinnatifida |

* * * Total Diet * * *

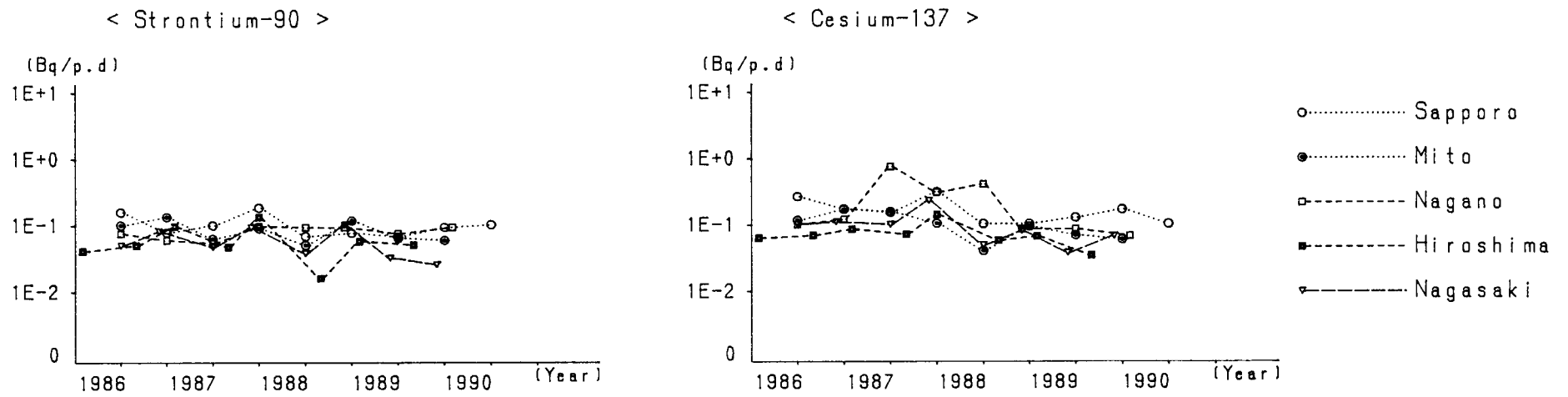


Fig. 1

* * * Milk (producing districts for domestic program) * * *

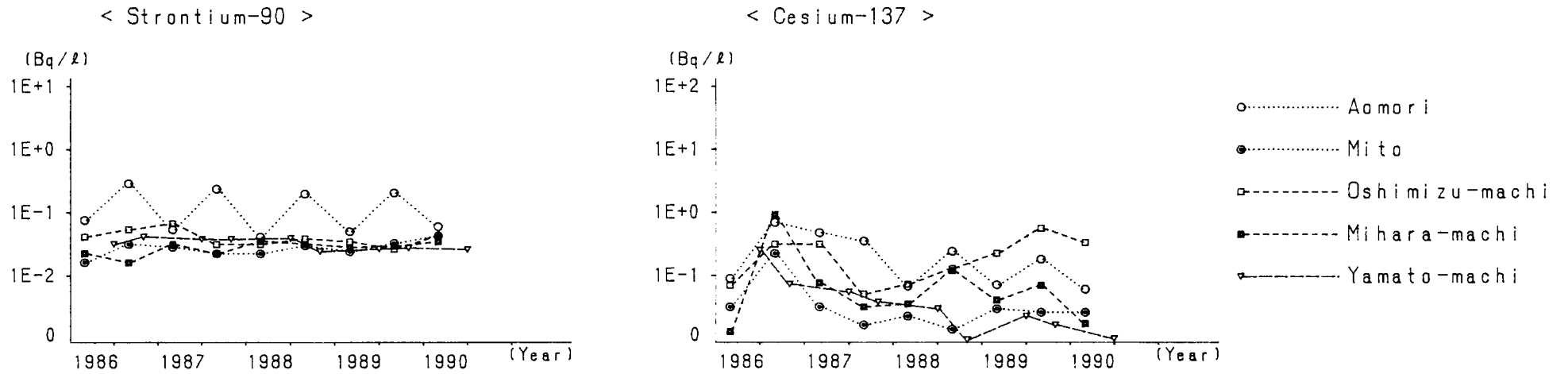


Fig.2-1

* * * Milk (producing districts for WHO program) * * *

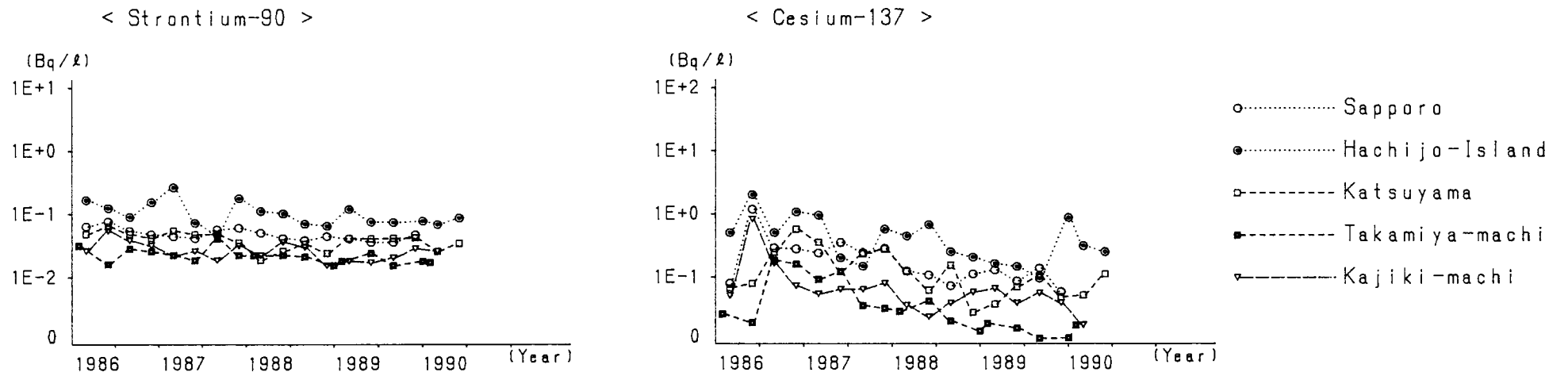


Fig. 2-2

* * * Milk (consuming districts) * * *

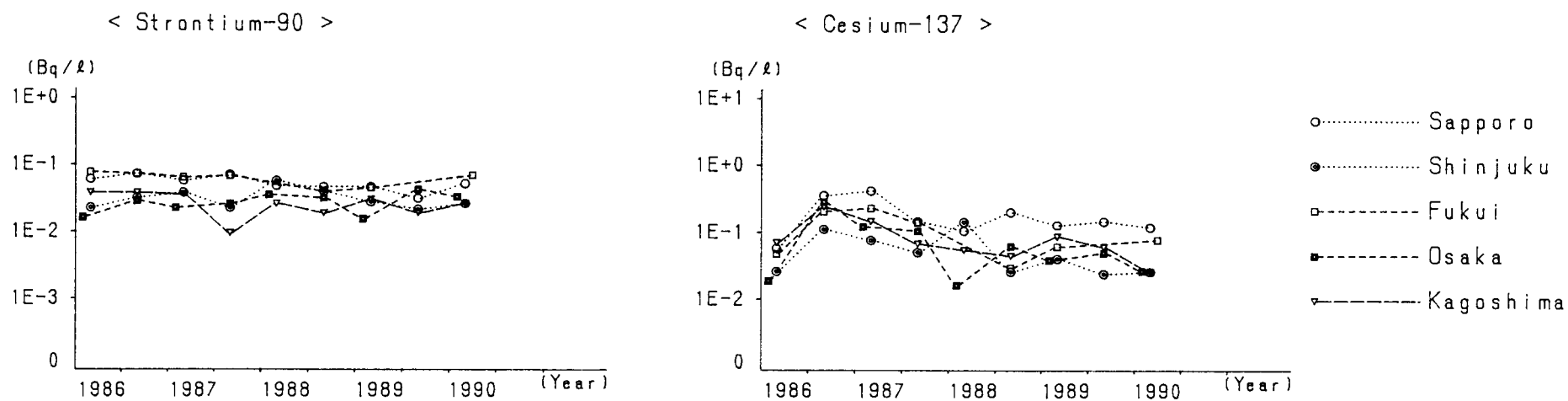


Fig. 2-3

* * * Vegetables (producing districts) * * *

[Spinach]

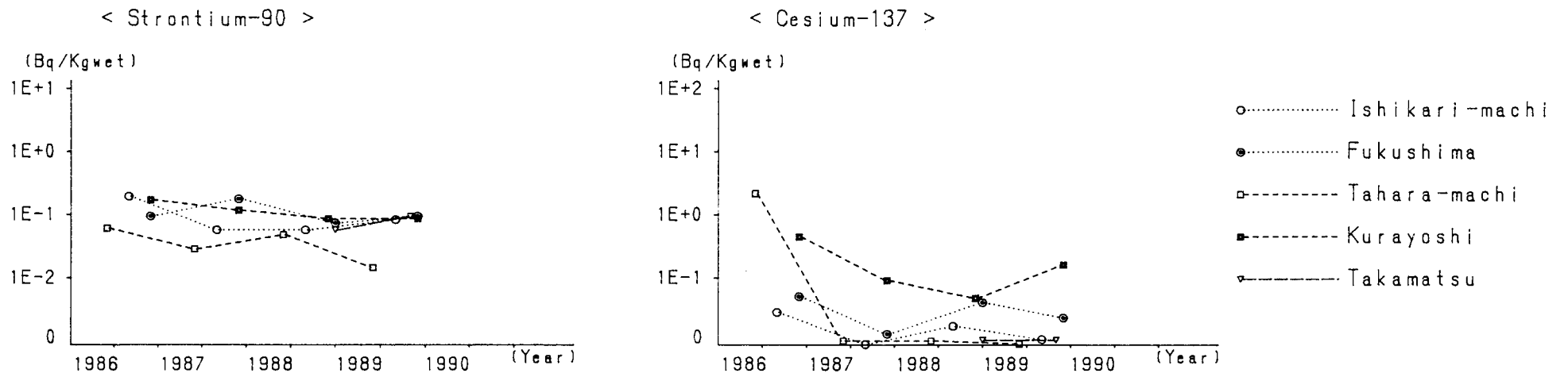


Fig. 3-1

*** Vegetables (consuming districts) ***
[Spinach]

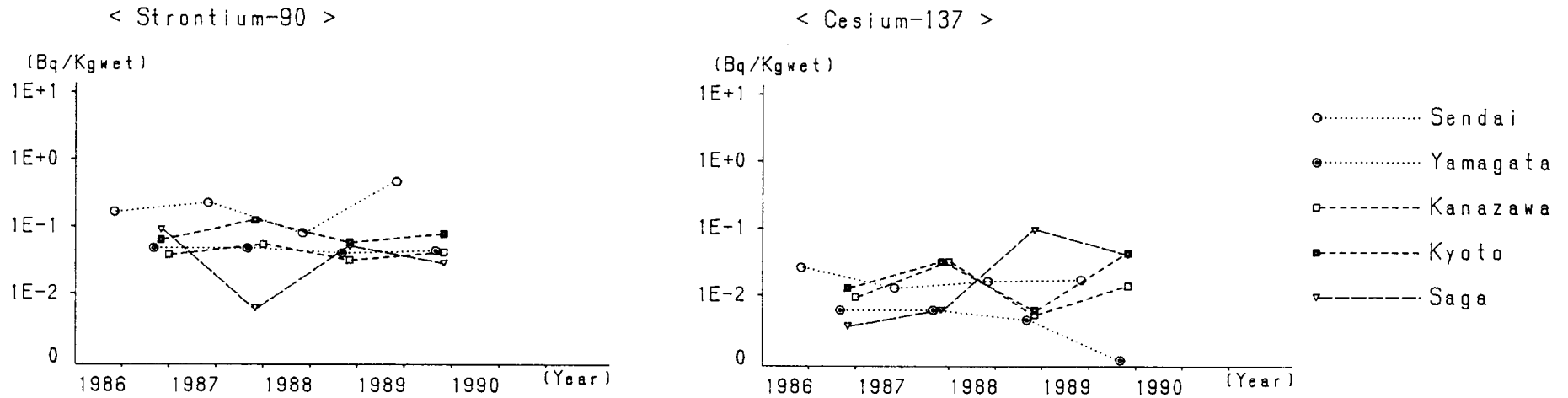


Fig.3-2

* * * Sea Fish * * *

(Scomber japonicus)

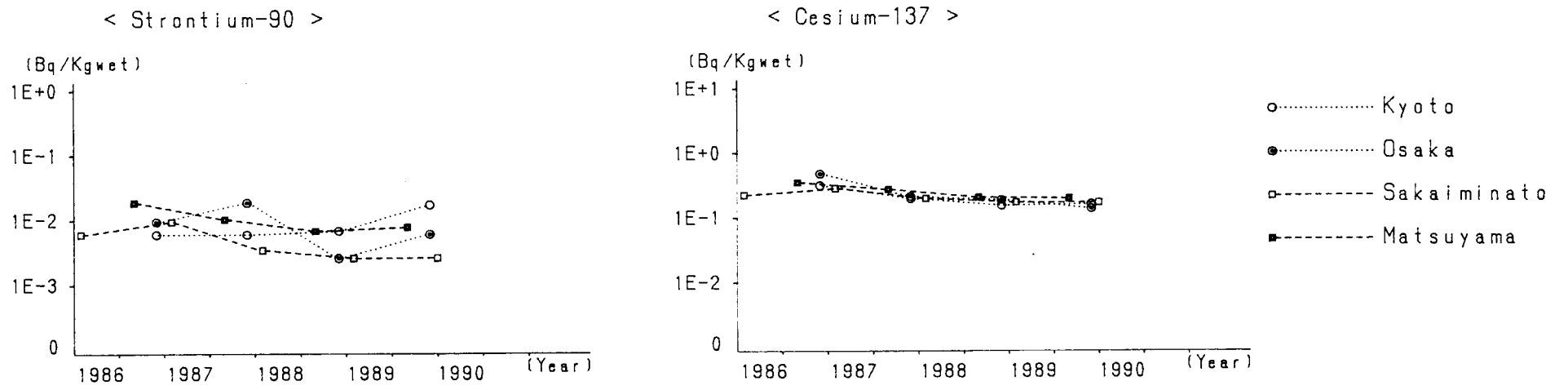


Fig. 4

* * * Shellfish * * *

(Turbo cornutus)

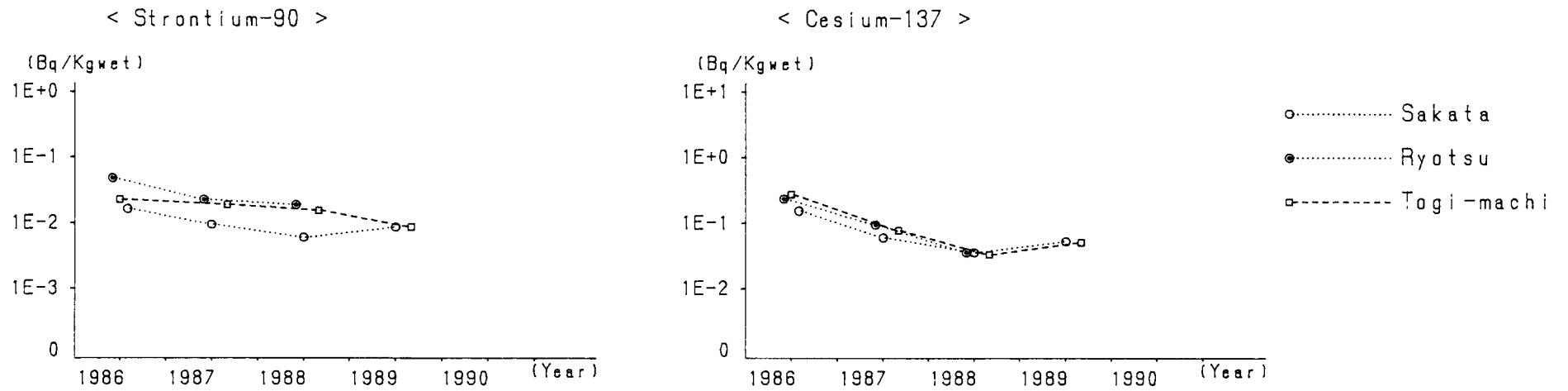


Fig. 5

* * * Seaweeds * * *

(Undaria pinnatifida)

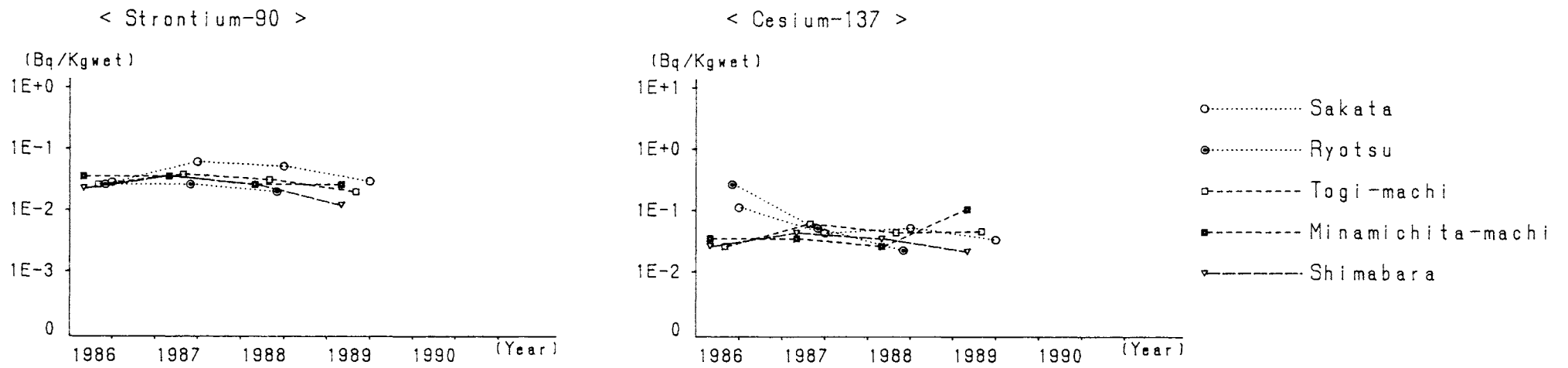


Fig. 6

** Sampling Locations in Japan **

- | | |
|-----------------|----------------|
| 1 : Sapporo | 23 : Tsu |
| 2 : Aomori | 24 : Kyoto |
| 3 : Morioka | 25 : Osaka |
| 4 : Akita | 26 : Tottori |
| 5 : Sendai | 27 : Kobe |
| 6 : Yamagata | 28 : Wakayama |
| 7 : Fukushima | 29 : Okayama |
| 8 : Niigata | 30 : Matsue |
| 9 : Mito | 31 : Takamatsu |
| 10 : Utsunomiya | 32 : Hiroshima |
| 11 : Chiba | 33 : Kochi |
| 12 : Urawa | 34 : Matsuyama |
| 13 : Shinjuku | 35 : Yamaguchi |
| 14 : Nagano | 36 : Ooita |
| 15 : Yokohama | 37 : Fukuoka |
| 16 : Kouhu | 38 : Saga |
| 17 : Toyama | 39 : Miyazaki |
| 18 : Kanazawa | 40 : Nagasaki |
| 19 : Shizuoka | 41 : Kagoshima |
| 20 : Fukui | 42 : Naha |
| 21 : Nagoya | |
| 22 : Ootsu | |

