NIRS-RSD-51

RADIOACTIVITY SURVEY DATA in Japan

NUMBER 51
Dec 1979

National Institute of Radiological Sciences
Chiba, Japan

Radioactivity Survey Data in Japan

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Dec. 1979

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Environmental and Dietary Materials*

(Japan Chemical Analysis Center)

1. Collection and pretreatment of samples

(1) Rain and dry fallout

Rain and dry fallout was collected monthly on a sampling tray, approximately 5000 cm^2 in area, which was filled with water to a depth of 1 cm at the beginning of every month.

The sample was filtered after strontium and cesium carriers were added. 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 of 80 mℓ/min.

(2) Airborne dust

Airborne dust was collected by an electrostatic precipitator or a filter air sampler for every three months at a rate of more than 3000 m^3 per month. The sampling was done 1 to 1.5 meters above the ground.

(3) Service water and freshwater

Service water, 100 ℓ each, was collected at an intake of the water-treatment plant and at the tap after water was left running for five minutes. Water, to which added carriers of strontium and cesium immediately after sampling, was vigorously stirred and filtered. 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 disturbance on the surface caused by dust-storms, inflow and outflow due to precipitation, and so on. 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 ~ 5 cm and 5 ~ 20 cm. In the course of air-drying, lumps were crushed by hand, and roots of plants and pebbles were removed. The soil was then passed through a 2 mm sieve to remove small gravels.

(5) Sea water

Sea water was collected at the fixed stations where the effect of terrestrial fresh water from rivers was expected to be negligibly small. A special consideration was also given to weather conditions. The sampling was carried out when there was no rainfall for the last few days. To prevent contamination, water samples were collected at the bow of a sampling boat just before she stood still by scooping surface water using a polyethylene bucket. Immediately after the collection, the samples were acidified to a pH lower than 3 by adding concentrated hydrochloric acid in a ratio of 1 mℓ to 1 ℓ of sea water, and then stored in 20 ℓ polyethylene containers. The sampling equipments as well as containers were thoroughly rinsed with dilute hydrochloric acid and then with distilled water before use. Two hundred milliliters of sea water was also collected at the same stations for the determination of chlorinity.

(6) Sea sediments

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

a. The depth of water exceeds 1 m at low tide.
b. No significant sedimental movement is observed in the vicinity of concern.
c. Mud, silt and fine sand are preferable.

A conventional sediment sampling device was used for collecting the top few centimeters of surface sediment. Approximately 4 kg of the sample in wet weight was spread on a large porcelain dish and dried in an electric oven at 105 to 110°C to a costant weight.

(7) Total diet

A full one day ordinary diet including three meals, water, tea and other in-between snacks for five persons was collected as a sample of "total diet". The sample in a large stainless steel pan was carbonized carefully by direct application of gas flame, and was transfered to a porcelain dish and then ashed at 500°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.

(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

* Samples were sent to the Center from 32 contracted prefectures.

and ashing.

(10) Vegetables

Spinach and Japanese radish were selected as the representatives for leaf vegetables and for non-starch roots, respectively. After removing soil, the edible part of vegetable sample was dried and carbonized in a stainless steel pan or a porcelain dish.

(11) Tea

Five hundred grams of manufactured green tea was collected, carbonized and ashed in a stainless steel pan or a porcelain dish.

(12) Fish, shellfish and seaweeds

a. Sea fish and freshwater fish

Fish was rinsed with water and blotted with a filter paper. Only the edible part was used in case of larger sized fish, and the whole part was used in case of smaller ones. Each sample was weighed and placed in a stainless steel pan or a porcelain dish. After carbonized, the sample was ashed in an electric muffle furnace.

b. Shellfish

Approximately 4 kg of shellfish including the shells was collected or purchased. After removing the shells, it was treated in the same way as that for the sea fish.

c. Seaweeds

Edible seaweeds were collected and rinsed with water to remove sand and other adhering matters on the surface. These were removed of excess water, weighed, dried and ashed.

Table 1 shows detailes of sample collection.

Table 1 Details of sample collection

Sample	Frequency of sampling	Quantity of sample
= Environmental materials =		
(1) Rain and dry fallout	monthly	
(2) Airborne dust	quarterly	>3000 m^3/month
(3) Service water and freshwater		
1 Service water (sourse water)	semiyearly (June and December)	100 ℓ
2 Service water (tap water)	semiyearly (June and December)	100 ℓ
3 Freshwater	yearly (fishing season)	100 ℓ
(4) Soil		
1 0 ~ 5 cm	yearly (June or July)	4 kg
2 5 ~ 20 cm	yearly (June or July)	4 kg
(5) Sea water	yearly (July or August)	40 ℓ
(6) Sea sediments	yearly (July or August)	4 kg
= Dietary materials =		
(7) Total diet	semiyearly (June, November or December)	daily amount for 5 person
(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
3 Consuming districts	semiyearly (February and August)	3 ℓ
(10) Vegetables		
1 Producing districts	yearly (harvesting season)	4 kg
2 Consuming districts	yearly (harvesting season)	4 kg

Sample	Frequency of sampling	Quantity of sample
(11) Tea	yearly (the first harvesting season)	500 g (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

Air-dried soil was passed through a 20 mesh sieve. The sieved sample was heated, in the presence of strontium and cesium carriers, together with sodium hydroxide. The sample was then heated with hydrochloric acid and the insoluble part was filtered and washed. The combined solution of the filtrate and washings was used for radiochemical analysis.

(3) Sea sediments

After removal of pebbles, shells and other foreign matters, the sediment sample was dried in a hot-air oven and ground finely with a mortar. The sample was passed through a 20 mesh sieve. The further preparation of the sample was the same as that described in the section 2-(2).

(4) Rice

The ashed sample was pulverlized with a porcelain mortar and passed through a 42 mesh sieve. The sieved sample to which both strontium and cesium carriers were added, was digested with hydrochloric 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 part was filtered and washed. The filtrate and washings were combined for subsequent radiochemical analysis.

(5) Airborne dust, diet, milk, vegetable, 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-(5), 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 calcium and strontium were precipitated as oxalates. The precipitate was dissolved in nitric acid and strontium was separated from calcium by successive fuming nitric acid separations. 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 the iron carrier was added. The solution was allowed to stand for two weeks for strontium-90 and yttrium-90 to attain equilibrium. The 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 in the solution was acidified with hydrochloric acid. While stirring the solution, cesium was adsorbed on ammonium molybdophosphate.

After filtered off and washed with dilute nitric

acid, the precipitate was dissolved in 2.5N sodium hydroxide solution. Ammonia was removed completely from the solution by boiling. The solution was adjusted to pH 8.2 with hydrochloric acid and allowed to cool. Molybdenum hydroxide which came out in the solution, was filtered off and washed with water. In such circumstance that ontamination by rubidium-87 was not negligible for the measurement of cesium-137, the following ion-exchange procedure was applied. A fixed amount of ferric chloride solution was added to the solution dissolved with 2.5N sodium hydroxide. Ammonia and molybdenum hydroxide were removed as described above. Ethylenediaminetetraaceticacid tetrasodium salt was added to the filtrate and washing. Cesium and rubidium were adsorbed on a cation exchange resin. Cesium was separated from rubidium by eluting with hydrochloric acid.

To this eluate or the filtrate and washings after removing molybdenum hydroxide, chloroplatinic acid solution was added to precipitate cesium. The precipitate was filtered onto a tared paper in a demountable filter and washed with water and then ethanol. After fixing the filter paper on a tared planchette and drying it, the chemical yield of cesium was determined by weighing the precipitate with the planchette. Radioactivity from cesium-137 was measured for this precipitate.

4. Determination of stable strontium, calcium and potassium

A weighed amount of soil or sea sediment was treated under heating with sodium hydroxide and then with hydrochloric acid for extraction. A weighed aliquot of ashed samples of total diet, vegetables, milk, fish, shellfish or seeweeds was digested using hydrochloric acid or nitric acid, hydrofluoric acid being used when necessary. 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. Conting

After the radiochemical separation, the mounted precipitates were counted for activity using low background beta counters normally for 60 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 radioactivity per sample aliquot. From the results, concentrations of these nuclides in the original samples were calculated.

6. Result

(1) Strontium-90 and Cesium-137 in Rain and dry fallout

(from Jan. 1979 to Jun. 1979)

– continued from No. 50 of this publication –

Table 1: Strontium-90 and Cesium-137 in Rain and dry fallout

Location	Duration (Days)	Precipitation (mm)	^{90}Sr (mCi/Km^2)	^{137}Cs (mCi/Km^2)
January, 1979				
Sapporo, HOKKAIDO	37	140.0	0.031 ± 0.0016	0.053 ± 0.001
Aomori, AOMORI	28	97.5	0.041 ± 0.0018	0.058 ± 0.001
Sendai, MIYAGI	25	87.6	0.009 ± 0.0009	0.018 ± 0.001
Akita, AKITA	27	95.44	0.028 ± 0.0016	0.053 ± 0.001
Yamagata, YAMAGATA	35	48.19	0.020 ± 0.0013	0.031 ± 0.001

Location	Duration (Days)	Precipitation (mm)	^{90}Sr (mCi/Km^2)	^{137}Cs (mCi/Km^2)
Ohkuma, FUKUSHIMA	29	8.0	0.007 ± 0.0009	0.007 ± 0.000
Mito, IBARAGI	28	62.0	0.008 ± 0.0008	0.016 ± 0.001
Shinjuku, TOKYO	31	66.5	0.009 ± 0.0011	0.018 ± 0.001
Yokohama, KANAGAWA	29	28.8	0.009 ± 0.0010	0.019 ± 0.001
Niigata, NIIGATA	28	115.80	0.039 ± 0.0016	0.065 ± 0.002
Kanazawa, ISHIKAWA	29	194.5	0.090 ± 0.0025	0.14 ± 0.003
Fukui, FUKUI	28	245.8	0.070 ± 0.0026	0.13 ± 0.003
Nagano, NAGANO	29	16.0	0.007 ± 0.0010	0.010 ± 0.000
Shizuoka, SHIZUOKA	27	67.0	0.010 ± 0.0010	0.020 ± 0.001
Nagoya, AICHI	29	72.2	0.008 ± 0.0009	0.013 ± 0.001
Kyoto, KYOTO	27	66.7	0.012 ± 0.0011	0.017 ± 0.001
Osaka, OSAKA	32	54	0.009 ± 0.0009	0.011 ± 0.001
Kobe, HYOGO	29	46.4	0.009 ± 0.0011	0.013 ± 0.001
Tottori, TOTTORI	28	102.50	0.041 ± 0.0017	0.059 ± 0.001
Matsue, SHIMANE	32	96.5	0.043 ± 0.0018	0.073 ± 0.002
Okayama, OKAYAMA	27	54.7	0.007 ± 0.0009	0.012 ± 0.001
Yamaguchi, YAMAGUCHI	30	57.5	0.017 ± 0.0012	0.025 ± 0.001
Matsuyama, EHIME	36	74.5	0.021 ± 0.0014	0.033 ± 0.001
Kochi, KOCHI	27	91.1	0.016 ± 0.0012	0.016 ± 0.001
Dazaifu, FUKUOKA	27	42.6	0.014 ± 0.0012	0.020 ± 0.001
Saga, SAGA	34	54.5	0.011 ± 0.0011	0.017 ± 0.001
Nagasaki, NAGASAKI	28	98.0	0.025 ± 0.0015	0.036 ± 0.001
Kagoshima, KAGOSHIMA	29	121.4	0.014 ± 0.0012	0.019 ± 0.001
Naha, OKINAWA	27	109.5	0.008 ± 0.0010	0.012 ± 0.001
February, 1979				
Sapporo, HOKKAIDO	29	72.5	0.023 ± 0.0014	0.033 ± 0.001
Aomori, AOMORI	29	27.1	0.023 ± 0.0014	0.048 ± 0.001
Sendai, MIYAGI	29	134.7	0.016 ± 0.0011	0.024 ± 0.001
Akita, AKITA	29	90.71	0.035 ± 0.0019	0.049 ± 0.001
Yamagata, YAMAGATA	28	78.04	0.021 ± 0.0013	0.028 ± 0.001
Ohkuma, FUKUSHIMA	29	166.6	0.019 ± 0.0014	0.032 ± 0.001
Mito, IBARAGI	29	81.5	0.019 ± 0.0013	0.032 ± 0.001
Shinjuku, TOKYO	28	26.9	0.022 ± 0.0014	0.038 ± 0.001
Yokohama, KANAGAWA	28	90.4	0.022 ± 0.0014	0.037 ± 0.001
Niigata, NIIGATA	29	111.64	0.053 ± 0.0018	0.076 ± 0.002
Kanazawa, ISHIKAWA	29	253.5	0.12 ± 0.003	0.19 ± 0.003
Fukui, FUKUI	29	232.8	0.16 ± 0.004	0.22 ± 0.004
Nagano, NAGANO	29	10.0	0.007 ± 0.0009	0.011 ± 0.000
Shizuoka, SHIZUOKA	28	140.0	0.028 ± 0.0014	0.041 ± 0.001
Nagoya, AICHI	29	130.7	0.024 ± 0.0013	0.039 ± 0.001

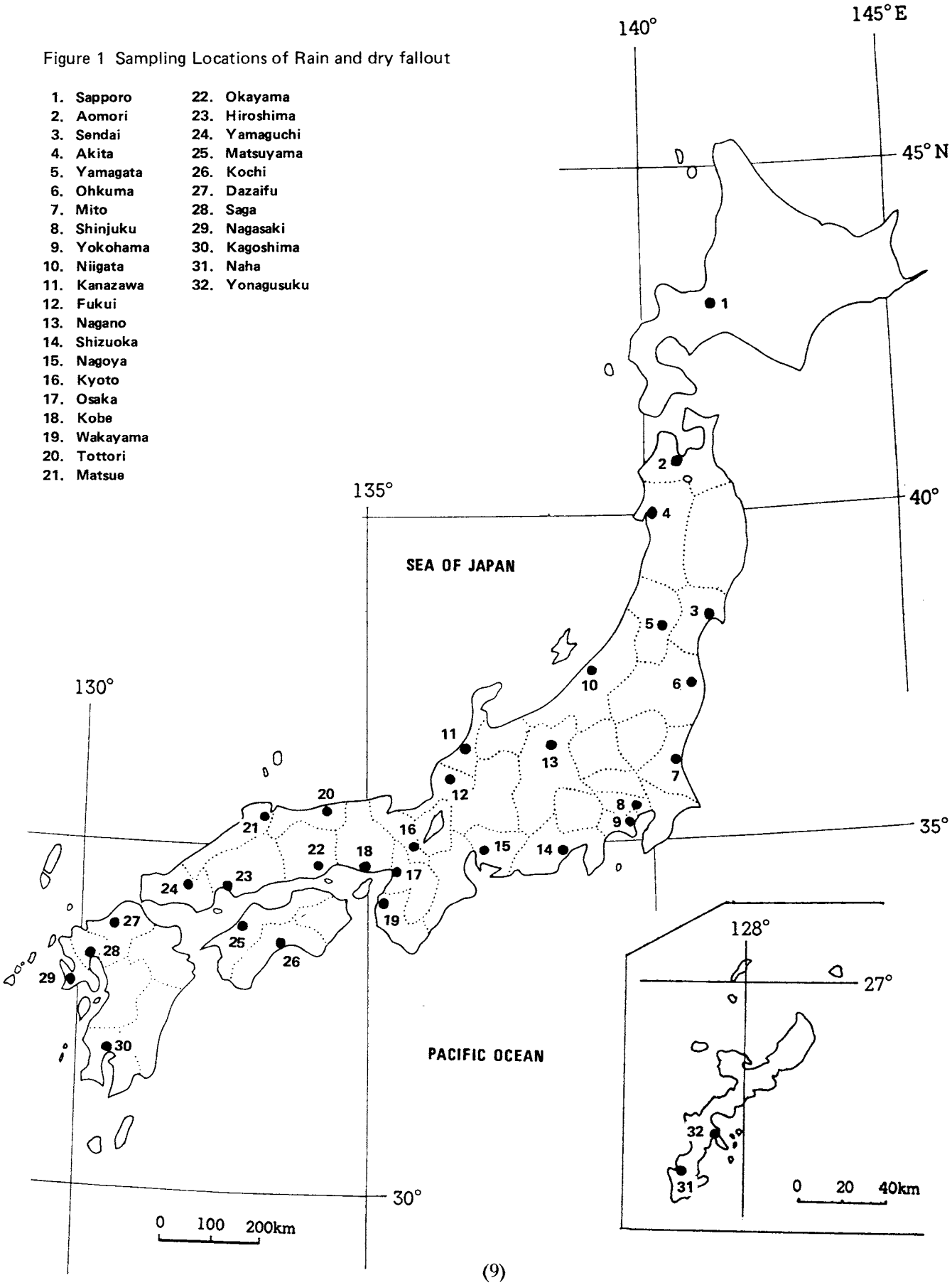
Location	Duration (Days)	Precipitation (mm)	^{90}Sr (mCi/Km^2)	^{137}Cs (mCi/Km^2)
Kyoto, KYOTO	28	79.0	0.024 ± 0.0014	0.036 ± 0.001
Osaka, OSAKA	28	70.78	0.014 ± 0.0013	0.027 ± 0.001
Kobe, HYOGO	28	81.0	0.022 ± 0.0014	0.038 ± 0.001
Wakayama, WAKAYAMA	27	71.5	0.026 ± 0.0014	0.030 ± 0.001
Tottori, TOTTORI	31	149.5	0.055 ± 0.0021	0.089 ± 0.002
Matsue, SHIMANE	31	116.6	0.063 ± 0.0019	0.10 ± 0.002
Okayama, OKAYAMA	28	104.4	0.010 ± 0.0014	0.023 ± 0.001
Yamaguchi, YAMAGUCHI	29	120.5	0.047 ± 0.0020	0.076 ± 0.002
Matsuyama, EHIME	29	88.5	0.022 ± 0.0013	0.032 ± 0.001
Kochi, KOCHI	27	158.4	0.037 ± 0.0016	0.062 ± 0.001
Dazaifu, FUKUOKA	28	112.0	0.037 ± 0.0018	0.054 ± 0.001
Saga, SAGA	27	99.3	0.035 ± 0.0016	0.054 ± 0.001
Nagasaki, NAGASAKI	28	148.5	0.051 ± 0.0021	0.068 ± 0.002
Kagoshima, KAGOSHIMA	28	38.2	0.017 ± 0.0014	0.028 ± 0.001
Yonagusuku, OKINAWA	29	119.5	0.032 ± 0.0017	0.049 ± 0.001
March, 1979				
Sapporo, HOKKAIDO	33	110.5	0.041 ± 0.0018	0.061 ± 0.0018
Aomori, AOMORI	32	70.1	0.040 ± 0.0023	0.049 ± 0.0017
Sendai, MIYAGI	34	42.2	0.031 ± 0.0015	0.042 ± 0.0016
Akita, AKITA	33	89.58	0.045 ± 0.0017	0.071 ± 0.0021
Yamagata, YAMAGATA	30	26.34	0.016 ± 0.0012	0.026 ± 0.0014
Ohkuma, FUKUSHIMA	33	49.0	0.026 ± 0.0015	0.041 ± 0.0016
Mito, IBARAGI	33	56.0	0.026 ± 0.0013	0.039 ± 0.0016
Shinjuku, TOKYO	31	89.2	0.038 ± 0.0015	0.059 ± 0.0020
Yokohama, KANAGAWA	31	91.7	0.037 ± 0.0017	0.056 ± 0.0018
Niigata, NIIGATA	33	57.66	0.046 ± 0.0016	0.075 ± 0.0021
Kanazawa, ISHIKAWA	33	83.0	0.045 ± 0.0019	0.079 ± 0.0025
Fukui, FUKUI	33	97.2	0.039 ± 0.0018	0.071 ± 0.0021
Nagano, NAGANO	33	41.5	0.011 ± 0.0010	0.014 ± 0.0010
Shizuoka, SHIZUOKA	33	289.0	0.095 ± 0.0031	0.14 ± 0.003
Nagoya, AICHI	34	144.1	0.044 ± 0.0018	0.059 ± 0.0018
Kyoto, KYOTO	30	80.1	0.023 ± 0.0014	0.035 ± 0.0016
Osaka, OSAKA	30	106	0.017 ± 0.0012	0.027 ± 0.0013
Kobe, HYOGO	31	86.4	0.023 ± 0.0013	0.030 ± 0.0014
Wakayama, WAKAYAMA	31	124.0	0.020 ± 0.0014	0.038 ± 0.0016
Tottori, TOTTORI	33	46.0	0.048 ± 0.0019	0.073 ± 0.0021
Matsue, SHIMANE	31	106.7	0.046 ± 0.0018	0.076 ± 0.0021
Okayama, OKAYAMA	32	96.0	0.018 ± 0.0012	0.025 ± 0.0013
Hiroshima, HIROSHIMA	32	151.6	0.029 ± 0.0015	0.041 ± 0.0016
Yamaguchi, YAMAGUCHI	31	200.5	0.044 ± 0.0019	0.058 ± 0.0018
Matsuyama, EHIME	30	102.0	0.019 ± 0.0012	0.026 ± 0.0013

Location	Duration (Days)	Precipitation (mm)	^{90}Sr (mCi/Km^2)	^{137}Cs (mCi/Km^2)
Kochi, KOCHI	31	279.8	0.090 ± 0.0025	0.12 ± 0.003
Dazaifu, FUKUOKA	31	158.9	0.037 ± 0.0016	0.055 ± 0.0019
Saga, SAGA	27	183.2	0.038 ± 0.0018	0.053 ± 0.0018
Nagasaki, NAGASAKI	33	198.0	0.036 ± 0.0015	0.057 ± 0.0019
Kagoshima, KAGOSHIMA	33	291	0.009 ± 0.0009	0.011 ± 0.0010
Yonagusuku, OKINAWA	31	180.0	0.043 ± 0.0018	0.074 ± 0.0020
April, 1979				
Sapporo, HOKKAIDO	30	37.0	0.022 ± 0.0013	0.036 ± 0.0015
Aomori, AOMORI	30	67.7	0.049 ± 0.0019	0.077 ± 0.0021
Sendai, MIYAGI	30	127.5	0.036 ± 0.0018	0.052 ± 0.0018
Akita, AKITA	30	158.3	0.086 ± 0.0024	0.13 ± 0.003
Yamagata, YAMAGATA	31	58.5	0.043 ± 0.0017	0.066 ± 0.0019
Ohkuma, FUKUSHIMA	31	96.0	0.053 ± 0.0017	0.078 ± 0.0021
Mito, IBARAGI	30	111.5	0.048 ± 0.0019	0.064 ± 0.0020
Shinjuku, TOKYO	30	114	0.040 ± 0.0018	0.073 ± 0.0020
Yokohama, KANAGAWA	33	96.3	0.040 ± 0.0018	0.066 ± 0.0019
Niigata, NIIGATA	31	91.97	0.042 ± 0.0018	0.066 ± 0.0020
Kanazawa, ISHIKAWA	30	195.5	0.052 ± 0.0019	0.076 ± 0.0021
Fukui, FUKUI	30	136.6	0.042 ± 0.0016	0.068 ± 0.0020
Nagano, NAGANO	30	74.5	0.020 ± 0.0014	0.033 ± 0.0014
Shizuoka, SHIZUOKA	28	218.0	0.055 ± 0.0919	0.091 ± 0.0023
Nagoya, AICHI	29	217	0.063 ± 0.0022	0.087 ± 0.0022
Kyoto, KYOTO	31	163.6	0.051 ± 0.0019	0.083 ± 0.0025
Osaka, OSAKA	31	178	0.052 ± 0.0016	0.075 ± 0.0020
Kobe, HYOGO	32	177.4	0.068 ± 0.0024	0.11 ± 0.002
Wakayama, WAKAYAMA	28	92.5	0.038 ± 0.0016	0.049 ± 0.0017
Tottori, TOTTORI	28	57.25	0.033 ± 0.0016	0.063 ± 0.0021
Matsue, SHIMANE	32	82.4	0.042 ± 0.0018	0.063 ± 0.0020
Okayama, OKAYAMA	29	71.2	0.022 ± 0.0012	0.033 ± 0.0014
Yamaguchi, YAMAGUCHI	30	155.0	0.044 ± 0.0018	0.066 ± 0.0020
Matsuyama, EHIME	33	94.5	0.037 ± 0.0016	0.058 ± 0.0019
Kochi, KOCHI	30	283.2	0.087 ± 0.0023	0.13 ± 0.003
Dazaifu, FUKUOKA	31	102.3	0.030 ± 0.0014	0.050 ± 0.0020
Saga, SAGA	28	174.2	0.028 ± 0.0014	0.051 ± 0.0023
Nagasaki, NAGASAKI	29	183.0	0.082 ± 0.0025	0.11 ± 0.002
Kagoshima, KAGOSHIMA	30	115.5	0.015 ± 0.0013	0.016 ± 0.0011

Location	Duration (Days)	Precipitation (mm)	^{90}Sr (mCi/Km^2)	^{137}Cs (mCi/Km^2)
May, 1979				
Sapporo, HOKKAIDO	32	38.0	0.018 ± 0.0011	0.030 ± 0.0014
Sendai, MIYAGI	32	132.0	0.042 ± 0.0016	0.065 ± 0.0024
Akita, AKITA	32	84.08	0.036 ± 0.0015	0.052 ± 0.0017
Yamagata, YAMAGATA	31	101.60	0.049 ± 0.0018	0.065 ± 0.0019
Ohkuma, FUKUSHIMA	32	250.0	0.057 ± 0.0019	0.087 ± 0.0022
Mito, IBARAGI	32	223.0	0.066 ± 0.0020	0.10 ± 0.003
Shinjuku, TOKYO	31	210	0.051 ± 0.0022	0.087 ± 0.0027
Yokohama, KANAGAWA	35	140.3	0.038 ± 0.0016	0.068 ± 0.0021
Niigata, NIIGATA	31	56.68	0.025 ± 0.0013	0.039 ± 0.0019
Kanazawa, ISHIKAWA	35	131.5	0.072 ± 0.0023	0.11 ± 0.002
Fukui, FUKUI	32	160.9	0.044 ± 0.0018	0.068 ± 0.0024
Nagano, NAGANO	32	76.5	0.038 ± 0.0017	0.049 ± 0.0019
Shizuoka, SHIZUOKA	31	2220.0	0.060 ± 0.0020	0.090 ± 0.0022
Nagoya, AICHI	31	166.8	0.022 ± 0.0013	0.036 ± 0.0020
Kyoto, KYOTO	30	153.2	0.057 ± 0.0021	0.083 ± 0.0028
Osaka, OSAKA	31	140	0.042 ± 0.0018	0.068 ± 0.020
Kobe, HYOGO	32	99.4	0.042 ± 0.0016	0.058 ± 0.0018
Wakayama, WAKAYAMA	28	190.5	0.080 ± 0.0024	0.12 ± 0.003
Tottori, TOTTORI	32	36.75	0.040 ± 0.0016	0.073 ± 0.0030
Okayama, OKAYAMA	31	84.9	0.025 ± 0.0013	0.049 ± 0.0018
Yamaguchi, YAMAGUCHI	31	159.0	0.029 ± 0.0014	0.043 ± 0.0019
Matsuyama, EHIME	32	42.5	0.016 ± 0.0011	0.025 ± 0.0013
Kochi, KOCHI	31	191.8	0.030 ± 0.0014	0.034 ± 0.0015
Dazaifu, FUKUOKA	30	92.2	0.011 ± 0.0009	0.022 ± 0.0015
Saga, SAGA	30	157.5	0.013 ± 0.0010	0.019 ± 0.0013
Nagasaki, NAGASAKI	31	84.5	0.013 ± 0.0010	0.022 ± 0.0014
Kagoshima, KAGOSHIMA	32	111	0.014 ± 0.0011	0.035 ± 0.0015
Yonagusuku, OKINAWA	30	209.0	0.029 ± 0.0014	0.050 ± 0.0022
June, 1979				
Akita, AKITA	31	240.03	0.075 ± 0.0023	0.12 ± 0.003
Yamagata, YAMAGATA	31	145.70	0.040 ± 0.0017	0.053 ± 0.0018
Ohkuma, FUKUSHIMA	32	69.0	0.029 ± 0.0015	0.047 ± 0.0017
Kanazawa, ISHIKAWA	29	111.5	0.028 ± 0.0015	0.045 ± 0.0016
Shizuoka, SHIZUOKA	31	144.5	0.013 ± 0.0012	0.025 ± 0.0013
Nagoya, AICHI	32	267	0.035 ± 0.0016	0.057 ± 0.0018
Kyoto, KYOTO	32	292.9	0.023 ± 0.0015	0.035 ± 0.0015
Kobe, HYOGO	32	189.7	0.023 ± 0.0013	0.040 ± 0.0016
Kagoshima, KAGOSHIMA	31	385	0.006 ± 0.0008	0.016 ± 0.0011

Figure 1 Sampling Locations of Rain and dry fallout

1. Sapporo
2. Aomori
3. Sendai
4. Akita
5. Yamagata
6. Ohkuma
7. Mito
8. Shinjuku
9. Yokohama
10. Niigata
11. Kanazawa
12. Fukui
13. Nagano
14. Shizuoka
15. Nagoya
16. Kyoto
17. Osaka
18. Kobe
19. Wakayama
20. Tottori
21. Matsue
22. Okayama
23. Hiroshima
24. Yamaguchi
25. Matsuyama
26. Kochi
27. Dazaifu
28. Saga
29. Nagasaki
30. Kagoshima
31. Naha
32. Yonagusuku



(2) Strontium-90 and Cesium-137 Airborne dust (from Oct. 1978 to June 1979)

– Continued from No. 50 of this publication –

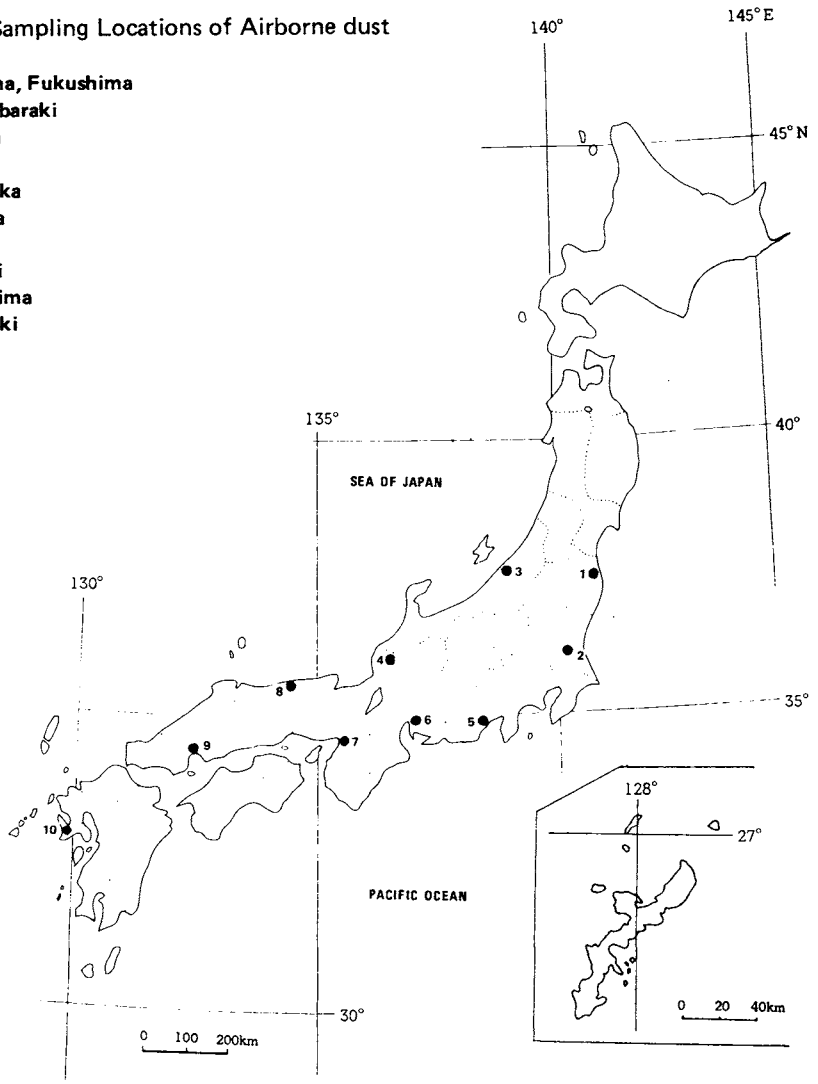
Table 2: Strontium-90 and Cesium-137 in Airborne dust

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (10^{-3}pCi/m^3)	^{137}Cs (10^{-3}pCi/m^3)
Oct. ~ Nov. 1978				
Shizuoka, SHIZUOKA	10 ~ 11	10,488	0.4 ± 0.05	0.5 ± 0.03
Oct. ~ Dec., 1978				
Mito, IBARAGI	10 ~ 12	11,023	0.4 ± 0.06	0.4 ± 0.03
Niigata, NIIGATA	10 ~ 12	13,996.6	0.5 ± 0.04	0.8 ± 0.04
Fukui, FUKUI	10 ~ 12	22,100	0.6 ± 0.03	1.1 ± 0.03
Tottori, TOTTORI	10 ~ 12	11,803	0.5 ± 0.06	0.7 ± 0.04
Hiroshima, HIROSHIMA	10 ~ 12	10,800	0.1 ± 0.04	0.2 ± 0.02
Osaka, OSAKA	10 ~ 12	9,072	0.4 ± 0.06	0.6 ± 0.04
Nov. ~ Dec., 1978				
Ohkuma, FUKUSHIMA	11 ~ 12	12,735	0.3 ± 0.04	0.7 ± 0.03
Nagasaki, NAGASAKI	11 ~ 12	13,259	0.5 ± 0.04	0.7 ± 0.03
December, 1978				
Shizuoka, SHIZUOKA	12	10,350	0.3 ± 0.05	0.4 ± 0.03
Jan. ~ Mar., 1979				
Mito, IBARAGI	1 ~ 3	10,379	0.2 ± 0.04	0.3 ± 0.03
Niigata, NIIGATA	1 ~ 3	12,699.4	0.6 ± 0.06	1.1 ± 0.04
Fukui, FUKUI	1 ~ 3	18,324	1.0 ± 0.05	1.7 ± 0.04
Nagoya, AICHI	1 ~ 3	10,740	0.7 ± 0.06	1.0 ± 0.05
Osaka, OSAKA	1 ~ 3	7,776	0.5 ± 0.05	0.7 ± 0.05
Tottori, TOTTORI	1 ~ 3	11,074.8	0.9 ± 0.05	1.3 ± 0.05
Hiroshima, HIROSHIMA	1 ~ 3	10,800	0.1 ± 0.03	0.1 ± 0.03
Nagasaki, NAGASAKI	1 ~ 3	8,161	0.9 ± 0.07	1.5 ± 0.06
Jan. ~ Feb., 1979				
Shizuoka, SHIZUOKA	1 ~ 2	12,062	0.4 ± 0.05	0.6 ± 0.03
Feb. ~ Mar., 1979				
Ohkuma, FUKUSHIMA	2 ~ 3	12,034	0.4 ± 0.04	0.6 ± 0.04
March, 1979				
Shizuoka, SHIZUOKA	3	11,411	0.6 ± 0.04	0.9 ± 0.04

Location	Sampling period	Absorption volume (m^3)	^{90}Sr (10^{-3} pCi/m^3)	^{137}Cs (10^{-3} pCi/m^3)
April ~ June, 1979				
Mito, IBARAGI	4 ~ 6	10,368	0.4 ± 0.04	0.5 ± 0.03
Niigata, NIIGATA	4 ~ 6	10,888.4	1.1 ± 0.06	1.6 ± 0.05
Fukui, FUKUI	4 ~ 6	19,249	1.2 ± 0.05	1.9 ± 0.04
Nagoya, AICHI	4 ~ 6	11,919	0.7 ± 0.05	1.0 ± 0.04
Osaka, OSAKA	4 ~ 6	7,776	0.5 ± 0.06	0.8 ± 0.05
Tottori, TOTTORI	4 ~ 6	12,577	0.9 ± 0.05	1.3 ± 0.05
Hiroshima, HIROSHIMA	4 ~ 6	10,800	0.2 ± 0.03	0.3 ± 0.03
Nagasaki, NAGASAKI	4 ~ 6	9,005	1.3 ± 0.07	1.9 ± 0.06

Figure 2 Sampling Locations of Airborne dust

1. **Ohkuma, Fukushima**
2. **Mito, Ibaraki**
3. **Niigata**
4. **Fukui**
5. **Shizuoka**
6. **Nagoya**
7. **Osaka**
8. **Tottori**
9. **Hiroshima**
10. **Nagasaki**



(3) Strontium-90 and Cesium-137 in Freshwater (from Oct. 1978 to June 1979)

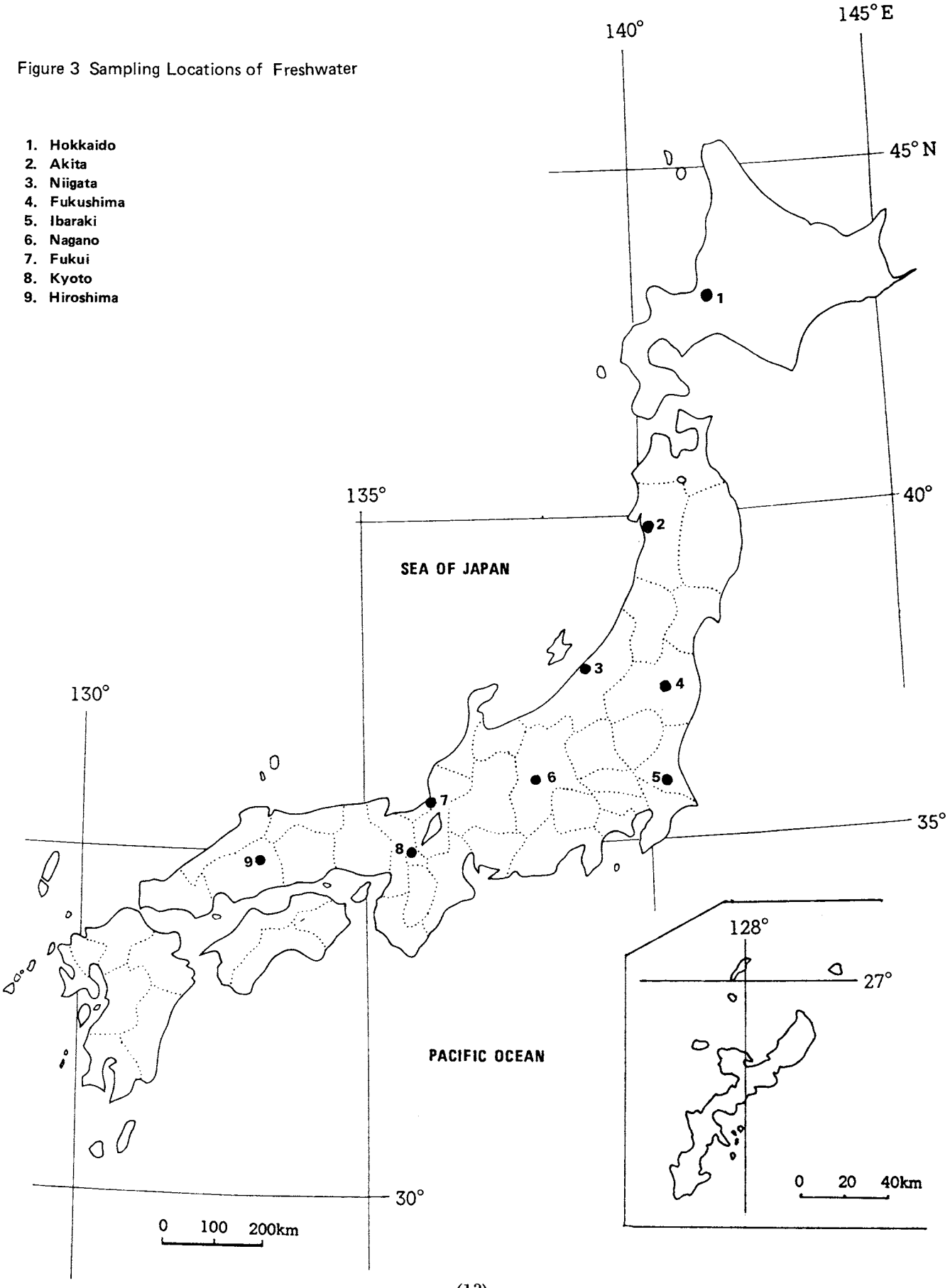
– Continued from No. 49 of this publication –

Table 3: Strontium-90 and Cesium-137 in Freshwater

Location	pH	^{90}Sr (pCi/ℓ)	^{137}Cs (pCi/ℓ)
May, 1978			
Kasumigaura, IBARAGI	8.0	0.31 ± 0.011	0.06 ± 0.005
July, 1978			
Akita, AKITA	6.3	0.19 ± 0.009	0.05 ± 0.005
September, 1978			
Fukushima, FUKUSHIMA	7.8	0.10 ± 0.006	0.01 ± 0.004
October, 1978			
Sapporo, HOKKAIDO	6.8	0.17 ± 0.008	0.05 ± 0.005
November, 1978			
Niigata, NIIGATA	7.08	0.34 ± 0.011	0.04 ± 0.005
Shobata, HIROSHIMA	7.1	0.09 ± 0.007	0.01 ± 0.004
December, 1978			
Miho-gun, FUKUI	7.6	0.39 ± 0.01	0.09 ± 0.006
Suwa-lake, NAGANO	6.9	0.07 ± 0.006	0.02 ± 0.004
Uji, KYOTO	7.4	0.01 ± 0.003	0.01 ± 0.003

Figure 3 Sampling Locations of Freshwater

1. Hokkaido
2. Akita
3. Niigata
4. Fukushima
5. Ibaraki
6. Nagano
7. Fukui
8. Kyoto
9. Hiroshima



(4) Strontium-90 and Cesium-137 in Rice (from Sept. 1978 to March, 1979)

– Continued from No. 49 of this publication –

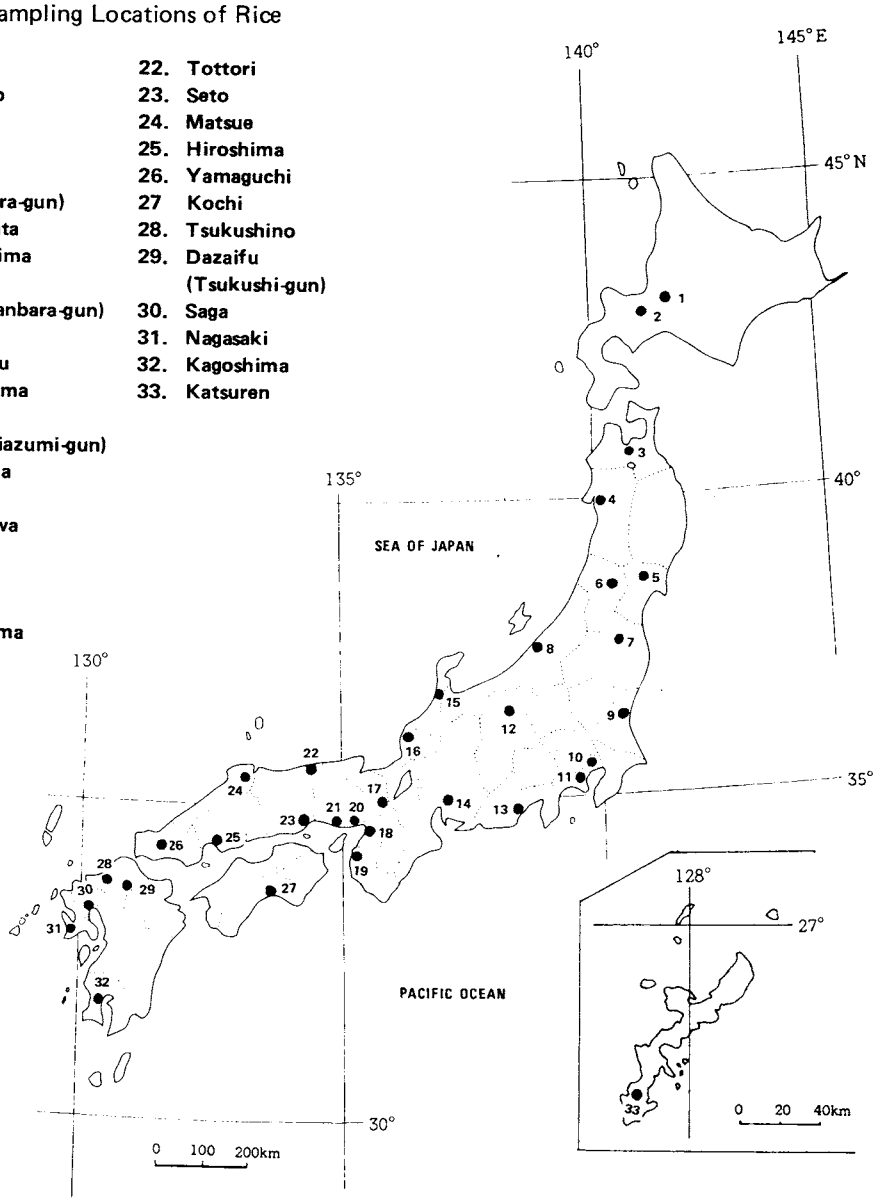
Table 4: Strontium-90 and Cesium-137 in Rice

Location	Component			^{90}Sr		^{137}Cs	
	Ash (%)	Ca (%)	K (%)	pCi/Kg	S.U.	pCi/Kg	C.U.
Sept. 1978							
Kanazawa, ISHIKAWA	0.534	0.0082	0.12	0.5 ± 0.20	5.9 ± 2.4	2.3 ± 0.20	1.9 ± 0.1
Hodaka (Minamiazumi-gun) NAGANO	0.431	0.0090	0.090	0.1 ± 0.32	1.5 ± 3.5	1.7 ± 0.25	1.9 ± 0.2
Katsuren, OKINAWA	0.592	0.0060	0.13	0.5 ± 0.31	9.0 ± 5.2	3.3 ± 0.32	2.5 ± 0.2
October, 1978							
Akita, AKITA	0.419	0.0066	0.10	1.2 ± 0.32	18 ± 4.8	12 ± 0.5	12 ± 0.5
Mito, IBARAGI	0.333	0.0060	0.075	0.4 ± 0.22	6.7 ± 3.7	2.3 ± 0.22	3.1 ± 0.3
Mito, IBARAGI	0.325	0.0043	0.069	0.3 ± 0.20	6.0 ± 4.7	2.0 ± 0.22	2.9 ± 0.3
Maki, NIIGATA	0.405	0.0107	0.085	0.4 ± 0.26	3.8 ± 2.5	4.1 ± 0.30	4.8 ± 0.3
Nishikanbara-gun, NIIGATA	0.336	0.0077	0.071	1.4 ± 0.26	19 ± 3.4	2.5 ± 0.22	3.5 ± 0.3
Wakayama, WAKAYAMA	0.414	0.0070	0.089	0.8 ± 0.30	11 ± 4.2	3.3 ± 0.29	3.8 ± 0.3
Shinjuku, TOKYO	0.409	0.0052	0.091	0.8 ± 0.28	16 ± 5.5	9.9 ± 0.42	11 ± 0.5
November, 1978							
Sapporo, HOKKAIDO	0.443	0.0051	0.10	0.7 ± 0.34	14 ± 6.6	5.5 ± 0.38	5.4 ± 0.3
Ishikari, HOKKAIDO	0.405	0.0056	0.10	0.1 ± 0.26	1.9 ± 4.6	5.2 ± 0.35	5.1 ± 0.3
Fukui, FUKUI	0.346	0.0052	0.079	1.2 ± 0.32	23 ± 6.0	2.1 ± 0.24	2.6 ± 0.3
Shizuoka, SHIZUOKA	0.405	0.0058	0.094	0.3 ± 0.28	4.7 ± 4.8	6.1 ± 0.36	6.5 ± 0.38
Osaka, OSAKA	0.383	0.0050	0.089	0.8 ± 0.26	15 ± 5.2	7.9 ± 0.40	8.9 ± 0.45
December, 1978							
Nishikanbara-gun, NIIGATA	0.346	0.0051	0.068	0.4 ± 0.23	7.5 ± 4.5	4.0 ± 0.31	5.8 ± 0.45
Yamagata, YAMAGATA	0.386	0.0058	0.088	1.2 ± 0.31	22 ± 5.4	17 ± 0.5	19 ± 0.6
Yokohama, KANAGAWA	0.435	0.0061	0.10	1.3 ± 0.38	21 ± 6.2	12 ± 0.5	12 ± 0.5
Kyoto, KYOTO	0.538	0.0076	0.12	0.1 ± 0.39	1.6 ± 5.2	3.9 ± 0.38	3.2 ± 0.31
Hiroshima, HIROSHIMA	0.413	0.0059	0.085	1.3 ± 0.31	22 ± 5.3	11 ± 0.5	13 ± 0.5
Yamaguchi, YAMAGUCHI	0.462	0.0058	0.10	0.1 ± 0.32	2.3 ± 5.4	1.0 ± 0.27	1.0 ± 0.27
Kochi, KOCHI	0.483	0.0071	0.10	1.1 ± 0.41	16 ± 5.8	4.4 ± 0.40	4.3 ± 0.40
Kasuga, FUKUOKA	0.457	0.0057	0.097	0.8 ± 0.26	15 ± 4.7	2.0 ± 0.31	2.1 ± 0.32
Dazaifu, FUKUOKA	0.496	0.0063	0.11	0.9 ± 0.32	15 ± 5.0	9.0 ± 0.48	8.3 ± 0.44
Fukushima, FUKUSHIMA	0.442	0.0047	0.093	0.4 ± 0.16	8.2 ± 3.3	3.3 ± 0.21	3.6 ± 0.23
January, 1979							
Aomori, AOMORI	0.444	0.0051	0.097	0.8 ± 0.16	15 ± 3.2	4.3 ± 0.22	4.4 ± 0.23
Nagoya, AICHI	0.427	0.0051	0.086	0.7 ± 0.15	13 ± 2.9	12 ± 0.3	15 ± 0.4
Kobe, HYOGO	0.410	0.0051	0.087	0.9 ± 0.14	17 ± 2.7	4.6 ± 0.21	5.3 ± 0.2
Akashi, HYOGO	0.426	0.0054	0.090	0.3 ± 0.13	5.0 ± 2.3	1.2 ± 0.14	1.4 ± 0.1
Tottori, TOTTORI	0.390	0.0049	0.079	1.0 ± 0.15	20 ± 3.1	2.4 ± 0.16	3.1 ± 0.2

Location	Component			^{90}Sr		^{137}Cs	
	Ash (%)	Ca (%)	K (%)	pCi/Kg	S.U.	pCi/Kg	C.U.
Matue, SHIMANE	0.418	0.0055	0.088	1.2 ± 0.18	22 ± 3.3	11 ± 0.3	13 ± 0.4
Seto, OKAYAMA	0.504	0.0051	0.12	1.2 ± 0.19	24 ± 3.7	4.1 ± 0.22	3.5 ± 0.1
Saga, SAGA	0.628	0.0064	0.14	0.9 ± 0.22	13 ± 3.4	2.5 ± 0.22	1.8 ± 0.1
Kagoshima, KAGOSHIMA	0.496	0.0066	0.098	0.9 ± 0.19	13 ± 2.8	2.4 ± 0.21	2.5 ± 0.2
March, 1979							
Nagasaki, NAGASAKI	0.423	0.0054	0.089	0.8 ± 0.17	15 ± 3.1	3.2 ± 0.18	3.6 ± 0.2

Figure 4 Sampling Locations of Rice

1. Ishikari
2. Sapporo
3. Aomori
4. Akita
5. Miyagi (Kurihara-gun)
6. Yamagata
7. Fukushima
8. Maki (Nishikanbara-gun)
9. Mito
10. Shinjuku
11. Yokohama
12. Hodaka (Minamiazumi-gun)
13. Shizuoka
14. Nagoya
15. Kanazawa
16. Fukui
17. Kyoto
18. Osaka
19. Wakayama
20. Kobe
21. Akashi
22. Tottori
23. Seto
24. Matsue
25. Hiroshima
26. Yamaguchi
27. Kochi
28. Tsukushino
29. Dazaifu (Tsukushi-gun)
30. Saga
31. Nagasaki
32. Kagoshima
33. Katsuren



(5) Strontium-90 and Cesium-137 in Vegetables (from April 1978 to February 1979)

– Continued from No. 49 of this publication –

Tabl 5: Strontium-90 and Cesium-137 in Vegetables

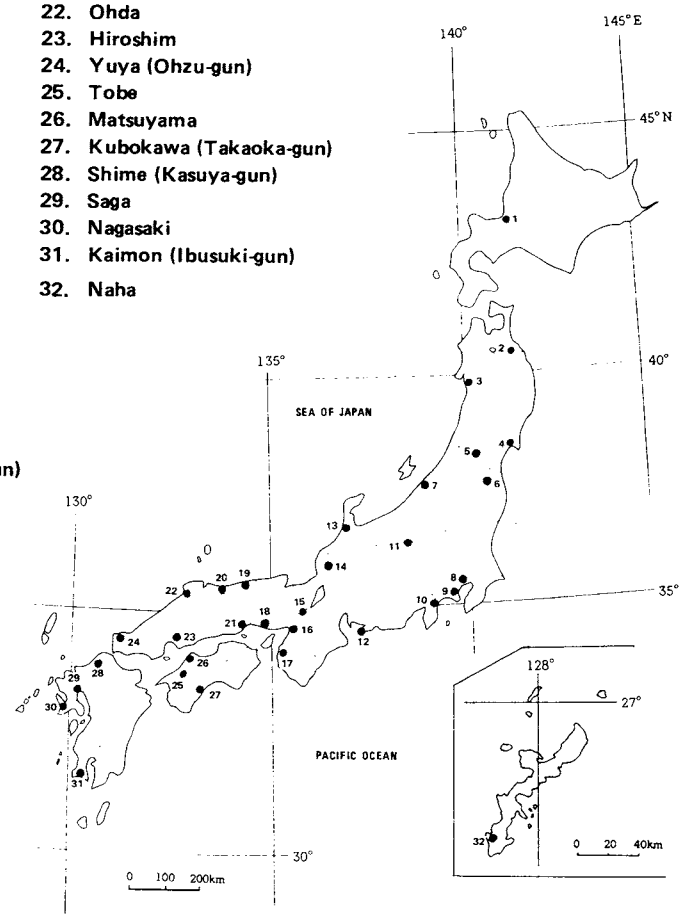
Location	Component			^{90}Sr		^{137}Cs	
	Ash (%)	Ca (%)	K (%)	pCi/Kg	S.U.	pCi/Kg	C.U.
(Spinach)							
April, 1978							
Sendai, MIYAGI	1.46	0.086	0.308	6.7 ± 0.69	7.8 ± 0.81	7.6 ± 0.56	2.5 ± 0.18
June, 1978							
Niigata, NIIGATA	1.17	0.073	0.447	27 ± 1.1	37 ± 1.5	6.1 ± 0.46	1.4 ± 0.10
Toyohashi, AICHI	1.48	0.062	0.675	5.3 ± 0.72	0.6 ± 1.2	0.23 ± 0.33	0.03 ± 0.05
August, 1978							
Ohta, SHIMANE	1.46	0.054	0.632	26 ± 1.3	49 ± 2.4	2.6 ± 0.42	0.4 ± 0.07
September, 1978							
Ishikari, HOKKAIDO	1.75	0.107	0.803	4.3 ± 0.78	4.0 ± 0.74	1.8 ± 0.48	0.2 ± 0.06
October, 1978							
Yamagata, YAMAGATA	1.67	0.052	0.785	8.4 ± 0.85	16 ± 1.6	2.8 ± 0.47	0.4 ± 0.06
November, 1978							
Kanazawa, ISHIKAWA	1.27	0.057	0.511	2.1 ± 0.35	3.7 ± 0.62	2.2 ± 0.30	0.4 ± 0.06
Saku, NAGANO	1.78	0.060	0.791	9.6 ± 0.72	16 ± 1.2	0.4 ± 0.24	0.05 ± 0.03
Gotenba, SHIZUOKA	1.35	0.070	0.571	17 ± 0.8	24 ± 1.1	5.4 ± 0.37	1.0 ± 0.06
Kyoto, KYOTO	1.38	0.065	0.533	0.9 ± 0.30	1.4 ± 0.46	1.7 ± 0.24	0.3 ± 0.04
Osaka, OSAKA	1.47	0.59	0.628	1.8 ± 0.43	3.0 ± 0.73	0.8 ± 0.25	0.0 ± 0.04
Akashi, HYOGO	1.39	0.047	0.671	2.6 ± 0.39	5.6 ± 0.83	0.3 ± 0.22	0.04 ± 0.03
Kurayoshi, TOTTORI	1.44	0.089	0.454	17 ± 0.9	19 ± 1.0	6.3 ± 0.41	1.4 ± 0.09
Kasuya-gun, FUKUOKA	1.31	0.087	0.555	9.4 ± 0.54	11 ± 0.6	1.9 ± 0.26	0.3 ± 0.05
Fukushima, FUKUSHIMA	1.53	0.056	0.657	9.3 ± 0.71	17 ± 1.3	1.6 ± 0.32	0.2 ± 0.05
Okayama, OKAYAMA	1.54	0.137	0.596	6.1 ± 0.61	4.4 ± 0.44	1.3 ± 0.29	0.2 ± 0.05
Matsuyama, EHIME	1.68	0.056	0.639	3.4 ± 0.50	6.1 ± 0.89	2.1 ± 0.34	0.3 ± 0.05
Matsuyama, EHIME	1.48	0.059	0.626	3.1 ± 0.44	5.2 ± 0.73	1.1 ± 0.27	0.2 ± 0.04
Kaimon, KAGOSHIMA	1.91	0.169	0.772	52 ± 1.5	31 ± 0.9	30 ± 0.9	3.9 ± 0.12
December, 1978							
Shinjuku, TOKYO	1.90	0.058	0.836	10 ± 0.6	17 ± 1.1	3.8 ± 0.35	0.4 ± 0.04
Saga, SAGA	1.75	0.096	0.697	9.5 ± 0.71	9.9 ± 0.74	2.2 ± 0.35	0.3 ± 0.05
January, 1979							
Takaoka-gun, KOCHI	1.49	0.075	0.608	16 ± 0.9	22 ± 1.2	2.2 ± 0.31	0.4 ± 0.05
Nagasaki, NAGASAKI	1.65	0.088	0.600	12 ± 0.9	13 ± 1.0	3.1 ± 0.48	0.5 ± 0.08

Location	Component			^{90}Sr		^{137}Cs	
	Ash (%)	Ca (%)	K (%)	pCi/Kg	S.U.	pCi/Kg	C.U.
February, 1979							
Yokohama, KANAGAWA	1.41	0.048	0.604	7.5 ± 0.58	16 ± 1.2	1.2 ± 0.29	0.2 ± 0.05
Hiroshima, HIROSHIMA	1.28	0.039	0.533	4.3 ± 0.53	11 ± 1.4	1.7 ± 0.35	0.3 ± 0.07
Ohtsu-shi, YAMAGUCHI	1.45	0.069	0.632	21 ± 1.0	30 ± 1.5	3.4 ± 0.37	0.5 ± 0.06
Katsuren, OKINAWA	1.43	0.055	0.402	0.00 ± 0.46	0.00 ± 0.84	0.7 ± 0.38	0.2 ± 0.09
(Japanese radish)							
June, 1978							
Atumi-gun, AICHI	0.638	0.013	0.316	1.8 ± 0.31	14 ± 2.4	0.8 ± 0.16	0.2 ± 0.05
August, 1978							
Ohta, SHIMANE	0.592	0.025	0.230	21 ± 0.7	85 ± 2.7	16 ± 0.4	7.0 ± 0.19
September, 1978							
Ishikari, HOKKAIDO	0.621	0.023	0.307	9.2 ± 0.50	39 ± 2.1	1.6 ± 0.20	0.5 ± 0.06
October, 1978							
Sendai, MIYAGI	0.666	0.041	0.293	4.8 ± 0.36	12 ± 0.9	0.3 ± 0.15	0.1 ± 0.05
Akita, AKITA	0.499	0.027	0.201	20 ± 0.6	75 ± 2.4	0.8 ± 0.15	0.4 ± 0.08
Yamagata, YAMAGATA	0.641	0.028	0.289	1.5 ± 0.30	5.5 ± 1.1	0.6 ± 0.16	0.2 ± 0.06
Kyoto, KYOTO	0.657	0.029	0.306	32 ± 0.8	100 ± 3	2.3 ± 0.22	0.8 ± 0.07
Shinjuku, TOKYO	0.482	0.019	0.215	8.9 ± 0.47	47 ± 2.5	1.3 ± 0.16	0.6 ± 0.08
Kanazawa, ISHIKAWA	0.568	0.026	0.241	8.2 ± 0.42	32 ± 1.6	1.9 ± 0.20	0.8 ± 0.08
Saku, NAGANO	0.655	0.036	0.284	6.9 ± 0.47	19 ± 1.3	0.7 ± 0.17	0.3 ± 0.06
Gotenba, SHIZUOKA	0.338	0.016	0.165	9.9 ± 0.52	63 ± 3.3	1.7 ± 0.21	1.1 ± 0.13
Osaka, OSAKA	0.462	0.016	0.225	14 ± 0.7	90 ± 4.7	0.5 ± 0.25	0.2 ± 0.11
Akashi, HYOGO	0.640	0.024	0.306	3.9 ± 0.33	16 ± 1.4	0.5 ± 0.15	0.2 ± 0.05
Kasuya-gun, FUKUOKA	0.680	0.071	0.254	15 ± 0.6	21 ± 0.8	0.9 ± 0.17	0.4 ± 0.07
Sannohe, AOMORI	0.567	0.031	0.252	19 ± 0.6	60 ± 1.9	2.9 ± 0.25	1.2 ± 0.10
Fukushima, FUKUSHIMA	0.439	0.028	0.170	2.9 ± 0.25	10 ± 0.9	0.4 ± 0.11	0.3 ± 0.06
Niigata, NIIGATA	0.438	0.021	0.194	2.5 ± 0.22	12 ± 1.1	0.7 ± 0.12	0.4 ± 0.06
Fukui, FUKUI	0.545	0.030	0.249	4.5 ± 0.32	15 ± 1.1	0.3 ± 0.14	0.1 ± 0.06
Okayama, OKAYAMA	0.668	0.032	0.276	1.5 ± 0.26	4.7 ± 0.79	0.3 ± 0.16	0.1 ± 0.06
Kaimon, KAGOSHIMA	0.666	0.041	0.284	14 ± 0.6	34 ± 1.4	4.9 ± 0.30	1.7 ± 0.10
December, 1978							
Wakayama, WAKAYAMA	0.764	0.043	0.293	5.6 ± 0.42	13 ± 1.0	0.5 ± 0.19	0.2 ± 0.06
Kokufu (Iwami-gun) TOTTORI	0.622	0.028	0.282	11 ± 0.5	41 ± 1.8	0.5 ± 0.17	0.2 ± 0.06
Saga, SAGA	0.547	0.032	0.259	7.3 ± 0.40	23 ± 1.3	0.6 ± 0.16	0.2 ± 0.06
January, 1979							
Takaoka-gun, KOCHI	0.562	0.048	0.223	17 ± 0.6	35 ± 1.2	0.7 ± 0.15	0.3 ± 0.07
Nagasaki, NAGASAKI	0.465	0.035	0.172	6.4 ± 0.32	18 ± 0.9	–	–

Location	Component			^{90}Sr		^{137}Cs	
	Ash (%)	Ca (%)	K (%)	pCi/Kg	S.U.	pCi/Kg	C.U.
February, 1979							
Yokohama, KANAGAWA	0.449	0.023	0.195	5.3 ± 0.32	23 ± 1.4	0.1 ± 0.11	0.1 ± 0.06
Hiroshima, HIROSHIMA	0.559	0.033	0.236	5.4 ± 0.37	16 ± 1.1	0.4 ± 0.13	0.2 ± 0.06
Ohtsu-shi, YAMAGUCHI	0.599	0.036	0.279	7.8 ± 0.44	22 ± 1.2	0.0 ± 0.14	0.0 ± 0.05
Katsuren, OKINAWA	0.637	0.035	0.260	2.5 ± 0.31	7.1 ± 0.88	0.4 ± 0.16	0.1 ± 0.06
(Cabbage)							
November, 1978							
Sannohe, AOMORI	0.683	0.042	0.309	18 ± 0.7	44 ± 1.7	1.4 ± 0.20	0.5 ± 0.07
Akita, AKITA	0.733	0.085	0.270	34 ± 1.0	41 ± 1.1	2.8 ± 0.27	1.0 ± 0.10
(Chainese cabbage)							
December, 1978							
Wakayama, WAKAYAMA	1.15	0.128	0.329	13 ± 0.8	10 ± 0.6	1.0 ± 0.27	0.3 ± 0.08

Figure 5 Sampling Locations of Vegetables

1. Ishikari
2. Sannohe
3. Akita
4. Sendai
5. Yamagata
6. Fukushima
7. Niigata
8. Shinjuku
9. Yokohama
10. Gotenba
11. Saku
12. Akabane
13. Kanazawa
14. Fukui
15. Kyoto
16. Osaka
17. Wakayama
18. Akashi
19. Kokufu (Iwami-gun)
20. Kurayoshi
21. Okayama
22. Ohda
23. Hiroshim
24. Yuya (Ohzu-gun)
25. Tobe
26. Matsuyama
27. Kubokawa (Takaoka-gun)
28. Shime (Kasuya-gun)
29. Saga
30. Nagasaki
31. Kaimon (Ibusuki-gun)
32. Naha



(6) Strontium-90 and Cesium-137 in Tea (Green tea) (from May 1978 to July 1978)

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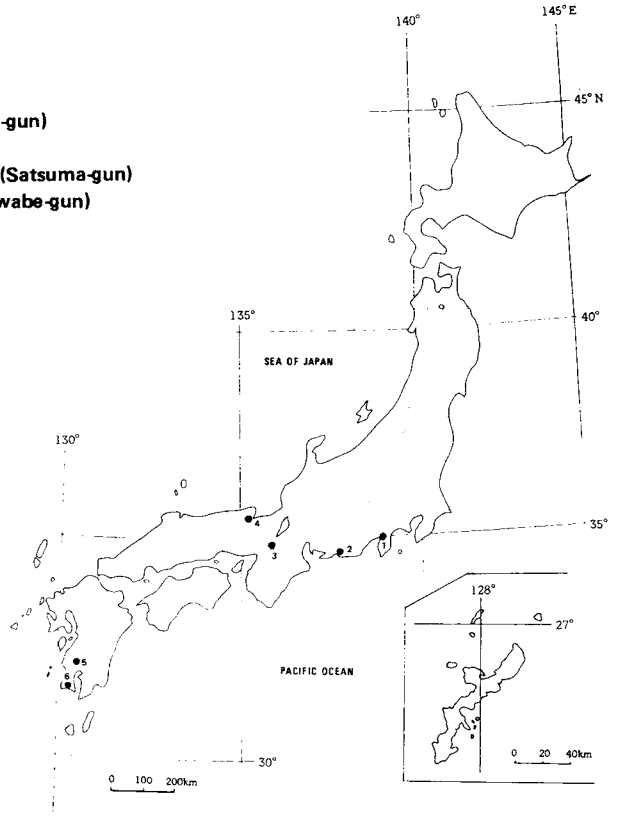
Table 6: Strontium-90 and Cesium-137 in Tea (Green tea)

Location	Component			^{90}Sr		^{137}Cs	
	Ash (%)	Ca (%)	K (%)	pCi/Kg	S.U.	pCi/Kg	C.U.
May, 1978							
Kagoshima, KAGOSHIMA	5.54	0.254	1.93	90 ± 4.5	36 ± 1.8	320 ± 6	16 ± 0.3
Kagoshima, KAGOSHIMA	5.56	0.286	1.91	150 ± 6	52 ± 1.9	350 ± 6	18 ± 0.3
June, 1978							
Shizuoka, SHIZUOKA	5.12	0.381	1.79	410 ± 8	110 ± 2	260 ± 5	15 ± 0.3
Shizuoka, SHIZUOKA	5.88	0.422	1.92	140 ± 5	32 ± 1.3	150 ± 4	7.6± 0.2
Kyoto, KYOTO	5.16	0.247	2.06	57 ± 3.5	23 ± 1.4	140 ± 4	6.7± 0.1
July, 1978							
Kyoto, KYOTO	6.20	0.558	1.99	190 ± 7	35 ± 1.3	200 ± 5	9.9± 0.2

Figure 6 Sampling Locations of Tea (Green tea)

1. Shuzenji
2. Iwata
3. Kaya (Yosa-gun)
4. Uji
5. Miyanojyo (Satsuma-gun)
6. Chiran (Kawabe-gun)



(7) Strontium-90 and Cesium-137 in Seaweeds (from May 1978 to March 1979)

– Continued from No. 49 of this publication –

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

Location	Date	Component			^{90}Sr		^{137}Cs	
		Ash(%)	Ca(%)	K(%)	pCi/Kg	S.U.	pCi/Kg	C.U.
(Katsuwonus pelamis)								
Tosa, KOCHI	May, 1978	2.88	22.2	11.9	0.5 ± 0.28	0.1 ± 0.04	21. ± 0.6	6.2 ± 0.19
(Undaria pinnatifida)								
Sakata, YAMAGATA	June, 1978	2.17	6.28	18.9	4.2 ± 0.39	3.1 ± 0.29	1.8 ± 0.22	0.5 ± 0.05
Sado, NIIGATA	June, 1978	0.968	0.107	1.21	4.2 ± 0.44	3.9 ± 0.41	0.6 ± 0.23	0.5 ± 0.19
Chita, AICHI	Jan., 1979	1.56	2.40	27.0	0.8 ± 0.27	2.0 ± 0.70	0.8 ± 0.20	0.2 ± 0.05
Nagasaki, NAGASAKI	Jan., 1979	2.08	3.26	35.2	1.9 ± 0.41	2.8 ± 0.60	1.4 ± 0.29	0.2 ± 0.04
Hiroshima, HIROSHIMA	Feb., 1979	3.11	1.86	19.7	0.4 ± 0.33	0.7 ± 0.57	1.3 ± 0.27	0.2 ± 0.04
(Turbo cornutus)								
Sado, NIIGATA	June, 1978	2.20	3.40	10.5	1.7 ± 1.5	2.3 ± 2.0	1.4 ± 0.77	0.6 ± 0.34
Sakata, YAMAGATA	July, 1978	1.55	6.13	11.9	1.7 ± 1.1	1.8 ± 1.1	2.0 ± 0.68	1.1 ± 0.37
Togi, ISHIKAWA	Aug., 1978	2.87	0.210	0.219	0.05± 0.95	0.02 ± 0.45	3.9 ± 0.75	1.8 ± 0.34
(Sillago sihame)								
Chita-gun, AICHI	June, 1978	3.72	22.6	6.74	1.0 ± 0.31	0.1 ± 0.04	3.8 ± 0.31	1.5 ± 0.12
(Venerupis phillippinarum)								
Chita-gun, AICHI	June, 1978	2.31	7.55	10.8	0.0 ± 0.68	0.0 ± 0.39	1.0 ± 0.46	0.4 ± 0.18
Nagasaki, NAGASAKI	July, 1978	1.65	0.044	0.257	0.9 ± 1.3	2.1 ± 2.9	1.8 ± 0.79	0.70 ± 0.31
(Trachurus trachurus)								
Ogashima, HYOGO	July, 1978	2.83	21.5	16.3	0.10± 0.30	0.02 ± 0.050	13 ± 0.5	2.7 ± 0.12
Wakayama, WAKAYAMA	Sept., 1978	3.74	0.899	0.350	1.5 ± 0.31	0.2 ± 0.03	8.9 ± 0.50	2.5 ± 0.14
Odawara, KANAGAWA	Oct., 1978	3.69	0.909	0.334	1.1 ± 0.33	0.1 ± 0.04	7.5 ± 0.46	2.3 ± 0.14
(Sebastiscus marmoratus)								
Hamada, SHIMANE	June, 1978	2.55	0.619	0.129	1.3 ± 0.29	0.2 ± 0.05	2.5 ± 0.27	1.9 ± 0.21
(Chrysophrys major)								
Fukuoka, FUKUOKA	July, 1978	5.14	1.12	0.514	0.9 ± 0.56	0.08 ± 0.05	8.1 ± 0.63	1.6 ± 0.12
(Argyrosomus argentatus)								
Nagasaki, NAGASAKI	July, 1978	1.12	0.031	0.358	0.4 ± 0.78	1.3 ± 2.5	9.3 ± 0.79	2.6 ± 0.22
(Pneumatophorus japonicus)								
Matsuyama, EHIME	Aug., 1978	1.16	0.023	0.374	0.2 ± 0.55	1.0 ± 2.3	11 ± 0.5	2.9 ± 0.14
Shizuoka, SHIZUOKA	Nov., 1978	2.29	0.519	0.280	0.2 ± 0.29	0.03 ± 0.066	11 ± 0.5	3.8 ± 0.17
Maizuru, KYOTO	Nov., 1978	2.74	0.578	0.375	0.2 ± 0.29	0.03 ± 0.051	7.4 ± 0.42	2.0 ± 0.11
Osaka, OSAKA	Nov., 1978	2.24	0.477	0.204	0.8 ± 0.36	0.2 ± 0.07	9.4 ± 0.50	4.6 ± 0.25
Tottori	Feb., 1979	0.638	5.42	24.0	0.0 ± 0.25	0.0 ± 0.62	5.1 ± 0.32	2.9 ± 0.18

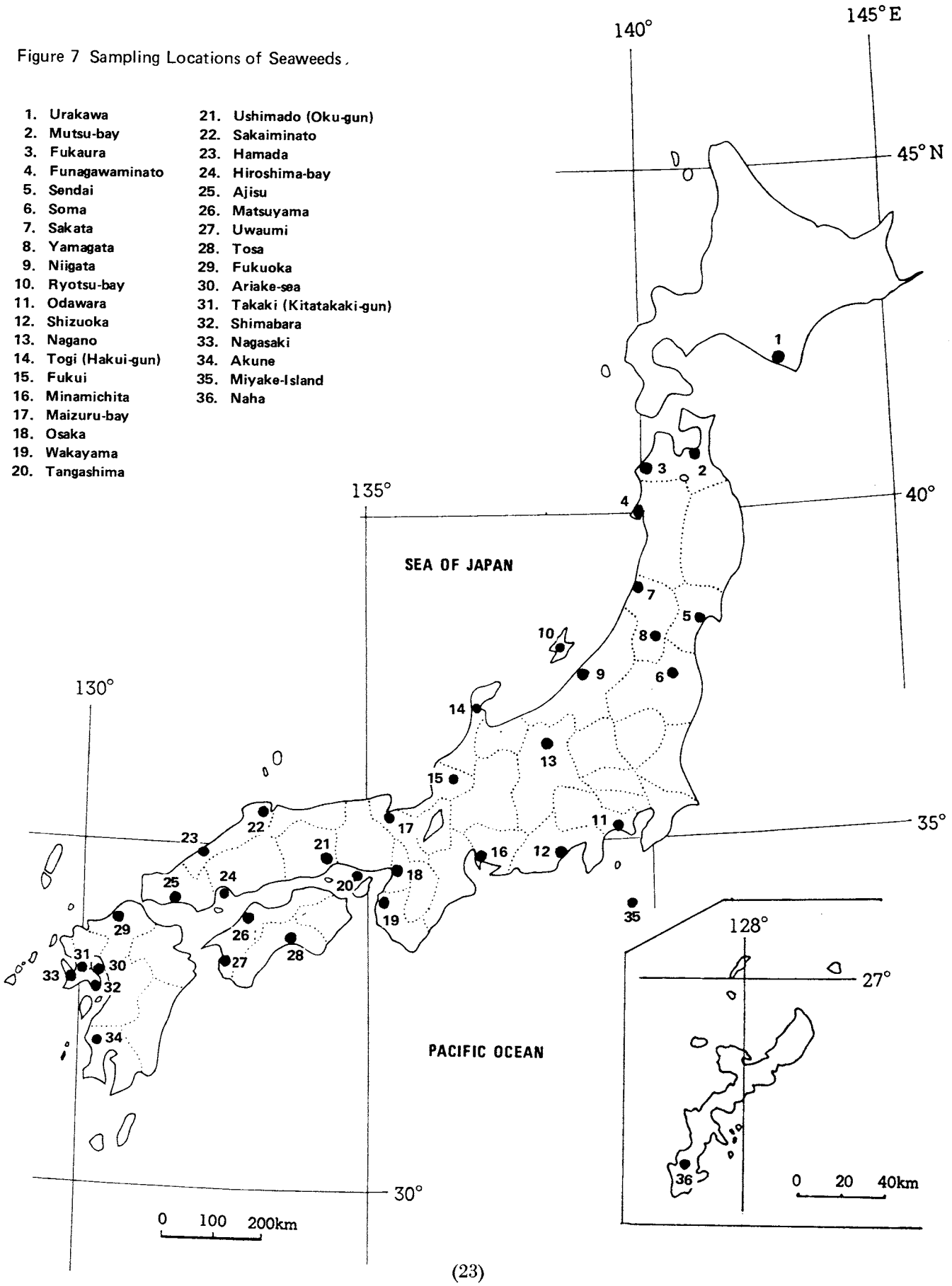
Location	Date	Component			^{90}Sr		^{137}Cs	
		Ash(%)	Ca(%)	K(%)	pCi/Kg	S.U.	pCi/Kg	C.U.
(Mugil cephalus)								
Saga, SAGA	Aug., 1978	1.46	0.112	0.407	0.2 ± 0.22	0.2 ± 0.20	4.9 ± 0.34	1.2 ± 0.08
Okayama, OKAYAMA	Nov., 1978	1.16	1.75	31.2	0.6 ± 0.44	2.5 ± 1.9	5.1 ± 0.44	1.3 ± 0.11
Naha, OKINAWA	Mar., 1979	6.59	19.8	5.63	2.0 ± 0.4	0.2 ± 0.03	4.5 ± 0.46	1.2 ± 0.12
(Ommastrephes sloani pacificus)								
Yamagata, YAMAGATA	Sept., 1978	0.503	0.007	0.097	0.4 ± 0.21	4.8 ± 2.9	1.2 ± 0.16	1.3 ± 0.16
(Decapterus)								
Miyake-Island, TOKYO	Sept., 1978	1.94	0.341	0.213	0.5 ± 0.28	0.2 ± 0.08	5.1 ± 0.39	2.4 ± 0.18
(Sargassum fulvellum)								
Ishikawa, ISHIKAWA	Sept., 1978	2.47	0.331	0.742	4.0 ± 0.45	1.2 ± 0.13	2.4 ± 0.29	0.3 ± 0.0
Aomori, AOMORI	Nov., 1978	5.48	1.12	0.612	13 ± 0.9	1.1 ± 0.08	2.9 ± 0.33	0.5 ± 0.05
(Oncorhynchus Keta)								
Uraga, Hokkaido	Oct. 1978	1.35	0.087	0.400	0.3 ± 0.20	0.3 ± 0.23	7.9 ± 0.35	2.0 ± 0.09
(Seriola quinqueradiata)								
Ishikawa, ISHIKAWA	Oct., 1978	1.31	0.082	0.377	0.0 ± 0.41	0.0 ± 0.51	12 ± 0.6	3.1 ± 0.16
(Pleuronectidae)								
Mutu, AOMORI	Nov., 1978	1.23	0.101	0.323	0.9 ± 0.47	0.8 ± 0.47	5.2 ± 0.44	1.6 ± 0.14
Fukui, FUKUI	Nov., 1978	1.01	3.66	31.7	0.0 ± 0.30	0.0 ± 0.78	6.8 ± 0.42	2.1 ± 0.13
Niigata (Limanda Yokohamae)	Nov., 1978	3.81	22.2	10.7	1.0 ± 0.29	0.1 ± 0.03	4.8 ± 0.36	1.2 ± 0.09
Hiroshima, HIROSHIMA	Dec., 1978	2.64	22.9	13.0	1.0 ± 0.33	0.2 ± 0.05	4.3 ± 0.33	2.0 ± 0.15
Sendai, MIYAGI	Feb., 1979	3.44	21.3	7.34	1.1 ± 0.39	0.2 ± 0.05	4.3 ± 0.41	1.7 ± 0.16
(Pecten yessoensis)								
Mutu-bay, AOMORI	Nov., 1978	1.10	1.49	24.8	0.0 ± 0.30	0.0 ± 1.8	1.6 ± 0.30	0.6 ± 0.11
(Arctoscopus japonicus)								
Akita, AKITA	Dec., 1978	2.37	19.9	13.2	0.6 ± 0.29	0.1 ± 0.06	3.8 ± 0.36	1.2 ± 0.11
(Sardinops melanosticta)								
Nagano, NAGANO	Dec., 1978	2.24	28.2	9.53	0.3 ± 0.25	0.05 ± 0.04	4.3 ± 0.33	2.0 ± 0.15
(Stolephorus japonicus)								
Kagoshima, KAGOSHIMA	Dec., 1978	2.92	20.6	11.4	0.5 ± 0.30	0.1 ± 0.05	11 ± 0.5	3.1 ± 0.14
(Ostrea gigas)								
Hiroshima, HIROSHIMA	Jan., 1979	3.02	15.2	6.83	0.4 ± 0.34	0.1 ± 0.07	2.2 ± 0.35	1.0 ± 0.17
(Caesio chrysozonus cuvier)								
Naha, OKINAWA	Feb., 1979	3.32	17.5	8.04	0.5 ± 0.34	0.1 ± 0.06	6.4 ± 0.45	2.4 ± 0.17
(Sebastes inermis)								
Fukushima, FUKUSHIMA	Mar., 1979	4.36	20.0	6.19	0.3 ± 0.34	0.04 ± 0.04	10 ± 0.5	3.8 ± 0.20

Location	Date	Component			^{90}Sr		^{137}Cs	
		Ash(%)	Ca(%)	K(%)	pCi/Kg	S.U.	pCi/Kg	C.U.
(Hexagrammos Otakii)								
Yamaguchi, YAMAGUCHI	Mar., 1979	3.33	22.1	6.29	1.0 ± 0.34	0.1 ± 0.04	4.1 ± 0.40	1.6 ± 0.15
(Gerres Macrosoma)								
Naha, OKINAWA	Mar., 1979	4.13	18.2	6.61	0.9 ± 0.25	0.1 ± 0.03	6.2 ± 0.42	2.3 ± 0.15
(Scarots Rubroviolaceus)								
Naha, OKINAWA	Mar., 1979	5.99	19.5	5.24	1.2 ± 0.31	0.1 ± 0.03	10 ± 0.6	3.1 ± 0.19
(Therapon theraps)								
Naha, OKINAWA	Mar. 1979	5.08	19.6	5.34	1.0 ± 0.28	0.1 ± 0.03	4.9 ± 0.42	1.8 ± 0.1
(Clupanodon thrissa)								
Naha, OKINAWA	Mar., 1979	3.83	20.3	7.46	0.8 ± 0.25	0.1 ± 0.03	3.2 ± 0.35	1.1 ± 0.1
(Lethrinus Xanthochilus)								
Naha, OKINAWA	Mar., 1979	5.48	19.8	5.63	1.7 ± 0.31	0.2 ± 0.03	11 ± 0.6	3.7 ± 0.1

Scientific name	English name	Japanese name
Katsuwonus pelamis	Bonito	Katsuo
Undaris pinnatifida	Wakame seaweed	Wakame
Turbo cornutus	Wreath shell	Sazae
Sillago sihame	Sillago	Kisu
Venerupis phillippinarum	Short-necked clam	Asari
Trachurus trachurus	Saurel	Aji
Sebastiscus marmoratus	Scorpion-fish	Kasago
Chrysophrys major	Sea bream	Tai
Argyrosomus argentatus	Croaker	Guchi (Ishimochi)
Pneumatophorus japonicus	Mackerel	Saba
Mugil cephalus	Gray mullet	Bora
Ommastrephes sloani pacificus	Cuttlefish	Sulumeika
Decapterus	House-mackerel	Muro-agi
Sargassum fulvellum	Gulfweed	Hondawara
Oncorhynchus Keta	Salmon	Sake
Seriola quinqueradiata	Yellow-tail	Buri
Pleuronectidae	Flatfish	Karei
Pecten yessoensis	Scallop	Hotategai
Arctoscopus japonicus	Hatahata	Hatahata
Sardinops melanosticta	Sardine	Iwashi
Stolephorus japonicus	Kibinago	Kibinago
Ostrea gigas	Oyster	Kaki
Caesio chrysozonus cuvier	Takasago	Takasago
Sebastes inermis	Jacopever	Kurogara
Hexagrammos otakii	Rock-trout	Ainame
Gerres Macrosoma	Big Mouth Majarras	Ōkuchisagi
Scarots Rubroviolaceus	Parrotfish	Nagabudai
Therapon theraps		Kotohiki
Clupanodon thrissa		Konoshiro
Lethrinus Xanthochilus	Rudder fish	Muneakakuchibi

Figure 7 Sampling Locations of Seaweeds.

1. Urakawa
2. Mutsu-bay
3. Fukaura
4. Funagawaminato
5. Sendai
6. Soma
7. Sakata
8. Yamagata
9. Niigata
10. Ryotsu-bay
11. Odawara
12. Shizuoka
13. Nagano
14. Togi (Hakui-gun)
15. Fukui
16. Minamichita
17. Maizuru-bay
18. Osaka
19. Wakayama
20. Tangashima
21. Ushimado (Oku-gun)
22. Sakaiminato
23. Hamada
24. Hiroshima-bay
25. Ajisu
26. Matsuyama
27. Uwaumi
28. Tosa
29. Fukuoka
30. Ariake-sea
31. Takaki (Kitatakaki-gun)
32. Shimabara
33. Nagasaki
34. Akune
35. Miyake-Island
36. Naha



(8) Strontium-90 and Cesium-137 in Freshwater fish (from July 1978 to December 1978)

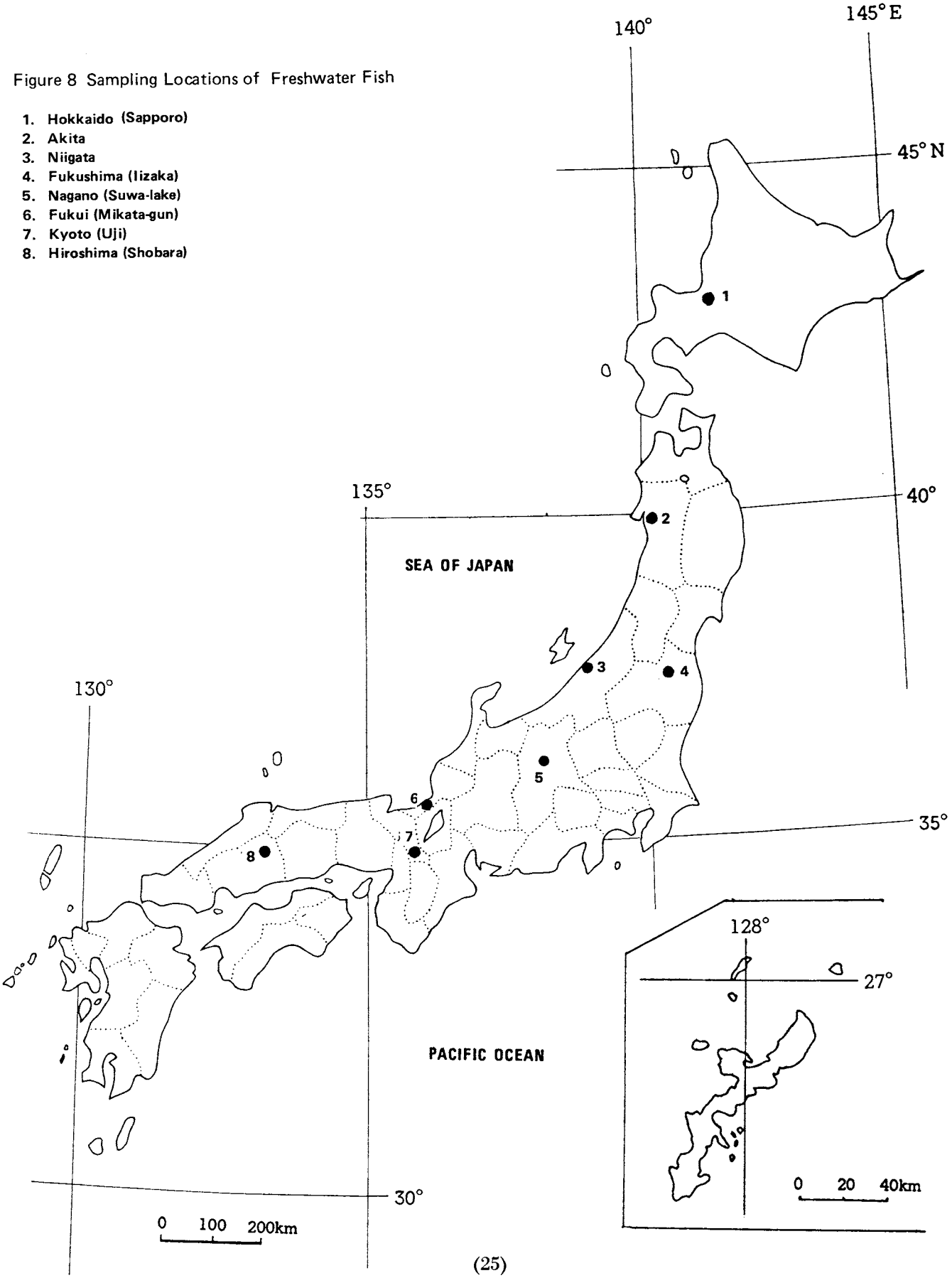
– Continued from No. 49 of this publication –

Table 8: Strontium-90 and Cesium-137 in Freshwater fish

Sampling Location	Date	Ash(%)	Component (% by weight)		^{90}Sr (pCi/ℓ)		^{137}Cs (pCi/ℓ)	
			Ca(%)	K(%)	pCi/Kg	S.U.	pCi/Kg	C.U.
(Cyprinus carpio)								
Akita, AKITA	July, 1978	3.56	1.01	0.199	95 ± 2.2	9.5 ± 0.22	7.4± 0.66	3.7 ± 0.33
Iizaka, FUKUSHIMA	Sept., 1978	2.63	0.632	0.211	49 ± 1.4	7.7 ± 0.22	13 ± 0.6	6.2 ± 0.30
Shobara, HIROSHIMA	Nov., 1978	2.24	0.504	0.345	27 ± 0.9	5.4 ± 0.18	19 ± 0.6	5.6 ± 0.17
(Carassius auratus)								
Sapporo, HOKKAIDO	Oct., 1978	4.07	1.15	0.265	54 ± 1.3	4.6 ± 0.11	7.3± 0.46	2.8 ± 0.17
Uji, KYOTO	Dec., 1978	5.12	1.58	0.263	84 ± 1.7	5.2 ± 0.10	8.2± 0.47	3.1 ± 0.18
Mikata (Mikata-gun), FUKUI	Dec., 1978	0.992	3.83	30.1	2.3± 0.42	5.3 ± 0.98	15 ± 0.6	4.4 ± 0.18
(Carassius Carassius cuvieri)								
Niigata, NIIGATA	Nov., 1978	4.89	26.3	5.91	120 ± 2	8.3 ± 0.16	12 ± 0.5	3.8 ± 0.17
(Hypomesus olidus)								
Suwa-lake, NAGANO	Dec., 1978	2.13	20.5	14.5	7.3± 0.46	1.7 ± 0.10	6.7± 0.38	2.1 ± 0.12

Figure 8 Sampling Locations of Freshwater Fish

1. Hokkaido (Sapporo)
2. Akita
3. Niigata
4. Fukushima (Iizaka)
5. Nagano (Suwa-lake)
6. Fukui (Mikata-gun)
7. Kyoto (Uji)
8. Hiroshima (Shobara)



(9) Strontium-90 and Cesium-137 in Powdered milk (from Oct. 1978 to Nov. 1978)

— Continued from No. 49 of this publication —

Table 9: Strontium-90 and Cesium-137 in Powdered milk

Name of producer	Component			^{90}Sr		^{137}Cs	
	Ash(%)	Ca(%)	K(%)	pCi/Kg	S.U.	pCi/Kg	C.U.
October, 1978							
Morinaga*	8.37	1.31	1.87	35 ± 1.5	2.7 ± 0.12	79 ± 1.9	4.2 ± 0.10
Morinaga*	2.57	0.337	0.599	15 ± 0.7	4.6 ± 0.21	110 ± 1	18 ± 0.2
Yukijirushi*	2.45	0.372	0.514	17 ± 0.8	4.5 ± 0.21	75 ± 1.2	14 ± 0.2
Meiji	3.18	0.487	0.674	22 ± 1.0	4.6 ± 0.21	110 ± 2	17 ± 0.3
Wako-do	2.41	0.313	0.574	4.4 ± 0.44	1.4 ± 0.14	17 ± 0.6	2.9 ± 0.11
Nov., 1978							
Meiji*	8.27	1.29	2.06	75 ± 2.2	5.8 ± 0.17	230 ± 3	11 ± 0.2

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