ISSN 0441-2516
NIRS-RSD-62

RADIOACTIVITY SURVEY DATA in Japan

NUMBER 62
Sep. 1982

National Institute of Radiological Sciences
Chiba, Japan

Radioactivity Survey Data in Japan Number 62

September 1982

Contents

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 duststorms, 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.

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

(9) Milk

Raw milk was collected in producing districts and commercial milk was purchased in consuming districts. Milk in a stainless steel pan or a porcelain dish was evaporated to dryness followed by carbonization and ashing.

(10) Vegetables

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

(11) Tea

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

(12) Fish, shellfish and seaweeds

a. Sea fish and freshwater fish

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

b. Shellfish

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

c. Seaweeds

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

Table 1 shows detailes of sample collection.

Table 1 Details of sample collection

Sample	Frequency of sampling	Quantity of sample
= Environmental materials =		
(1) Rain and dry fallout		
1 for domestic program	monthly	
2 for WHO program	monthly	
(2) Airborne dust	quarterly	>3000 m^3/month
(3) Service water and freshwater		
1 Service water (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

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)	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 contamination 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 washings. 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. Counting

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. Results

(1)-1 Strontium-90 and Cesium-137 in Rain and dry fallout (for domestic program) (from Jun. 1982 to Dec. 1982)

– continued from No. 60 of this publication –

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

Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
June, 1982				
Kyoto, KYOTO	31	73.4	0.0040 ± 0.0007	0.0070 ± 0.0009
Matsue, SHIMANE	31	58.6	0.0050 ± 0.0007	0.0080 ± 0.0009
Hiroshima, HIROSHIMA	30	74.0	0.0130 ± 0.0010	0.0090 ± 0.0009
Saga, SAGA	33	414.6	0.0060 ± 0.0008	0.0050 ± 0.0009
Nagasaki, NAGASAKI	31	66.0	0.0030 ± 0.0007	0.0030 ± 0.0007
July, 1982				
Sapporo, HOKKAIDO	33	44.5	0.0090 ± 0.0009	0.012 ± 0.0010
Aomori, AOMORI	34	26.7	0.0080 ± 0.0008	0.0060 ± 0.0009
Ojika-gun, MIYAGI	31	99.7	0.0010 ± 0.0006	0.0080 ± 0.0010
Futaba-gun, FUKUSHIMA	32	128.0	0.0070 ± 0.0008	0.0110 ± 0.0010
Mito, IBARAGI	33	154.0	0.0050 ± 0.0008	0.0060 ± 0.0009
Shinjuku, TOKYO	32	139.0	0.0070 ± 0.0009	0.0140 ± 0.0011
Yokohama, KANAGAWA	34	193.0	0.0080 ± 0.0008	0.0100 ± 0.0010
Fukui, FUKUI	30	131.5	0.0020 ± 0.0007	0.0070 ± 0.0009
Shizuoka, SHIZUOKA	33	622.0	0.0070 ± 0.0008	0.0110 ± 0.0010
Kyoto, KYOTO	33	421.9	0.0070 ± 0.0008	0.0090 ± 0.0009
Wakayama, WAKAYAMA	26	243.5	0.0040 ± 0.0007	0.0050 ± 0.0009
Tottori' TOTTORI	34	246.4	0.0100 ± 0.0009	0.0070 ± 0.0009
Matsue, SHIMANE	32	98.0	0.0040 ± 0.0007	0.0070 ± 0.0009
Hiroshima, HIROSHIMA	33	365.9	0.0170 ± 0.0012	0.0100 ± 0.0009
Matsuyama, EHIME	33	305.5	0.0050 ± 0.0008	0.0070 ± 0.0008
Tsukushi-gun, FUKUOKA	32	566.4	0.0070 ± 0.0008	0.0120 ± 0.0011
Saga, SAGA	39	414.5	0.0050 ± 0.0007	0.0040 ± 0.0008
Nagasaki, NAGASAKI	33	1,178.5	0.0080 ± 0.0008	0.0070 ± 0.0009
Nakagami-gun, OKINAWA	35	79.5	0.0030 ± 0.0006	0.0020 ± 0.0007
August, 1982				
Sapporo, HOKKAIDO	31	47.5	0.0030 ± 0.0007	0.0040 ± 0.0008
Aomori, AOMORI	30	112.7	0.0050 ± 0.0008	0.0030 ± 0.0008
Ojika-gun, MIYAGI	32	112.4	0.0100 ± 0.0009	0.0070 ± 0.0007
Yamagata, YAMAGATA	31	73.8	0.0010 ± 0.0006	0.0030 ± 0.0008
Futaba-gun, FUKUSHIMA	32	189.0	0.0020 ± 0.0007	0.0050 ± 0.0009

Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
Mito, IBARAGI	31	190.5	0.0040 ± 0.0007	0.0060 ± 0.0007
Shinjuku, TOKYO	32	205.0	0.0030 ± 0.0007	0.0040 ± 0.0006
Yokohama, KANAGAWA	30	187.6	0.0030 ± 0.0006	0.0020 ± 0.0005
Fukui, FUKUI	27	263.3	0.0030 ± 0.0006	0.0100 ± 0.0009
Shizuoka, SHIZUOKA	32	344.0	0.0040 ± 0.0008	0.0060 ± 0.0007
Nagoya, AICHI	31	342.0	0.0050 ± 0.0008	0.0070 ± 0.0009
Kyoto, KYOTO	31	172.7	0.0050 ± 0.0008	0.0040 ± 0.0006
Kobe, HYOGO	33	128.6	0.0040 ± 0.0007	0.0050 ± 0.0008
Wakayama, WAKAYAMA	38	324.0	0.0050 ± 0.0008	0.0070 ± 0.0007
Tottori, TOTTORI	30	154.5	0.0070 ± 0.0008	0.0030 ± 0.0006
Matsue, SHIMANE	32	141.6	0.0030 ± 0.0007	0.0050 ± 0.0007
Hiroshima, HIROSHIMA	31	56.4	0.0110 ± 0.0010	0.0110 ± 0.0009
Matsuyama, EHIME	31	75.0	0.0020 ± 0.0007	0.0030 ± 0.0006
Tsukushi-gun, FUKUOKA	32	363.6	0.0050 ± 0.0008	0.0040 ± 0.0007
Saga, SAGA	26	25.8	0.0010 ± 0.0006	0.0000 ± 0.0004
Nagasaki, NAGASAKI	31	169.0	0.0030 ± 0.0008	0.0010 ± 0.0005
Nakagami-gun, OKINAWA	35	145.5	0.0010 ± 0.0007	0.0020 ± 0.0005
September, 1982				
Sapporo, HOKKAIDO	31	133.0	0.0040 ± 0.0023	0.0040 ± 0.0009
Aomori, AOMORI	31	101.1	0.0020 ± 0.0007	0.0020 ± 0.0007
Ojika-gun, MIYAGI	31	140.1	0.0080 ± 0.0008	0.0060 ± 0.0008
Yamagata, YAMAGATA	31	141.5	0.0040 ± 0.0006	0.0050 ± 0.0009
Futaba-gun, FUKUSHIMA	31	231.0	0.0060 ± 0.0008	0.0070 ± 0.0008
Mito, IBARAGI	31	253.5	0.0040 ± 0.0007	0.0050 ± 0.0007
Shinjuku, TOKYO	31	301.4	0.0050 ± 0.0014	0.0040 ± 0.0008
Yokohama, KANAGAWA	31	438.7	0.0050 ± 0.0008	0.0050 ± 0.0008
Fukui, FUKUI	31	209.5	0.0020 ± 0.0007	0.0040 ± 0.0006
Shizuoka, SHIZUOKA	31	695.5	0.0020 ± 0.0007	0.0030 ± 0.0007

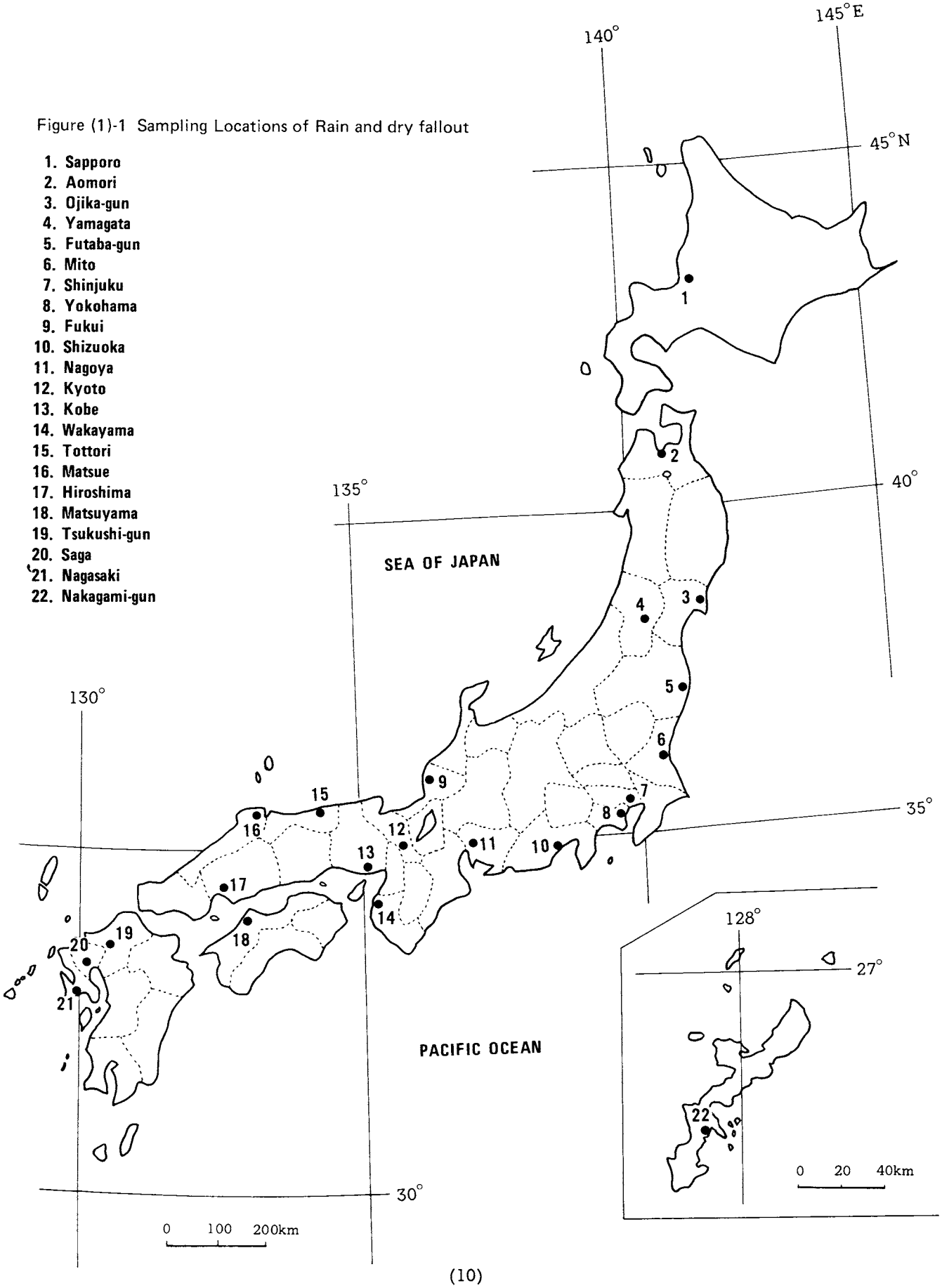
Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
Nagoya, AICHI	31	281.0	0.0050 ± 0.0008	0.0040 ± 0.0011
Kyoto, KYOTO	31	105.4	0.0030 ± 0.0006	0.0030 ± 0.0007
Kobe, HYOGO	30	78.1	0.0040 ± 0.0007	0.0040 ± 0.0009
Wakayama, WAKAYAMA	24	40.0	0.0030 ± 0.0007	0.0020 ± 0.0008
Tottori, TOTTORI	31	212.5	0.0080 ± 0.0009	0.0040 ± 0.0008
Matsue, SHIMANE	31	205.6	0.0040 ± 0.0007	0.0040 ± 0.0007
Hiroshima, HIROSHIMA	31	151.0	0.0120 ± 0.0010	0.0040 ± 0.0008
Matsuyama, EHIME	31	188.5	0.0040 ± 0.0007	0.0050 ± 0.0008
Tsukushi-gun, FUKUOKA	31	137.3	0.0030 ± 0.0007	0.0030 ± 0.0007
Saga, SAGA	32	125.7	0.0030 ± 0.0006	0.0020 ± 0.0005
Nagasaki, NAGASAKI	31	94.0	0.0030 ± 0.0007	0.0020 ± 0.0007
Nakagami-gun, OKINAWA	29	177.0	0.0010 ± 0.0005	0.0010 ± 0.0005
October, 1982				
Sapporo, HOKKAIDO	32	137.5	0.0060 ± 0.0008	0.0040 ± 0.0006
Aomori, AOMORI	32	62.8	0.0060 ± 0.0008	0.0030 ± 0.0008
Ojika-gun, MIYAGI	34	104.0	0.0100 ± 0.0009	0.0030 ± 0.0006
Yamagata, YAMAGATA	32	53.7	0.0040 ± 0.0007	0.0030 ± 0.0006
Futaba-gun, FUKUSHIMA	32	209.0	0.0060 ± 0.0008	0.0080 ± 0.0008
Mito, IBARAGI	32	144.0	0.0030 ± 0.0006	0.0030 ± 0.0006
Shinjuku, TOKYO	31	162.0	0.0040 ± 0.0008	0.0030 ± 0.0006
Yokohama, KANAGAWA	33	171.0	0.0050 ± 0.0008	0.0050 ± 0.0006
Fukui, FUKUI	33	90.6	0.0040 ± 0.0008	0.0040 ± 0.0006
Shizuoka, SHIZUOKA	31	111.0	0.0030 ± 0.0006	0.0030 ± 0.0006
Nagoya, AICHI	32	54.0	0.0020 ± 0.0007	0.0010 ± 0.0004
Kyoto, KYOTO	32	32.1	0.0030 ± 0.0007	0.0030 ± 0.0007
Kobe, HYOGO	31	26.6	0.0030 ± 0.0007	0.0020 ± 0.0006
Wakayama, WAKAYAMA	39	32.5	0.0020 ± 0.0007	0.0010 ± 0.0005
Tottori, TOTTORI	32	90.5	0.0070 ± 0.0008	0.0040 ± 0.0007

Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
Matsue, SHIMANE	31	68.1	0.0020 ± 0.0007	0.0030 ± 0.0006
Hiroshima, HIROSHIMA	33	61.9	0.0080 ± 0.0009	0.0030 ± 0.0006
Matsuyama, EHIME	32	25.5	0.0020 ± 0.0007	0.0050 ± 0.0006
Tsukushi-gun, FUKUOKA	33	41.9	0.0020 ± 0.0007	0.0030 ± 0.0007
Saga, SAGA	32	72.6	0.0030 ± 0.0007	0.0030 ± 0.0007
Nagasaki, NAGASAKI	32	20.0	0.0010 ± 0.0005	0.0010 ± 0.0005
Nakagami-gun, OKINAWA	30	134.5	0.0030 ± 0.0008	0.0010 ± 0.0007
November, 1982				
Sapporo, HOKKAIDO	31	80.5	0.0040 ± 0.0008	0.0040 ± 0.0008
Aomori, AOMORI	31	91.1	0.0030 ± 0.0007	0.0040 ± 0.0008
Ojika-gun, MIYAGI	29	86.7	0.0060 ± 0.0008	0.0040 ± 0.0008
Yamagata, YAMAGATA	31	58.3	0.0010 ± 0.0006	0.0030 ± 0.0007
Fukushima, FUKUSHIMA	31	92.0	0.0030 ± 0.0007	0.0050 ± 0.0008
Mito, IBARAGI	31	88.0	0.0020 ± 0.0007	0.0000 ± 0.0007
Shinjuku, TOKYO	32	146.0	0.0030 ± 0.0007	0.0030 ± 0.0006
Yokohama, KANAGAWA	30	131.4	0.0030 ± 0.0007	0.0030 ± 0.0006
Fukui, FUKUI	30	164.4	0.0040 ± 0.0008	0.0060 ± 0.0008
Shizuoka, SHIZUOKA	31	248.0	0.0030 ± 0.0008	0.0040 ± 0.0008
Nagoya, AICHI	31	113.0	0.0030 ± 0.0007	0.0030 ± 0.0005
Kyoto, KYOTO	31	112.2	0.0020 ± 0.0007	0.0000 ± 0.0006
Kobe, HYOGO	33	143.0	0.0030 ± 0.0007	0.0030 ± 0.0006
Wakayama, WAKAYAMA	31	107.0	0.0020 ± 0.0006	0.0030 ± 0.0006
Tottori, TOTTORI	31	100.7	0.0060 ± 0.0010	0.0050 ± 0.0009
Matsue, SHIMANE	32	82.7	0.0030 ± 0.0009	0.0050 ± 0.0008
Hiroshima, HIROSHIMA	30	119.9	0.0050 ± 0.0008	0.0040 ± 0.0009
Matsuyama, EHIME	31	110.5	0.0040 ± 0.0008	0.0120 ± 0.0010
Tsukushi-gun,FUKUOKA	31	108.7	0.0010 ± 0.0007	0.0010 ± 0.0007
Saga, SAGA	27	80.2	0.0010 ± 0.0006	0.0020 ± 0.0004
Nagasaki, NAGASAKI	32	181.5	0.0020 ± 0.0008	0.0020 ± 0.0008
Nakagami-gun, OKINAWA	29	209.5	0.0030 ± 0.0009	0.0020 ± 0.0008

Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
December, 1982				
Sapporo, HOKKAIDO	28	74.0	0.0040 ± 0.0007	0.0030 ± 0.0006
Aomori, AOMORI	36	67.1	0.0060 ± 0.0008	0.0080 ± 0.0008
Ojika-gun, MIYAGI	29	34.5	0.0050 ± 0.0008	0.0020 ± 0.0005
Yamagata, YAMAGATA	35	56.5	0.0030 ± 0.0008	0.0050 ± 0.0008
Futaba-gun, FUKUSHIMA	28	22.0	0.0030 ± 0.0007	0.0010 ± 0.0005
Mito, IBARAGI	36	18.0	0.0020 ± 0.0007	0.0000 ± 0.0005
Shinjuku, TOKYO	32	22.0	0.0030 ± 0.0007	0.0010 ± 0.0005
Yokohama, KANAGAWA	36	39.4	0.0030 ± 0.0007	0.0020 ± 0.0005
Fukui, FUKUI	38	283.8	0.0100 ± 0.0010	0.0150 ± 0.0010
Shizuoka, SHIZUOKA	35	54.5	0.0020 ± 0.0006	0.0010 ± 0.0005
Kyoto, KYOTO	36	37.1	0.0020 ± 0.0007	0.0020 ± 0.0005
Kobe, HYOGO	28	23.3	0.0010 ± 0.0006	0.0020 ± 0.0005
Wakayama, WAKAYAMA	36	50.5	0.0030 ± 0.0007	0.0020 ± 0.0005
Tottori, TOTTORI	37	142.7	0.0100 ± 0.0010	0.0130 ± 0.0009
Matsue, SHIMANE	31	108.7	0.0060 ± 0.0008	0.0100 ± 0.0008
Hiroshima, HIROSHIMA	36	13.9	0.0050 ± 0.0007	0.0040 ± 0.0006
Matsuyama, EHIME	28	25.0	0.0040 ± 0.0007	0.0040 ± 0.0006
Tsukushi-gun, FUKUOKA	35	31.8	0.0040 ± 0.0008	0.0050 ± 0.0006
Saga, SAGA	34	15.0	0.0020 ± 0.0007	0.0020 ± 0.0005
Nagasaki, NAGASAKI	35	51.5	0.0030 ± 0.0007	0.0030 ± 0.0006
Nakagami-gun, OKINAWA	36	173.5	0.0030 ± 0.0007	0.0020 ± 0.0006

Figure (1)-1 Sampling Locations of Rain and dry fallout

1. Sapporo
2. Aomori
3. Ojika-gun
4. Yamagata
5. Futaba-gun
6. Mito
7. Shinjuku
8. Yokohama
9. Fukui
10. Shizuoka
11. Nagoya
12. Kyoto
13. Kobe
14. Wakayama
15. Tottori
16. Matsue
17. Hiroshima
18. Matsuyama
19. Tsukushi-gun
20. Saga
21. Nagasaki
22. Nakagami-gun



(1)-2 Strontium-90 and Cesium-137 in Rain and dry fallout (for WHO program) (from Jul. 1982 to Dec. 1982)

– continued from No. 60 of this publication –

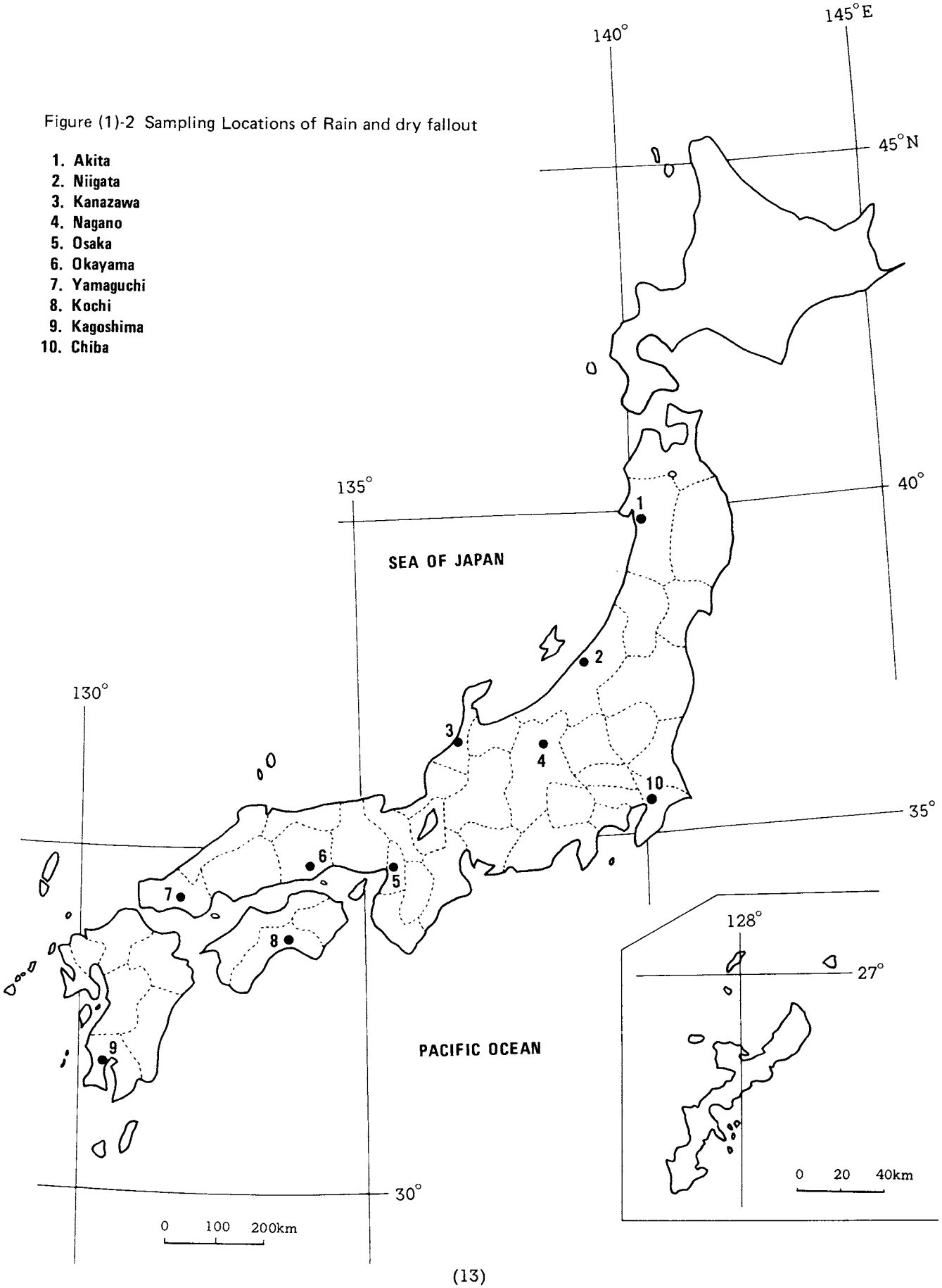
Table (1)-2: Strontium-90 and Cesium-137 in Rain dna dry fallout

Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
July, 1982				
Kanazawa, ISHIKAWA	32	114.5	0.0070 ± 0.0008	0.0050 ± 0.0008
Nagano, NAGANO	33	95.5	0.0040 ± 0.0007	0.0040 ± 0.0008
Osaka, OSAKA	33	317.8	0.0060 ± 0.0008	0.0060 ± 0.0008
Yamaguchi, YAMAGUCHI	32	550.0	0.0120 ± 0.0009	0.0090 ± 0.0010
Kochi, KOCHI	32	665.4	0.0130 ± 0.0010	0.0170 ± 0.0011
August, 1982				
Akita, AKITA	31	120.8	0.0020 ± 0.0006	0.0040 ± 0.0008
Niigata, NIIGATA	31	47.9	0.0030 ± 0.0007	0.0040 ± 0.0008
Kanazawa, ISHIKAWA	32	207.0	0.0030 ± 0.0007	0.0020 ± 0.0008
Nagano, NAGANO	31	44.0	0.0020 ± 0.0007	0.0020 ± 0.0005
Osaka, OSAKA	31	125.9	0.0030 ± 0.0007	0.0040 ± 0.0006
Okayama, OKAYAMA	31	57.8	0.0020 ± 0.0006	0.0000 ± 0.0007
Yamaguchi, YAMAGUCHI	32	153.0	0.0100 ± 0.0009	0.0020 ± 0.0005
Kochi, KOCHI	32	334.9	0.0050 ± 0.0008	0.0020 ± 0.0007
Kagoshima, KAGOSHIMA	31	187.5	0.0020 ± 0.0007	0.0030 ± 0.0009
Chiba, CHIBA	32	104.9	0.0000 ± 0.0012	0.0030 ± 0.0007
September, 1982				
Akita, AKITA	31	161.5	0.0040 ± 0.0006	0.0070 ± 0.0009
Niigata, NIIGATA	31	98.4	0.0040 ± 0.0007	0.0060 ± 0.0009
Kanazawa, ISHIKAWA	31	256.0	0.0040 ± 0.0007	0.0060 ± 0.0009
Nagano, NAGANO	31	237.5	0.0030 ± 0.0007	0.0020 ± 0.0008
Osaka, OSAKA	31	87.8	0.0020 ± 0.0006	0.0030 ± 0.0008
Okayama, OKAYAMA	31	192.4	0.0040 ± 0.0006	0.0030 ± 0.0008
Yamaguchi, YAMAGUCHI	31	196.0	0.0090 ± 0.0008	0.0030 ± 0.0006
Kochi, KOCHI	31	307.0	0.0070 ± 0.0007	0.0020 ± 0.0008
Kagoshima, KAGOSHIMA	31	165.0	0.0030 ± 0.0006	0.0030 ± 0.0009
Chiba, CHIBA	31	366.8	0.0030 ± 0.0008	0.0070 ± 0.0008

Location	Duration (days)	Precipitation (mm)	^{90}Sr (mCi/km^2)	^{137}Cs (mCi/km^2)
October, 1982				
Akita, AKITA	32	111.0	0.0040 ± 0.0007	0.0050 ± 0.0006
Niigata, NIIGATA	32	79.1	0.0040 ± 0.0008	0.0060 ± 0.0007
Kanazawa, ISHIKAWA	32	66.0	0.0040 ± 0.0007	0.0070 ± 0.0007
Nagano, NAGANO	32	50.5	0.0030 ± 0.0007	0.0030 ± 0.0005
Osaka, OSAKA	30	26.1	0.0030 ± 0.0007	0.0010 ± 0.0005
Okayama, OKAYAMA	32	19.1	0.0010 ± 0.0006	0.0000 ± 0.0004
Yamaguchi, YAMAGUCHI	32	36.5	0.0080 ± 0.0009	0.0020 ± 0.0005
Kochi, KOCHI	31	49.9	0.0050 ± 0.0007	0.0020 ± 0.0005
Kagoshima, KAGOSHIMA	32	38.3	0.0020 ± 0.0007	0.0010 ± 0.0005
Chiba, CHIBA	32	195.6	0.0030 ± 0.0009	0.0050 ± 0.0006
November, 1982				
Akita, AKITA	31	171.7	0.0040 ± 0.0007	0.0060 ± 0.0007
Niigata, NIIGATA	31	130.6	0.0040 ± 0.0007	0.0070 ± 0.0007
Kanazawa, ISHIKAWA	31	288.0	0.0080 ± 0.0009	0.0100 ± 0.0009
Nagano, NAGANO	32	50.5	0.0030 ± 0.0007	0.0020 ± 0.0008
Osaka, OSAKA	33	120.8	0.0020 ± 0.0007	0.0010 ± 0.0007
Okayama, OKAYAMA	31	72.6	0.0020 ± 0.0007	0.0010 ± 0.0005
Yamaguchi, YAMAGUCHI	31	120.0	0.0050 ± 0.0009	0.0020 ± 0.0007
Kochi, KOCHI	31	293.1	0.0060 ± 0.0008	0.0030 ± 0.0006
Kagoshima, KAGOSHIMA	31	162.2	0.0020 ± 0.0007	0.0010 ± 0.0007
Chiba, CHIBA	31	89.2	0.0010 ± 0.0007	0.0010 ± 0.0007
December, 1982				
Akita, AKITA	35	229.6	0.0100 ± 0.0009	0.0130 ± 0.0009
Niigata, NIIGATA	36	199.1	0.0100 ± 0.0009	0.0150 ± 0.0010
Kanazawa, ISHIKAWA	35	345.0	0.0140 ± 0.0011	0.0180 ± 0.0011
Nagano, NAGANO	35	14.0	0.0030 ± 0.0007	0.0020 ± 0.0005
Osaka, OSAKA	31	33.9	0.0020 ± 0.0007	0.0030 ± 0.0006
Okayama, OKAYAMA	35	21.3	0.0020 ± 0.0007	0.0010 ± 0.0005
Yamaguchi, YAMAGUCHI	36	34.5	0.0070 ± 0.0008	0.0040 ± 0.0006
Kochi, KOCHI	37	31.1	0.0040 ± 0.0007	0.0020 ± 0.0005
Kagoshima, KAGOSHIMA	36	36.0	0.0010 ± 0.0006	0.0010 ± 0.0005
Chiba, CHIBA	36	55.2	0.0030 ± 0.0010	0.0010 ± 0.0006

Figure (1)-2 Sampling Locations of Rain and dry fallout

1. Akita
2. Niigata
3. Kanazawa
4. Nagano
5. Osaka
6. Okayama
7. Yamaguchi
8. Kochi
9. Kagoshima
10. Chiba



(2) Strontium-90 and Cesium-137 in Airborne dust (from Apr. 1982 to Sep. 1982)

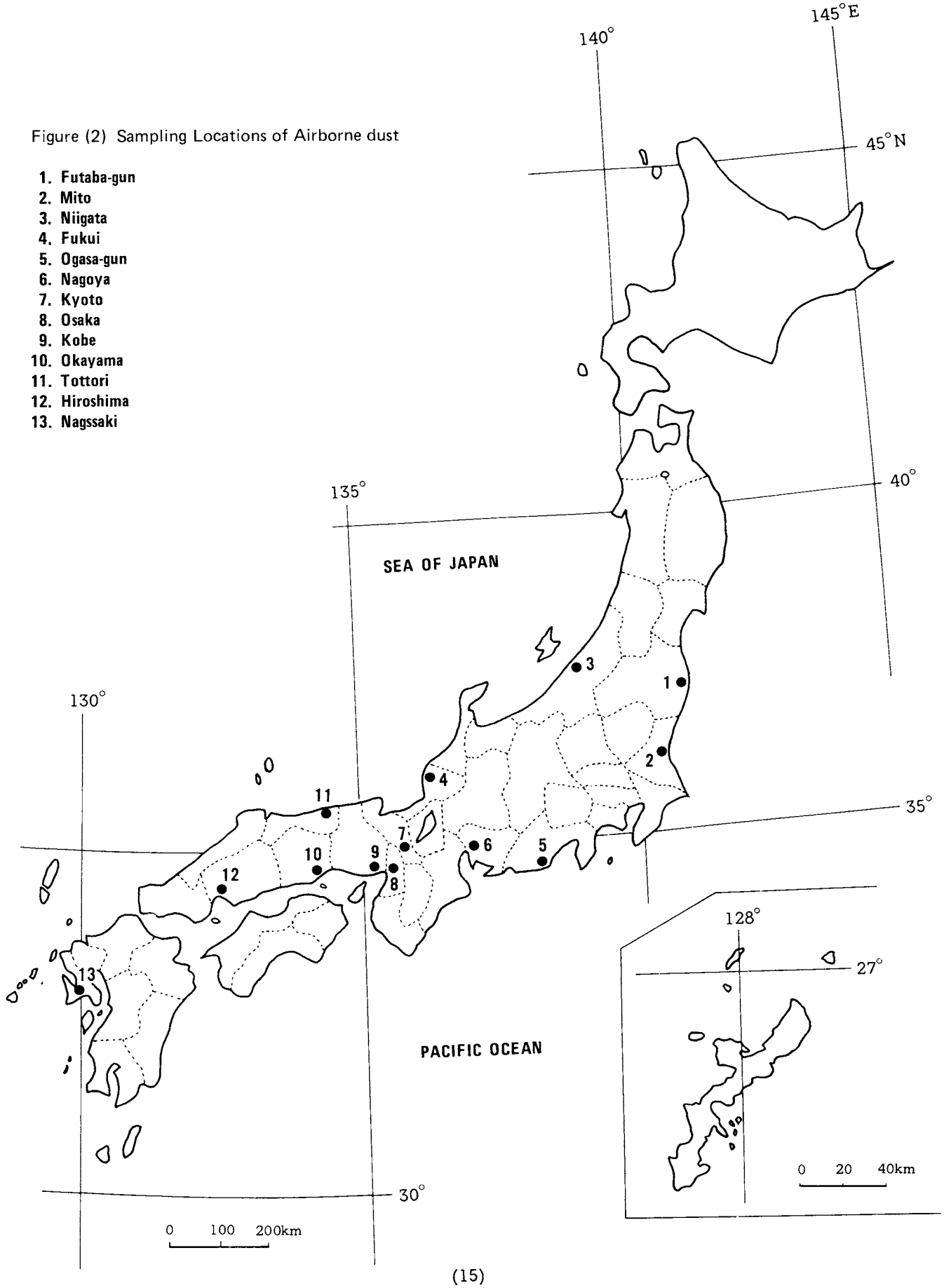
– continued from No. 60 of this publication –

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)
April ~ July, 1982				
Futaba-gun, FUKUSHIMA	4~7	12,779	0.10 ± 0.03	0.10 ± 0.02
April ~ June, 1982				
Mito, IBARAGI	4~6	10,368	0.10 ± 0.03	0.30 ± 0.03
Niigata, NIIGATA	4~6	14,673	0.30 ± 0.03	0.40 ± 0.03
Fukui, FUKUI	4~6	21,776	0.20 ± 0.02	0.30 ± 0.02
Shizuoka, SHIZUOKA	4~6	11,167	0.20 ± 0.03	0.30 ± 0.03
Nagoya, AICHI	4~6	10,259	0.30 ± 0.04	0.30 ± 0.03
Kyoto, KYOTO	4~6	9,744	0.20 ± 0.03	0.40 ± 0.04
Osaka, OSAKA	4~6	8,424	0.10 ± 0.04	0.20 ± 0.04
Tottori, TOTTORI	4~6	10,402	0.30 ± 0.04	0.30 ± 0.03
Hiroshima, HIROSHIMA	4~6	10,800	0.30 ± 0.04	0.50 ± 0.04
Nagasaki, NAGASAKI	4~6	9,799	0.30 ± 0.05	0.40 ± 0.03
May ~ June, 1982				
Kobe, HYOGO	5~6	10,484	0.20 ± 0.03	0.30 ± 0.03
July ~ September, 1982				
Futaba-gun, FUKUSHIMA	7~9	18,140	0.10 ± 0.02	0.10 ± 0.01
Mito, IBARAGI	7~9	10,368	0.02 ± 0.04	0.10 ± 0.02
Niigata, NIIGATA	7~9	14,647	0.10 ± 0.02	0.20 ± 0.02
Fukui, FUKUI	7~9	19,415	0.05 ± 0.01	0.10 ± 0.02
Ogasa-gun, SHIZUOKA	7~9	11,297	0.10 ± 0.03	0.10 ± 0.02
Nagoya, AICHI	7~9	10,152	0.10 ± 0.03	0.10 ± 0.03
Kyoto, KYOTO	7~9	10,754	0.02 ± 0.03	0.10 ± 0.02
Osaka, OSAKA	7~9	8,424	0.03 ± 0.03	0.10 ± 0.03
Kobe, HYOGO	7~9	9,811	0.02 ± 0.03	0.10 ± 0.03
Tottori, TOTTORI	7~9	13,073	0.04 ± 0.03	0.10 ± 0.02
Hiroshima, HIROSHIMA	7~9	10,800	0.04 ± 0.03	0.10 ± 0.02
Nagasaki, NAGASAKI	7~9	10,356	0.10 ± 0.04	0.10 ± 0.02
August ~ September, 1982				
Okayama, OKAYAMA	8~9	10,544	0.02 ± 0.03	0.10 ± 0.02

Figure (2) Sampling Locations of Airborne dust

1. Futaba-gun
2. Mito
3. Niigata
4. Fukui
5. Ogasa-gun
6. Nagoya
7. Kyoto
8. Osaka
9. Kobe
10. Okayama
11. Tottori
12. Hiroshima
13. Nagssaki



(3) Strontium-90 and Cesium-137 in Service water (from Jun. 1982 to Dec. 1982)

– continued from No. 60 of this publication –

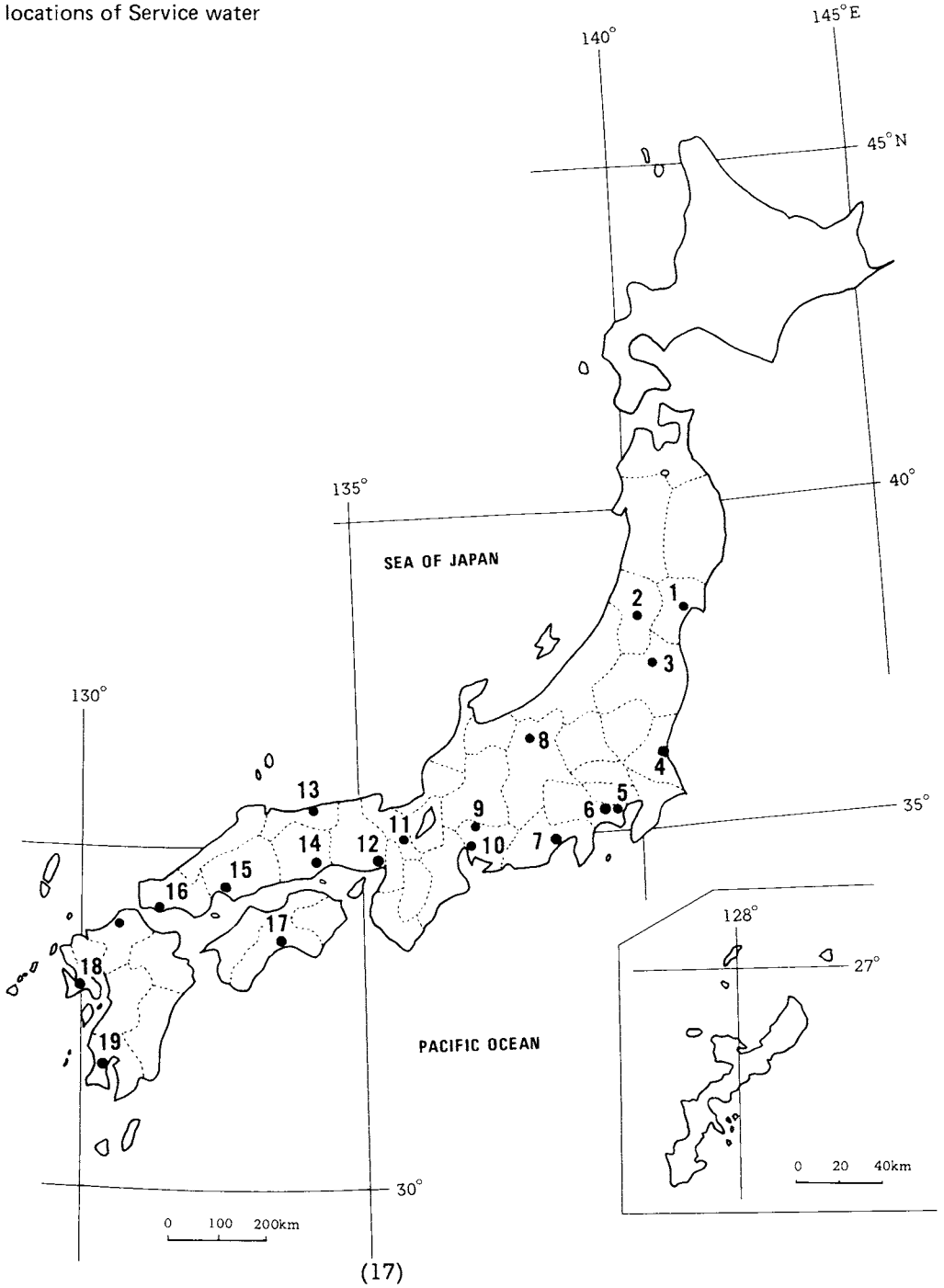
Table (3): Strontium-90 and Cesium-137 in Service water

Location	pH	^{90}Sr (pCi/ℓ)	^{137}Cs (pCi/ℓ)
(Source Water)			
August, 1982			
Kyoto, KYOTO	7.1	0.200 ± 0.008	0.020 ± 0.004
December, 1982			
Tsukui-gun, KANAGAWA	8.6	0.030 ± 0.004	0.001 ± 0.002
Inuyama, AICHI	6.7	0.080 ± 0.006	0.004 ± 0.002
(Tap Water)			
June, 1982			
Nagasaki, NAGASAKI	7.0	0.070 ± 0.005	0.010 ± 0.002
July, 1982			
Sendai, MIYAGI	6.7	0.090 ± 0.007	0.003 ± 0.003
Fukushima, FUKUSHIMA	7.5	0.110 ± 0.007	0.003 ± 0.002
August, 1982			
Kyoto, KYOTO	7.2	0.210 ± 0.008	0.004 ± 0.002
Hiroshima, HIROSHIMA	7.1	0.150 ± 0.008	0.010 ± 0.002
October, 1982			
Sendai, MIYAGI	7.5	0.090 ± 0.005	0.010 ± 0.002
December, 1982			
Akita, AKITA	7.3	0.130 ± 0.007	0.010 ± 0.002
Yamagata, YAMAGATA	7.2	0.130 ± 0.007	0.010 ± 0.002
Mito, IBARAGI	5.2	0.040 ± 0.004	0.003 ± 0.002
Yokohama, KANAGAWA	7.2	0.030 ± 0.004	0.004 ± 0.002
Fukui, FUKUI	7.3	0.010 ± 0.003	0.003 ± 0.002
Nagano, NAGANO	7.4	0.060 ± 0.005	0.005 ± 0.002
Shizuoka, SHIZUOKA	7.2	0.050 ± 0.004	0.002 ± 0.002
Nagoya, AICHI	6.1	0.080 ± 0.006	0.003 ± 0.002
Kobe, HYOGO	7.0	0.170 ± 0.013	0.010 ± 0.002
Tottori, TOTTORI	7.5	0.080 ± 0.006	0.001 ± 0.002
Matsue, SHIMANE	7.3	0.150 ± 0.007	0.004 ± 0.002

Location	pH	^{90}Sr (pCi/ℓ)	^{137}Cs (pCi/ℓ)
Okayama, OKAYAMA	6.8	0.100 ± 0.006	0.002 ± 0.003
Hiroshima, HIROSHIMA	6.8	0.100 ± 0.006	0.010 ± 0.002
Ube, YAMAGUCHI	7.0	0.090 ± 0.005	0.004 ± 0.002
Kochi, KOCHI	7.4	0.060 ± 0.005	0.003 ± 0.002
Kagoshima, KAGOSHIMA	7.0	0.010 ± 0.003	0.000 ± 0.002

Figure (3) Sampling locations of Service water

1. **Sendai**
2. **Yamagata**
3. **Fukushima**
4. **Mito**
5. **Yokohama**
6. **Tsukui-gun**
7. **Shizuoka**
8. **Nagano**
9. **Inuyama**
10. **Nagoya**
11. **Kyoto**
12. **Kobe**
13. **Tottori**
14. **Okayama**
15. **Hiroshima**
16. **Ube**
17. **Kochi**
18. **Nagasaki**
19. **Kagoshima**



(4) Strontium-90 and Cesium-137 in Freshwater (from Sep. 1982 to Dec. 1982)

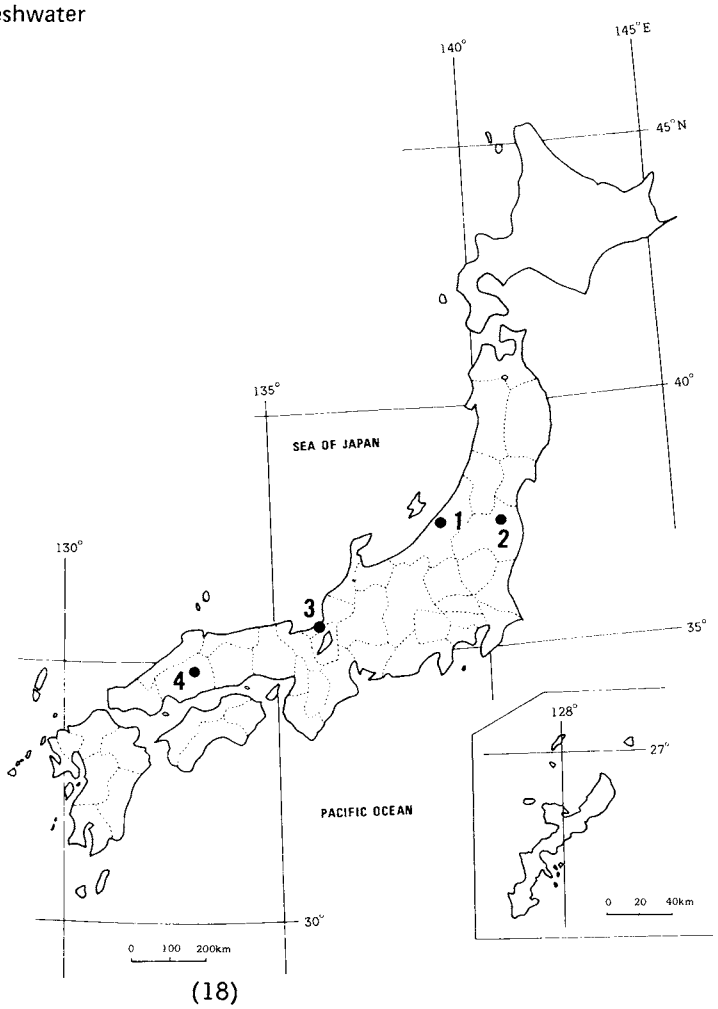
– continued from No. 60 this publication –

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

Location	pH	^{90}Sr (pCi/ℓ)	^{137}Cs (pCi/ℓ)
September, 1982			
Fukushima, FUKUSHIMA	–	0.080 ± 0.006	0.020 ± 0.003
November, 1982			
Niigata, NIIGATA	6.7	0.220 ± 0.008	0.020 ± 0.003
Shobara, HIROSHIMA	7.0	0.080 ± 0.005	0.003 ± 0.002
December, 1982			
Mikata-gun, FUKUI	10.0	0.180 ± 0.008	0.020 ± 0.004

Figure (4) Sampling Locations of Freshwater

1. **Niigata**
2. **Fukushima**
3. **Mikata-gun**
4. **Shobara**



(5) Strontium-90 and Cesium-137 in Soil (from May 1982 to Sep. 1982)

– continued from No. 59 of this publication –

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

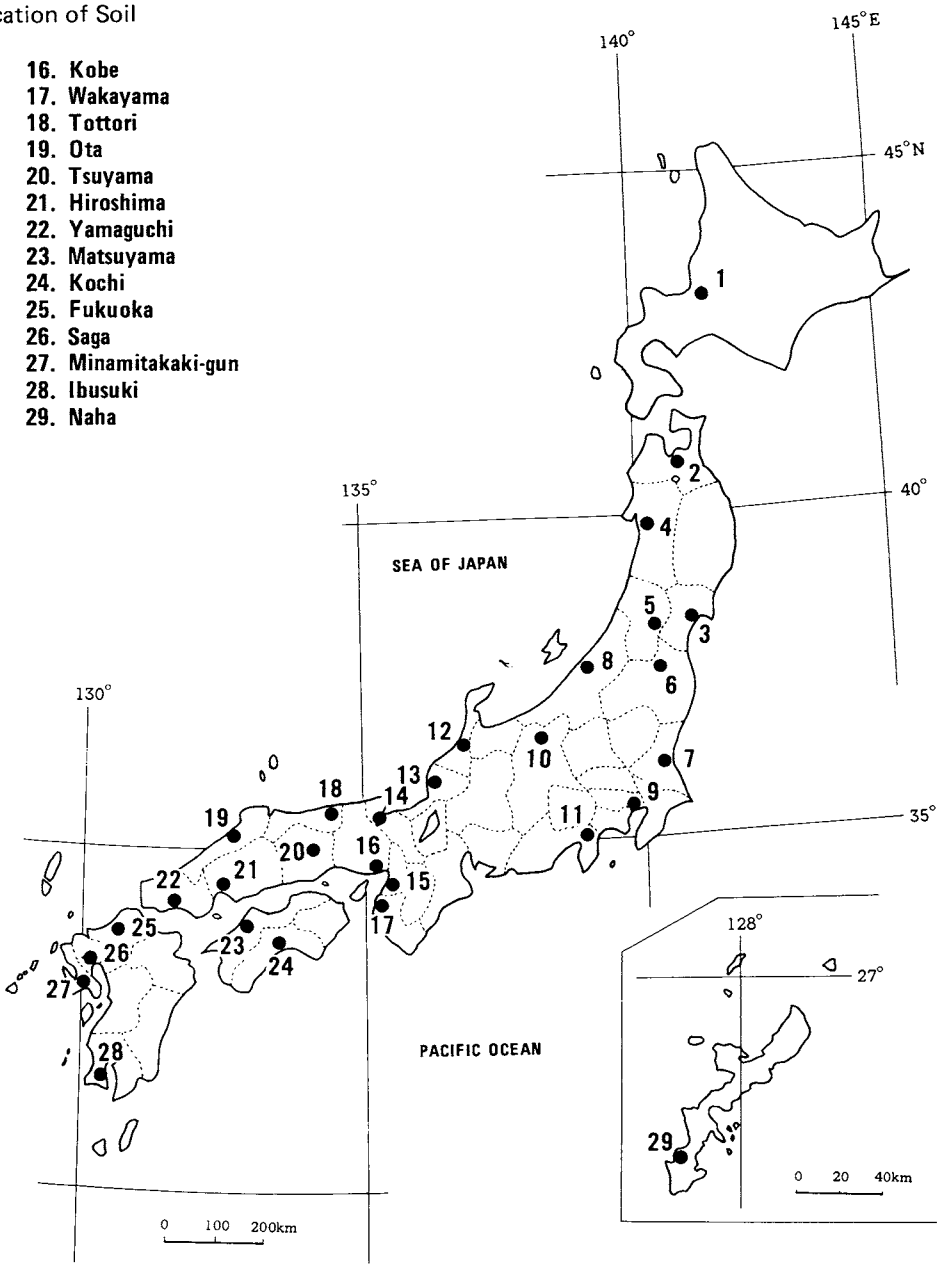
Location	Sampling Depth (cm)	^{90}Sr		^{137}Cs	
		(pCi/kg)	(mCi/km^2)	(pCi/kg)	(mCi/km^2)
May, 1982					
Atsumi-gun, AICHI	0 ~ 5	80.0 ± 5.8	3.70 ± 0.27	950.0 ± 16.0	44.00 ± 0.80
〃	5 ~20	49.0 ± 4.7	9.10 ± 0.88	390.0 ± 11.0	72.00 ± 2.00
June, 1982					
Fukushima, FUKUSHIMA	0~ 5	240.0 ± 9.0	6.80 ± 0.26	580.0 ± 13.0	16.00 ± 0.40
〃	5~20	84.0 ± 5.7	7.50 ± 0.50	68.0 ± 5.5	6.00 ± 0.49
Gotenba, SHIZUOKA	0~ 5	100.0 ± 6.0	2.20 ± 0.13	300.0 ± 10.0	6.30 ± 0.20
〃	5~20	37.0 ± 4.3	2.50 ± 0.29	130.0 ± 7.0	8.80 ± 0.46
Tsuyama, OKAYAMA	0~ 5	35.0 ± 4.5	1.40 ± 0.19	140.0 ± 7.0	5.80 ± 0.29
〃	5~20	45.0 ± 5.2	6.60 ± 0.77	89.0 ± 6.0	13.00 ± 0.90
Naha, OKINAWA	0 ~ 5	87.0 ± 5.7	4.80 ± 0.31	270.0 ± 10.0	15.00 ± 0.50
〃	5~20	69.0 ± 5.7	14.00 ± 1.10	150.0 ± 7.0	29.00 ± 1.40
July, 1982					
Aomori, AOMORI	0 ~ 5	99.0 ± 6.0	3.10 ± 0.19	130.0 ± 7.0	4.00 ± 0.21
〃	5~20	11.0 ± 3.3	1.40 ± 0.44	11.0 ± 3.9	1.40 ± 0.52
Kawabe-gun, AKITA	0~ 5	300.0 ± 10.0	11.00 ± 0.40	840.0 ± 16.0	32.00 ± 0.60
〃	5~20	610.0 ± 14.0	47.00 ± 1.10	1,400.0 ± 20.0	100.00 ± 1.00
Yamagata, YAMAGATA	0~ 5	160.0 ± 8.0	7.00 ± 0.34	790.0 ± 15.0	34.00 ± 0.70
〃	5~20	56.0 ± 4.8	5.60 ± 0.49	130.0 ± 7.0	13.00 ± 0.70
Katsushika, TOKYO	0~ 5	180.0 ± 9.0	11.00 ± 0.60	600.0 ± 13.0	37.00 ± 0.80
〃	5~20	180.0 ± 9.0	24.00 ± 1.20	370.0 ± 11.0	49.00 ± 1.40
Yasuda, NIIGATA	0~ 5	150.0 ± 7.0	11.00 ± 0.50	860.0 ± 16.0	62.00 ± 1.10
〃	5~20	220.0 ± 8.0	31.00 ± 1.10	250.0 ± 9.0	34.00 ± 1.20
Kanazawa, ISHIKAWA	0~ 5	180.0 ± 8.0	7.50 ± 0.31	580.0 ± 13.0	24.00 ± 0.50
〃	5~20	160.0 ± 7.0	24.00 ± 1.10	230.0 ± 9.0	34.00 ± 1.30
Nagano, NAGANO	0~ 5	100.0 ± 6.0	5.50 ± 0.32	350.0 ± 10.0	18.00 ± 0.50
〃	5~20	100.0 ± 6.0	15.00 ± 0.90	130.0 ± 7.0	19.00 ± 1.00
Miyazu, KYOTO	0~ 5	130.0 ± 7.0	6.20 ± 0.32	1,900.0 ± 20.0	89.00 ± 1.10
〃	5~20	150.0 ± 7.0	42.00 ± 2.00	220.0 ± 8.0	60.00 ± 2.20

Location	Sampling Depth (cm)	^{90}Sr (pCi/kg)	^{90}Sr (mCi/km^2)	^{137}Cs (pCi/kg)	^{137}Cs (mCi/km^2)
Sennan-gun, OSAKA	0~ 5	110.0 ± 6.0	5.90 ± 0.32	130.0 ± 6.0	6.50 ± 0.33
"	5~20	59.0 ± 4.7	9.80 ± 0.78	47.0 ± 4.0	7.90 ± 0.68
Kobe, HYOGO	0~ 5	68.0 ± 5.1	3.60 ± 0.27	390.0 ± 11.0	21.00 ± 0.60
"	5~20	66.0 ± 4.7	13.00 ± 0.90	310.0 ± 10.0	63.00 ± 2.00
Ota, SHIMANE	0~ 5	1,300.0 ± 20.0	31.00 ± 0.50	5,000.0 ± 40.0	120.00 ± 1.00
"	5~20	600.0 ± 14.0	68.00 ± 1.60	1,600.0 ± 20.0	180.00 ± 2.00
Hiroshima, HIROSHIMA	0~ 5	94.0 ± 6.0	7.20 ± 0.46	390.0 ± 11.0	30.00 ± 0.80
"	5~20	59.0 ± 5.4	14.00 ± 1.30	93.0 ± 5.7	22.00 ± 1.40
Fukuoka, FUKUOKA	0~ 5	250.0 ± 9.0	9.90 ± 0.35	770.0 ± 15.0	30.00 ± 0.60
"	5~20	270.0 ± 9.0	46.00 ± 1.60	260.0 ± 9.0	43.00 ± 1.50
August, 1982					
Sapporo, HOKKAIDO	0~ 5	510.0 ± 13.0	21.00 ± 0.50	1,300.0 ± 20.0	52.00 ± 0.80
"	5~20	200.0 ± 8.0	41.00 ± 1.60	190.0 ± 8.0	39.00 ± 1.60
Tokaimura, IBARAGI	0~ 5	430.0 ± 12.0	16.00 ± 0.40	1,500.0 ± 20.0	56.00 ± 0.70
"	5~20	310.0 ± 10.0	22.00 ± 0.70	88.0 ± 5.8	6.10 ± 0.40
Yokohama, KANAGAWA	0~ 5	380.0 ± 12.0	11.00 ± 0.40	860.0 ± 16.0	25.00 ± 0.50
"	5~20	230.0 ± 10.0	19.00 ± 0.90	320.0 ± 10.0	27.00 ± 0.90
Fului, FUKUI	0~ 5	130.0 ± 7.0	4.00 ± 0.22	370.0 ± 10.0	11.00 ± 0.30
"	5~20	140.0 ± 7.0	21.00 ± 1.10	560.0 ± 13.0	85.00 ± 1.90
Wakayama, WAKAYAMA	0~ 5	6.0 ± 3.0	0.30 ± 0.12	46.0 ± 4.8	1.90 ± 0.20
"	5~20	5.0 ± 3.1	0.90 ± 0.50	31.0 ± 4.6	5.10 ± 0.74
Tottori, TOTTORI	0~ 5	160.0 ± 8.0	8.90 ± 0.41	530.0 ± 12.0	29.00 ± 0.70
"	5~20	170.0 ± 8.0	30.00 ± 1.30	85.0 ± 5.7	14.00 ± 1.00
Yamaguchi, YAMAGUCHI	0~ 5	500.0 ± 12.0	23.00 ± 0.60	320.0 ± 10.0	15.00 ± 0.50
"	5~20	110.0 ± 6.0	17.00 ± 1.00	140.0 ± 7.0	21.00 ± 1.10
Matsuyama, EHIME	0~ 5	280.0 ± 9.0	4.50 ± 0.15	1,000.0 ± 20.0	16.00 ± 0.30
"	5~20	79.0 ± 5.4	5.10 ± 0.34	1,000.0 ± 20.0	66.00 ± 1.20
Saga, SAGA	0~ 5	61.0 ± 5.0	2.70 ± 0.23	83.0 ± 5.7	3.70 ± 0.25
"	5~20	81.0 ± 5.5	11.00 ± 0.70	38.0 ± 4.6	5.10 ± 0.60
Minamitakaki-gun, NAGASAKI	0~ 5	140.0 ± 8.0	6.40 ± 0.35	390.0 ± 11.0	18.00 ± 0.50
"	5~20	200.0 ± 8.0	27.00 ± 1.20	610.0 ± 13.0	85.00 ± 1.80

Location	Sampling Depth (cm)	^{90}Sr		^{137}Cs	
		(pCi/kg)	(mCi/km^2)	(pCi/kg)	(mCi/km^2)
Ibusuki-gun, KAGOSHIMA	0~ 5	160.0 ± 7.0	8.80 ± 0.39	720.0 ± 14.0	39.00 ± 0.80
"	5~20	240.0 ± 9.0	41.00 ± 1.50	450.0 ± 11.0	75.00 ± 1.90
September, 1982					
Sendai, MIYAGI	0~ 5	23.0 ± 4.0	0.90 ± 0.16	69.0 ± 5.5	2.80 ± 0.22
"	5~20	15.0 ± 3.6	1.60 ± 0.39	25.0 ± 4.1	2.70 ± 0.45
Kochi, KOCHI	0~ 5	270.0 ± 10.0	17.00 ± 0.60	1,000.0 ± 20.0	66.00 ± 1.10
"	5~20	270.0 ± 10.0	33.00 ± 1.20	610.0 ± 13.0	74.00 ± 1.60

Figure (5) Sampling Location of Soil

1. Sapporo
2. Aomori
3. Sendai
4. Kawabe-gun
5. Yamagata
6. Fukushima
7. Tokaimura
8. Yasuda
9. Katsushika
10. Nagano
11. Gotenba
12. Kanazawa
13. Fukui
14. Miyazu
15. Sennan-gun
16. Kobe
17. Wakayama
18. Tottori
19. Ota
20. Tsuyama
21. Hiroshima
22. Yamaguchi
23. Matsuyama
24. Kochi
25. Fukuoka
26. Saga
27. Minamitakaki-gun
28. Ibusuki
29. Naha



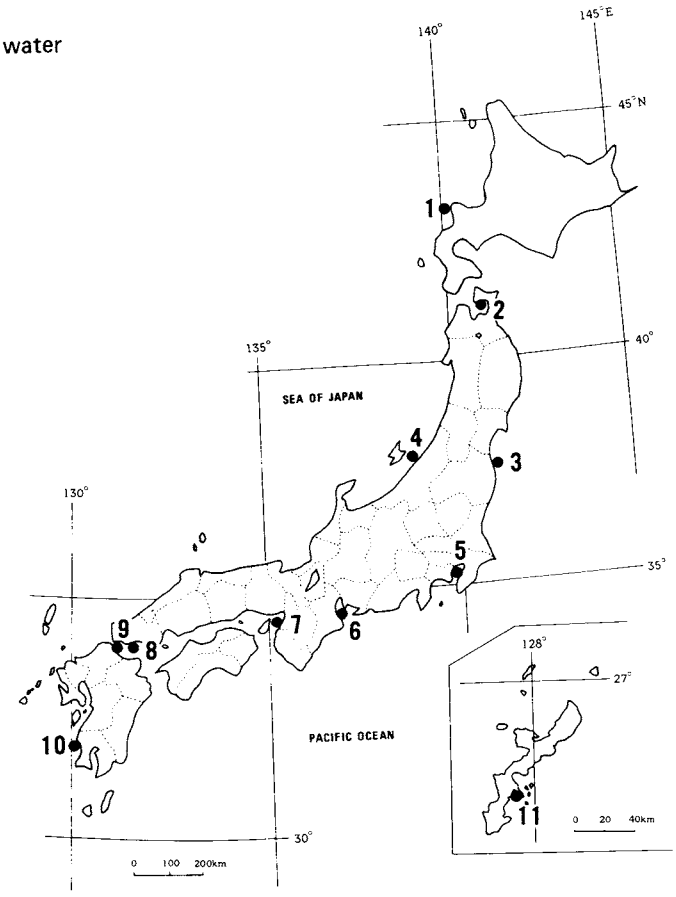
(6) Strontium-90 and Cesium-137 in Sea water (from Jul. 1982 to Sep. 1982)

– continued from No. 59 of this publication –

Location	Cl(‰)	Sample volume analyzed (ℓ)	^{90}Sr (pCi/ℓ)	^{137}Cs (pCi/ℓ)
July, 1982				
Off-Niigata-port, NIIGATA	17.23	40.0	0.090 ± 0.010	0.120 ± 0.011
Moji-port, FUKUOKA	17.90	40.0	0.090 ± 0.011	0.130 ± 0.011
White beach, OKINAWA	19.12	80.0	0.100 ± 0.011	0.120 ± 0.010
August, 1982				
Off-Tomari-port, HOKKAIDO	18.94	40.0	0.100 ± 0.011	0.140 ± 0.011
Mutsu-bay, AOMORI	17.70	40.0	0.100 ± 0.011	0.120 ± 0.011
Off-Soma, FUKUSHIMA	16.50	40.0	0.100 ± 0.011	0.160 ± 0.012
Yokosuka-bay, KANAGAWA	17.16	40.0	0.090 ± 0.011	0.120 ± 0.010
Ise-bay, AICHI	8.60	40.0	0.090 ± 0.011	0.060 ± 0.008
Osaka-port, OSAKA	7.56	40.0	0.130 ± 0.013	0.050 ± 0.008
Yamaguchi-bay, YAMAGUCHI	18.00	40.0	0.090 ± 0.011	0.120 ± 0.011
September, 1982				
Off-Kumisaki, KAGOSHIMA	18.61	40.0	0.110 ± 0.012	0.130 ± 0.011

Figure (6) Sampling Locations of Sea water

1. **Off-Tomari-port**
2. **Mutsu-bay**
3. **Off-Soma**
4. **Off-Niigata-port**
5. **Yokosuka-bay**
6. **Ise-bay**
7. **Osaka-bay**
8. **Yamaguchi-bay**
9. **Moji-port**
10. **Off-Kumisaki**
11. **White-beach**



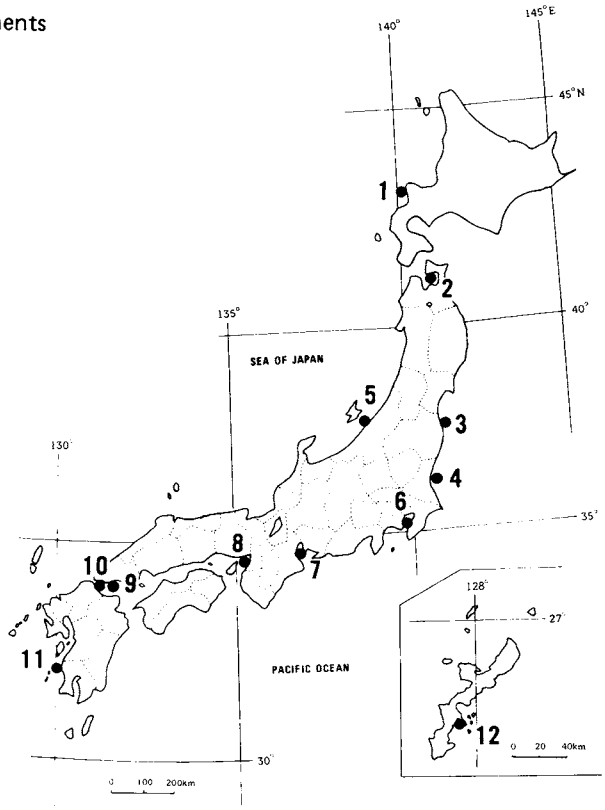
(7) Strontium-90 and Cesium-137 in Sea sediments (from Jul. 1982 to Sep. 1982)

– continued from No. 59 of this publication –

Location	Depth (m)	^{90}Sr (pCi/kg)	^{137}Cs (pCi/kg)
July, 1982			
Off-Tokai, IBARAGI	–	0.0 ± 2.7	17.0 ± 4.1
Off-Niigata-port, NIIGATA	28.0	5.0 ± 2.6	79.0 ± 5.6
Moji-port, FUKUOKA	10.0	5.0 ± 2.5	83.0 ± 5.7
White-beach, OKINAWA	14.0	7.0 ± 2.5	20.0 ± 3.9
August, 1982			
Tomari-port, HOKKAIDO	5.0	8.0 ± 2.5	25.0 ± 4.3
Mutsu-bay, AOMORI	12.5	27.0 ± 3.8	250.0 ± 9.0
Off-Soma, FUKUSHIMA	5.0	1.0 ± 2.3	19.0 ± 4.2
Yokosuka-bay, KANAGAWA	7.0	3.0 ± 2.8	130.0 ± 7.0
Ise-bay, AICHI	17.2	7.0 ± 2.6	91.0 ± 5.9
Osaka-port, OSAKA	11.0	6.0 ± 3.1	230.0 ± 8.0
Yamaguchi-bay, YAMAGUCHI	10.0	10.0 ± 2.9	160.0 ± 7.0
September, 1982			
Off-Kumisaki, KAGOSHIMA	6.5	0.2 ± 3.0	12.0 ± 3.9

Figure (7) Sampling Locations of Sea sediments

1. **Tomari-port**
2. **Mutsu-bay**
3. **Off-Soma**
4. **Off-Tokai**
5. **Off-Niigata-port**
6. **Yokosuka-bay**
7. **Ise-bay**
8. **Osaka-port**
9. **Yamaguchi-bay**
10. **Moji-port**
11. **Off-Kumisaki**
12. **White-beach**



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