RADIOACTIVITY SURVEY DATA in Japan

NUMBER 4
AUG. 1964

National Institute of Radiological Sciences
Chiba, Japan

In April 1963, in compliance with directives set forth by the Japan Atomic Energy Commisson, the Division of Radioactivity Survey, National Institute of Radiological Sciences was directed to:

1. Collect, record and maintain information on radiation from National and International sources.
2. Analyze the information collected.
3. Establish a radiation survey information exchange center.

As a part of the assignment, data from the Nationwide Radioactivity Survey Network were assembled and compiled in this publication. Present plans are to issue this type of publication on a quarterly basis.

For further information on any subject reported in this issue, readers are referred to the contributors indicated in the table headings.

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Contents

National Institute of Radiological Sciences

Meteorological Data

Strontium-90 and Cesium-137 in Rain and Dry Fallout

(Japan Analytical Chemistry Research Institute)

Since May 1963, the Japan Analytical Chemistry Research Institute, on commission by the Science and Technology Agency, has measured strontium-90 and cesium-137 content in monthly deposits at various locations throughout Japan. Sampling and pre-treatment for concentration have been carried out by 24 prefectural public health laboratories.

The tray recommended by the Science and Technology Agency has a collection area of 5,000 cm^2, and is exposed to rain and dust throughout the month. The depth of water in the tray is kept at 10 mm to prevent dust from being blown away. At the end of each month, water in the tray and water used to wash the tray are combined with strontium and cesium carriers, passed through a column filled with sodium type cation exchange resin (Dowex 50W-X8, 50-100 mesh), then the column was sent to the Japan Analytical Chemistry Research Institute for measurements. The column used was illustrated in Figure 4, Issue No. 2 of this publication.

After a fraction containing both strontium-90 and cesium-137 was eluted from the resin, radiochemical analysis was carried out using the method recommended by the Science and Technology Agency.

Results obtained during the period December 1963 to March 1964 are shown in Table 1.

Table 1. ^{90}Sr and ^{137}Cs in Rain and Dry Fallout —Dec 63 to Mar 64—

By T. Asari, M. Chiba and M. Kuroda
(Japan Analytical Chemistry Research Institute)

Station	Duration (days)	Precipitation (mm)	^{90}Sr (mc/km^2)	^{89}Sr (mc/km^2)	^{137}Cs (mc/km^2)
		December 1963			
Sapporo, HOKKAIDO	28	84.2	1.10	1.64	1.83
Aomori, AOMORI	27	109.8	1.91	0.86	1.70
Sendai, MIYAGI	36	20.6	0.24	0.18	0.98
Akita, AKITA	27	153.6	2.87	2.67	4.45
Mito, IBARAGI	36	12.0	0.30	0.17	0.45
Kumagaya, SAITAMA	35	13.8	0.09	0.15	0.16
Tokyo	35	29.8	0.11	0.21	0.52
Yokohama, KANAGAWA	35	35.0	0.31	0.25	0.60
Niigata, NIIGATA	31	173.0	2.94	2.95	4.51
Kanazawa, ISHIKAWA	31	203.5	3.01	2.05	3.51
Fukui, FUKUI	29	207.7	3.97	3.27	6.00
Shizuoka, SHIZUOKA	36	39.0	0.27	0.31	0.63
Nagoya, AICHI	31	63.4	0.22	0.25	0.40
Kyoto, KYOTO	31	19.0	0.80	0.84	1.86
Osaka, OSAKA	35	23.3	0.33	0.85	0.70
Kobe, HYOGO	33	16.4	0.34	0.57	0.20
Wakayama, WAKAYAMA	31	23.6	0.39	0.18	0.66
Tottori, TOTTORI	35	124.0	2.25	1.46	3.74
Okayama, OKAYAMA	31	21.6	0.25	0.36	0.44
Hiroshima, HIROSHIMA	31	27.3	0.24	0.18	0.44
Kochi, KOCHI	31	25.4	0.30	0.23	0.31
Fukuoka, FUKUOKA	31	73.1	1.12	0.71	0.50
Nagasaki, NAGASAKI	33	80.4	0.98	1.04	1.53
Kagoshima, KAGOSHIMA	31	67.0	0.34	0.57	1.18
		January 1964			
Sapporo, HOKKAIDO	34	95.5	1.79	0.75	1.50
Aomori, AOMORI	31	805.0	1.26	0.49	0.76
Sendai, MIYAGI	26	107.3	0.57	0.56	1.20
Akita, AKITA	31	160.0	2.51	2.74	3.82
Mito, IBARAGI	26	120.0	0.08	—	1.27
Kumagaya, SAITAMA	25	45.6	0.24	0.04	0.04
Tokyo	27	144.6	1.33	0.48	2.48
Yokohama, KANAGAWA	26	159.4	0.73	0.56	1.67
Niigata, NIIGATA	31	119.1	2.19	1.16	0.73
Kanazawa, ISHIKAWA	31	216.7	3.41	3.91	3.37
Fukui, FUKUI	34	169.7	3.08	3.81	3.46
Shizuoka, SHIZUOKA	26	178.1	1.20	0.31	1.80
Nagoya, AICHI	31	80.5	0.58	0.67	1.44
Kyoto, KYOTO	31	89.9	0.57	0.49	1.62
Osaka, OSAKA	25	87.2	0.46	0.27	2.92
Kobe, HYOGO	28	74.1	0.48	0.77	0.80
Wakayama, WAKAYAMA	31	102.2	0.10	—	0.20
Tottori, TOTTORI	28	162.6	2.92	1.42	0.90
Okayama, OKAYAMA	31	71.4	0.49	0.20	1.70
Hiroshima, HIROSHIMA	32	88.4	0.66	0.23	0.39
Kochi, KOCHI	31	127.5	1.09	0.92	1.60
Fukuoka, FUKUOKA	31	216.0	1.04	0.51	1.04
Nagasaki, NAGASAKI	28	118.3	1.00	0.52	3.53
Kagoshima, KAGOSHIMA	31	150.5	1.20	1.59	0.62

Table (1) ^{90}Sr and ^{137}Cs in Rain and Dry Fallout —Dec 63 to Mar 64— (*continued*)

Station	Duration (days)	Precipitation (mm)	^{90}Sr (mc/km^2)	^{89}Sr (mc/km^2)	^{137}Cs (mc/km^2)
		February 1964			
Sapporo, HOKKAIDO	29	112.5	1.14	0.39	1.87
Aomori, AOMORI	29	155.0	0.71	0.48	0.95
Sendai, MIYAGI	30	43.1	0.35	0.39	2.21
Akita, AKITA	26	55.7	1.91	—	3.21
Mito, IBARAGI	29	58.0	0.46	0.22	0.80
Kumagaya, SAITAMA	31	60.2	0.45	0.34	0.81
Tokyo	29	64.0	0.56	—	0.71
Yokohama, KANAGAWA	31	63.9	0.69	0.32	0.66
Niigata, NIIGATA	29	107.0	2.16	1.85	3.68
Kanazawa, ISHIKAWA	29	160.6	2.85	1.46	5.49
Fukui, FUKUI	28	182.7	0.69	—	5.24
Shizuoka, SHIZUOKA	29	73.5	0.61	—	1.20
Nagoya, AICHI	29	71.9	0.57	0.28	0.93
Kyoto, KYOTO	29	71.1	0.59	0.50	1.02
Osaka, OSAKA	30	88.7	0.26	0.84	0.60
Kobe, HYOGO	29	65.4	0.56	0.17	1.07
Wakayama, WAKAYAMA	29	47.7	0.33	0.15	0.52
Tottori, TOTTORI	28	193.2	4.25	1.11	5.97
Okayama, OKAYAMA	29	73.9	0.52	0.13	1.27
Hiroshima, HIROSHIMA	29	53.7	0.60	0.44	2.19
Kochi, KOCHI	29	67.4	0.83	—	1.31
Fukuoka, FUKUOKA	29	62.1	1.31	—	2.04
Nagasaki, NAGASAKI	29	57.0	1.03	1.45	1.72
Kagoshima, KAGOSHIMA	30	97.7	1.08	0.66	1.82
		March 1964			
Sapporo, HOKKAIDO	31	13.4	2.76	—	0.72
Aomori, AOMORI	31	281.0	3.31	—	4.10
Sendai, MIYAGI	29	53.0	1.10	—	2.38
Akita, AKITA	22	109.3	2.70	1.25	6.07
Mito, IBARAGI	31	76.0	0.92	0.29	2.23
Kumagaya, SAITAMA	29	57.3	0.88	—	1.30
Tokyo	31	99.7	0.44	0.21	1.94
Yokohama, KANAGAWA	30	127.8	2.16	0.59	2.33
Niigata, NIIGATA	31	98.8	2.12	0.98	3.61
Kanazawa, ISHIKAWA	30	131.6	3.45	0.71	4.30
Fukui, FUKUI	33	143.1	3.49	2.07	4.35
Shizuoka, SHIZUOKA	31	124.5	1.73	0.45	2.04
Nagoya, AICHI	31	114.2	1.86	0.41	4.22
Kyoto, KYOTO	31	96.6	1.50	—	2.71
Osaka, OSAKA	30	79.8	0.83	0.79	1.65
Kobe, HYOGO	32	66.4	1.61	0.43	2.22
Wakayama, WAKAYAMA	27	68.6	1.04	0.37	1.29
Tottori, TOTTORI	30	120.8	2.95	1.29	1.17
Okayama, OKAYAMA	31	56.7	0.83	0.29	2.05
Hiroshima, HIROSHIMA	31	92.7	1.41	0.85	2.05
Kochi, KOCHI	26	120.4	2.25	0·74	3.43
Fukuoka, FUKUOKA	31	67.4	0.76	0.85	1.52
Nagasaki, NAGASAKI	31	74.4	1.68	0.62	0.75
Kagoshima, KAGOSHIMA	31	66.4	1.32	0.73	1.86

Note; — indicates indetectable value

Table 2 shows the monthly values of strontium-90 and cesium-137 averaged by the 24 stations during the period May 1963 to March 1964. Table 3 and Figure 1 shows the total amount of strontium-90 and cesium-137 deposits during the period July 1963 to March 1964.

Table 4 shows the ratio of strontium-89 to strontium-90 and cesium-137 to strontium-90 during the period December 1963 to March 1964.

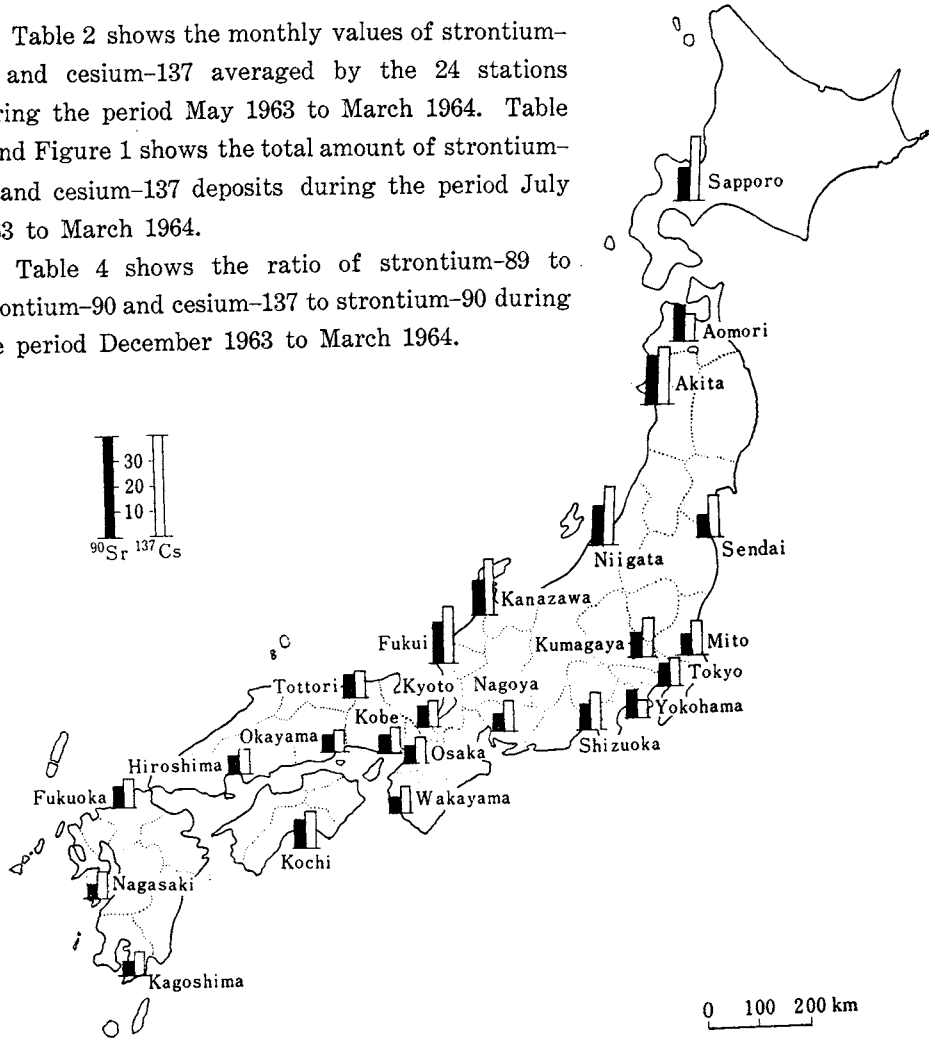


Figure 1. ^{90}Sr and ^{137}Cs in Deposits —Jul 63 to Mar 64—

Table 2. Monthly Mean Values of 24 Stations —May 63 to Mar 64—

Month	Number of Stations	Precipitation (mm)	Strontium-90 (mc/km²)	Strontium-89 (mc/km²)	Cesium-137 (mc/km²)
May 63	23	252.7	4.14	26.74	4.61
Jun	23	255.8	4.20	17.72	4.21
Jul	24	144.2	1.84	5.96	2.16
Aug	24	212.5	1.07	2.79	1.57
Sep	23	135.2	1.18	1.70	1.54
Oct	24	133.0	0.86	0.96	1.26
Nov	24	84.7	0.82	0.64	1.29
Dec	24	68.6	1.02	0.91	1.55
Jan 64	24	154.9	1.21	0.93	1.62
Feb	24	86.9	1.02	0.47	1.97
Mar	24	97.5	1.80	0.58	2.51

Table 3. Total Amount of ^{90}Sr and ^{137}Cs —Jul 63 to Mar 64—

Station	Strontium-90 (mc/km²)	Cesium-137 (mc/km²)	Station	Strontium-90 (mc/km²)	Cesium-137 (mc/km²)
Sapporo	15.32	27.58	Kyoto	8.68	13.44
Aomori	13.53	11.70	Osaka	4.39	9.62
Sendai	8.23	16.31	Kobe	5.69	7.85
Akita	20.25	24.30	Wakayama	4.42	6.52
Mito	9.38	14.13	Tottori	17.56	18.93
Kumagaya	9.35	16.13	Okayama	5.40	8.34
Tokyo	7.98	12.66	Hiroshima	6.65	10.00
Yokohama	11.48	15.81	Kochi	11.80	15.70
Niigata	18.02	24.27	Fukuoka	7.92	10.25
Kanazawa	19.34	26.93	Nagasaki	9.55	14.52
Fukui	17.91	24.87	Kagoshima	8.04	10.28
Shizuoka	9.88	13.84	**Mean**	**10.77**	**15.31**
Nagoya	7.74	13·42			

Table 4. Ratio of ^{89}Sr to ^{90}Sr and ^{137}Cs to ^{90}Sr (over 0.5 mc/km²) in Deposits —Dec 63 to Mar 64—

Station	$^{89}Sr/^{90}Sr$				$^{137}Cs/^{90}Sr$			
	Dec 63	Jan 64	Feb	Mar	Dec 63	Jan 64	Feb	Mar
Sapporo	1.5	0.4	0.3	—	1.7	0.8	1.6	0.3
Aomori	4.5	0.4	0.7	—	0.9	0.6	1.3	1.2
Sendai	—	1.0	—	—	—	2.1	—	2.1
Akita	0.9	1.1	—	0.5	1.6	1.5	1.7	2.3
Mito	—	—	—	0.3	—	—	—	2.4
Kumagaya	—	—	—	—	—	—	—	1.5
Tokyo	—	0.4	—	—	—	1.9	1.3	—
Yokohama	—	0.8	0.5	0.3	—	2.3	1.0	1.1
Niigata	1.0	0.5	0.9	0.5	1.5	0.3	1.7	1.7
Kanazawa	0.7	1.2	0.5	0.2	1.2	1.0	1.9	1.3
Fukui	0.8	1.2	—	0.6	1.5	1.1	7.6	1.3
Shizuoka	—	0.3	—	0.3	—	1.5	2.0	1.2
Nagoya	—	1.2	0.5	0.2	—	2.5	1.6	2.3
Kyoto	1.1	0.9	0.9	—	2.3	2.8	1.7	1.8
Osaka	—	—	—	1.0	—	—	—	2.0
Kobe	—	—	0.3	0.3	—	—	1.9	1.4
Wakayama	—	—	—	0.4	—	—	—	1.2
Tottori	0.7	0.5	0.3	0.4	1.7	0.3	1.4	0.4
Okayama	—	—	0.3	0.4	—	—	2.4	2.5
Hiroshima	—	0.4	0.7	0.6	—	0.6	3.7	1.5
Kochi	—	0.8	—	0.3	—	1.5	1.6	1.5
Fukuoka	0.6	0.5	—	1.1	0.4	1.0	1.6	2.0
Nagasaki	1.1	0.5	1.4	0.4	1.6	3.5	1.7	0.5
Kagoshima	—	1.3	0.6	0.6	—	0.5	1.7	1.4

Geographical Data

Strontium-90 and Cesium-137 in Soil

Since June 1963, strontium-90 and cesium-137 content in soil has been analyzed at 4 institutes, —the National Institute of Radiological Sciences (shown in Part I), Japan Analytical Chemistry Research Institute (shown in Part II), Institute of Public Health, and National Institute of Hygienic Sciences. The sampling of soil has been carried out by prefectural public health laboratories, and sent to these institutes for analyses.

Part I (*National Institute of Radiological Sciences*)

The National Institute of Radiological Sciences is charged with analysis of samples from 7 prefectures—Hokkaido, Niigata, Tokyo, Shizuoka, Aichi, Osaka and Fukuoka, in a research effort to determine the removal rate of radionuclides from various soils to rivers.

Two types of soil samples were collected at each prefecture. One was soil from "grass land", and the other from "grassless land". The sampling sites chosen were flat and uncultivated for at least for several years. In addition, sites where the dusts could be blown about and where rain water could flow in, were excluded. The soil collected from 2 spots, 1–2 m apart in one sampling area, was mixed to make one sample. The samples collected consisted of soil from a 30×30 cm area 5 cm in depth. Sampling locations are shown in Figure 2.

The grass and pebbles in the samples were removed by a screen with 2 mm mesh. Strontium

Table 5. ^{90}Sr and ^{137}Cs in Soil —Jun 63 to Dec 63—
By M. Saiki, H. Kamada and E. Shimizu
(*National Institute of Radiological Sciences*)

Location	Type	^{90}Sr (mc/km^2)	^{137}Cs (mc/km^2)	Location	Type	^{90}Sr (mc/km^2)	^{137}Cs (mc/km^2)
June 1963				**November 1963**			
Osaka, OSAKA	green	19	61	Sapporo, HOKKAIDO	green	12	18
Hirakata, OSAKA	bare	29	22	〃 〃	bare	34	76
July 1963				Shimizu, SHIZUOKA	green	17	24
Yokogoshi, NIIGATA	green	23	44	〃 〃	bare	13	33
〃 〃	bare	25	53	Konan, AICHI	green	19	63
Konan, AICHI	green	20	32	〃 〃	bare	37	113
〃 〃	bare	19	37	Osaka, OSAKA	green	19	113
August 1963				Hirakata, OSAKA	bare	20	35
Sapporo, HOKKAIDO	green	17	19	**December 1963**			
〃 〃	bare	22	29	Tokyo	green	14	37
Tokyo	green	12	32	〃	bare	6	11
Shimizu, SHIZUOKA	green	17	24	Yokogoshi, NIIGATA	green	42	137
September 1963				〃 〃	bare	23	6
Sawara, FUKUOKA	green	44	75	Sawara, FUKUOKA	green	31	78
〃 〃	bare	24	34	〃 〃	bare	11	19

and cesium in the treated soil samples were extracted with hydrochloric acid. The solution was analyzed for strontium-90 and cesium-137 content using the method recommended by the Science and Technology Agency.

Results obtained during the period June to December 1963 are shown in Table 5.

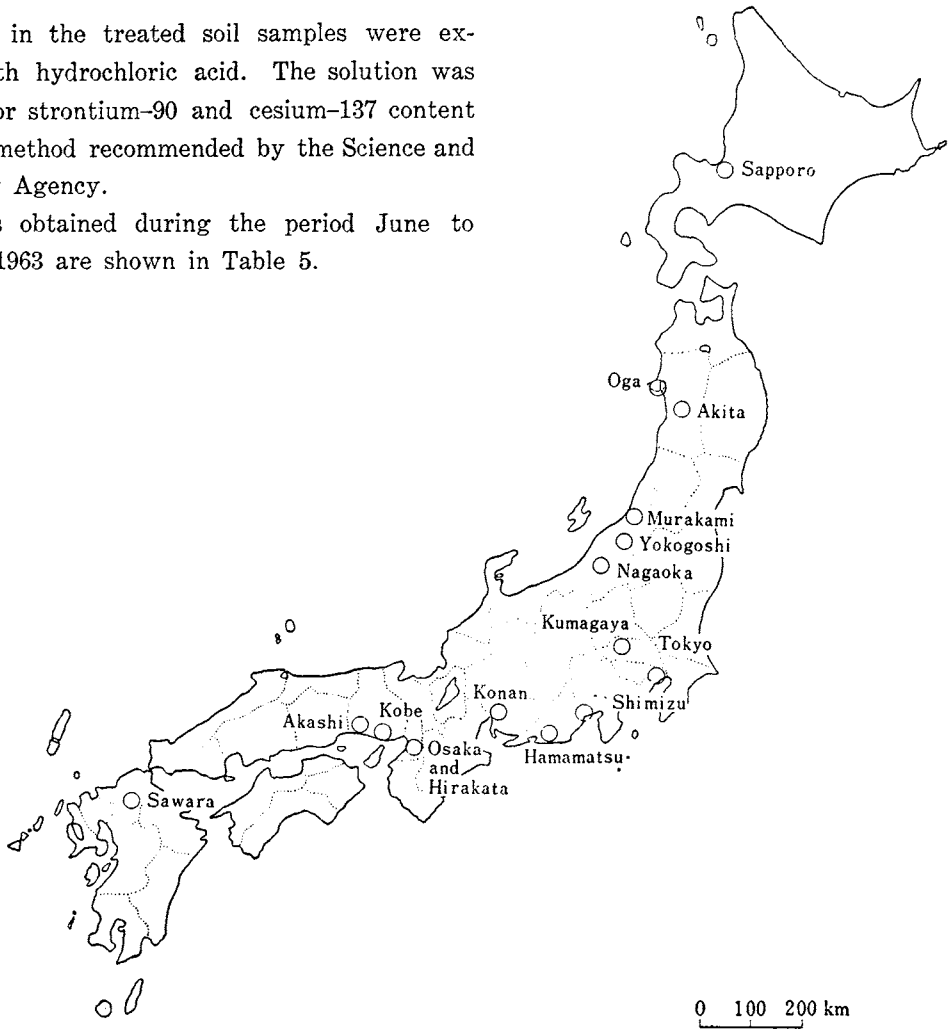


Figure 2. Sampling Location of Soil (Part I and II)

Part II (*Japan Analytical Chemistry Research Institute*)

The Japan Analytical Chemistry Research Institute has also analyzed, on commission by the Science and Technology Agency, samples from 7 prefectures, —Hokkaido, Akita, Saitama, Niigata, Shizuoka, Hyogo and Fukuoka, to obtain the total deposition in surface soils. Sampling location are shown in Figure 2.

Sampling procedures and the treatment method of the sample for strontium-90 and cesium-137 analyses are the same as those used in Part I, with the exception of using aqua regia as the extracting agent.

Results obtained during the period June 1963 to March 1964 are shown in Table 6.

Table 6. ^{90}Sr and ^{137}Cs in Soil —Jun 63 to Mar 64—

By T. Asari, M. Chiba and M. Kuroda
(*Japan Analytical Chemistry Research Institute*)

Location	Type	^{90}Sr (mc/km^2)	^{137}Cs (mc/km^2)	Dry Soil Collected*		
				weight kg	Ca %	K %
June 1963						
Sapporo, HOKKAIDO	bare	3	10	6.7	1.09	0.22
Kumagaya, SAITAMA	green	18	38	6.0	0.78	0.11
// //	bare	7	9	5.5	0.31	0.13
Hamamatsu, SHIZUOKA	green	13	32	5.2	0.01	0.38
// //	bare	13	31	6.9	0.01	0.41
Sawara, FUKUOKA	bare	17	33	7.3	0.36	0.23
July 1963						
Sapporo, HOKKAIDO	green	8	20	10.7	0.77	0.17
// //	bare	7	16	14.0	0.98	0.18
Hamamatsu, SHIZUOKA	green	12	21	5.1	0.13	0.11
// //	bare	13	30	7.8	0.13	0.11
Kobe, HYOGO	green	16	34	6.3	0.40	0.14
// //	bare	16	24	10.6	0.33	0.31
August 1963						
Kumagaya, SAITAMA	green	28	50	5.9	0.43	0.11
// //	bare	8	26	8.3	0.80	0.08
Nagaoka, NIIGATA	green	47	75	7.5	0.75	0.26
// //	bare	19	52	14.0	0.80	0.19
Murakami, NIIGATA	green	43	81	7.9	0.33	0.47
// //	bare	25	45	8.9	0.29	0.10
November 1963						
Sapporo, HOKKAIDO	green	25	54	13.6	0.56	0.07
// //	bare	15	30	14.1	0.89	0.05
Akashi, HYOGO	green	15	31	5.9	0.20	0.11
// //	bare	8	13.6	8.3	0.55	0.11
December 1963						
Kumagaya, SAITAMA	green	27	54	6.4	0.49	0.06
// //	bare	15	52	8.3	0.48	0.05
Nagaoka, NIIGATA	green	34	74	6.8	0.72	0.19
// //	bare	34	75	14.7	0.70	0.12
Hamamatsu, SHIZUOKA	green	50	56	7.1	0.01	0.35
// //	bare	22	21	8.4	0.01	0.32
Sawara, FUKUOKA	green	21	42	8.6	0.08	0.38
// //	bare	11	17	7.0	0.29	0.19
February 1964						
Kumagaya, SAITAMA	green	23	34	5.6	0.24	0.04
// //	bare	16	21	6.2	0.33	0.04
Hamamatsu, SHIZUOKA	green	26	44	8.9	0.02	0.19
// //	bare	29	52	9.8	0.02	0.32
Kobe, HYOGO	bare	11	15	7.3	0.66	0.14
Akashi, HYOGO	green	17	29	6.4	0.10	0.15
March 1964						
Sapporo, HOKKAIDO	green	17	23	7.5	0.82	0.11
// //	bare	24	44	14.1	0.78	0.14
Oga, AKITA	green	37	37	5.0	1.48	0.13
Sawara, FUKUOKA	bare	15	36	6.1	0.26	0.21

* Grass roots and pebbles were removed

Water Data

Strontium-90 and Cesium-137 in City Water

Since December 1961, the National Institute of Radiological Sciences has analyzed the strontium-90 and Cesium-137 content in city water. However, in April 1963, a majar portion of this work was transfered to the Japan Analytical Chemistry Research Institute (Part II). Sampling and pretreatment for concentration have been carried out by 24 prefectural public health laboratories.

Part I (*National Institute of Radiological Sciences*)

At present, the National Institute of Radiological Sciences is in charge of the analysis of strontium-90 and cesium-137 content in city water samples from Tokyo, Niigata and Osaka prefectures, to compare the amount of radionuclides in "source water" and "treated water" collected from the same water supply system.

To accomplish this, two types of city water samples were collected once a month at one city in each prefecture. One the "source water" collected before the treatment, and the other, "treated water" collected from a tap.

To concentrate strontium-90 and cesium-137, the ion exchange method has been used. An "A" type column, filled with sodium cation exchange resin (Dowex 50w-x8, 50-80 mesh), and 100 m*l* of carrier solution, containing both 100 mg of strontium and cesium, were sent in advance from the National Institute of Radiological Sciences to each prefectural public health laboratory. The column used was illustrated in Figure 4, Issue No. 2 of this publication. At each prefectural public health laboratory, a 100 liter water sample was passed through the column at the rate of 12 liters per hour, then the column "A" was sent back to the National Institute of Radiological Sciences.

At the National Institute of Radiological Sciences, after 2 liters of 5%—oxalic acid was passed through the column to remove other metals by complex ionization, strontium and cesium adsorbed on the resin were eluted by 3 liters of 3N-hydrochloric acid. The hydrochloric acid fraction was analyzed using the method recommended by the Science and Technology Agency.

Results obtained during the period September 1963 to March 1964 are shown in Table 7.

Table 7. ^{90}Sr and ^{137}Cs in Source and Treated Water —Sep 63 to Mar 64—

By M. Saiki, H. Kamada and E. Shimizu
(National Institute of Radiological Scences)

City	Source	Type	Date	^{90}Sr $\mu\mu c/l$	^{137}Cs $\mu\mu c/l$	pH*
September 1963						
Tokyo	Edo River sf.	SW	25	0.35	0.30	7.4
//	//	TW	25	0.30	0.09	7.5
Niigata, NIIGATA	Agano River sf.	SW	27	0.81	0.39	6.7
//	//	TW	27	0.74	0.24	6.5
October 1963						
Tokyo	Edo River sf.	SW	31	0.35	0.30	7.3
//	//	TW	31	0.35	0.09	7.4
Osaka, OSAKA	Yodo River sf.	SW	11	0.77	0.31	7.0
//	//	TW	14	0.73	0.24	6.6
December 1963						
Tokyo	Edo River sf.	SW	11	0.28	0.13	7.1
//	//	TW	11	0.22	0.15	7.3
Niigata, NIIGATA	Agano River sf.	SW	24	0.81	0.15	6.7
//	//	TW	24	0.70	0.14	6.4
February 1964						
Tokyo	Edo River sf.	SW	12	0.26	0.38	7.2
//	//	TW	12	0.22	0.15	7.3
Osaka, OSAKA	Yodo River sf.	SW	4	0.75	0.30	
//	//	TW	10	0.68	0.15	
//	//	SW	27	0.75	0.23	7.0
March 1964						
Niigata, NIIGATA	Agano River sf.	SW	3	0.52	0.46	6.7
//	//	TW	3	0.23	0.29	6.5
Osaka, OSAKA	Yodo River sf.	TW	4	0.65	0.15	6.4

* By notice from each prefectural public health laboratory
SW and TW indicates Source Water and Treated Water respectivily

Part II (*Japan Analytical Chemistry Research Institute*)

Since May 1963, the Japan Analytical Chemistry Research Institute, on commission by Science and Technology Agency, has analyzed the strontium-90 and cesium-137 content in city water from 21 prefectures once a month, to continue the work carried out by the National Institute of Radiological Sciences up to March 1963.

"Source water" is the only type of city water sample being collected.

The analytical procedure applied is the same as that used in Part I (National Institute of Radiological Sciences).

Results obtained during the period May 1963 to March 1964 are shown in Table 8.

Table 8. ^{90}Sr and ^{137}Cs in Source Water —May 63 to Mar 64—

By T. Asari, M. Chiba and M. Kuroda

(*Japan Analytical Chemistry Research Institute*)

City	Source	Date	^{90}Sr $\mu\mu c/l$	^{137}Cs $\mu\mu c/l$	Nature of Water *1	
					pH	Appearance
		May 1963				
Odawara, KANAGAWA	Sakawa River rb.	10 May	0.03	0.03	6.8	clear
Okayama, OKAYAMA	Asahi River rb.	17 May	0.69	0.10	7.0	
Tottori, TOTTORI	Bitani Storing Reservoir sf.	23 May	0.56	0.06	7.0	slight muddy
		June, July 1963				
Sapporo, HOKKAIDO	Toyohira River sf.	10 Jun	0.68	0.37	7.1	
Aomori, AOMORI	Yokouchi River sf.	11 Jul	0.15	0.40	6.8	clear
Sendai, MIYAGI	Okura and Aoshita Rivers sf.	18 Jun	0.83	0.09	6.8	slight muddy (yellow)
Akita, AKITA	Asahi River sf.	18 Jun	0.18	0.03	6.6	slight muddy (yellow)
Mito, IBARAGI	Naka River sf. and rb.	14 Jun	0.61	0.24	7.1	
Urawa, SAITAMA	Well	29 Jun	0.06	0.03	7.4	clear
Odawara, KANAGAWA	Sakawa River rb.	11 Jul	0.06	0.02	6.8	clear
Kanazawa, ISHIKAWA	Sai River sf. and rb.	22 Jun	0.81	0.07	7.2	clear
Shimizu, SHIZUOKA	Okitsu River rb.	13 Jun	0.15	0.20	7.6	clear
Nagoya, AICHI	Kino River sf.	24 Jun	0.33	0.12	6.9	
Kyoto, KYOTO	Biwa Lake sf.	5 Jun	1.20	0.28	6.9	
〃 〃	〃	18 Jul	0.30	0.46	7.3	slight muddy
Kobe, HYOGO	Chikari River sf.	17 Jun	0.42	0.20	6.9	muddy (yellow)
Wakayama, WAKAYAMA	Kino River sf. and rb.	17 Jun	1.21	0.03	6.9	
Okayama, OKAYAMA	Asahi River rb.	18 Jul	0.44	0.08	7.0	clear
Hiroshima, HIROSHIMA	Ota River sf. and rb.	13 Jun	0.49	0.37	7.0	slight muddy
Kochi, KOCHI	Kagami River rb.	19 Jun	0.68	0.25	7.2	clear
Fukuoka, FUKUOKA	Muromi River rb.	28 Jun	0.47	0.18		clear
Nagasaki, NAGASAKI	Storing Reservoir sf.	11 Jun	0.72	0.67	6.4	slight muddy (white)
Kagoshima, KAGOSHIMA	Nanakubo Spring	11 Jun	0.02	0.27	6.2	clear
* * *						
Yoshida-mura, FUKUI	Stream sf.	11 Jun	1.48	0.34	7.6	

Table 8. ^{90}Sr and ^{137}Cs in Source Water —May 63 to Mar 64— (*continued*)

City	Source	Date	^{90}Sr $\mu\mu c/l$	^{137}Cs $\mu\mu c/l$	Nature of Water *1	
					pH	Appearance
August, September 1963						
Sapporo, HOKKAIDO	Toyohira River sf.	6 Aug	0.36	0.08	7.2	slight muddy (white)
Aomori, AOMORI	Yokouchi River sf.	20 Sep	0.37	0.25	6.8	clear
Sendai, MIYAGI	Okura and Aoshita River sf.	27 Aug	0.64	0.46	6.6	slight muddy (yellow)
Akita, AKITA	Asahi River sf.	7 Aug	0.60	0.10	6.6	clear
Mito, IBARAGI	Naka River sf. and rb.	6 Aug	0.30	0.22	7.2	slight muddy
Urawa, SAITAMA	Well	21 Aug	0.03	0.02	7.4	
Odawara, KANAGAWA	Sakawa River rb.	4 Sep	0.06	0.36	6.8	clear
Kanazawa, ISHIKAWA	Sai River sf. and rb.	8 Aug	0.83	0.06	7.3	
Shimizu, SHIZUOKA	Okitsu River rb.	21 Aug	0.14	0.12	7.6	slight muddy
Nagoya, AICHI	Kino River sf.	6 Aug	0.59	0.37	6.6	clear
Kyoto, KYOTO	Biwa Lake sf.	11 Sep	1.55	0.06	7.1	slight muddy (white)
Kobe, HYOGO	Chikari River sf.	20 Aus	0.43	0.30	7.2	slight muddy (yellow)
Wakayama, WAKAYAMA	Kino River sf. and rb.	8 Aug	0.21	0.10	7.1	slight muddy
Tottori, TOTTORI	Bitani storing Reservoir sf.	9 Aug	0.41	0.15	7.0	slight muddy (brown)
Okayama, OKAYAMA	Asahi River rb.	5 Sep	0.49	0.72	7.2	clear
Hiroshima, HIROSHIMA	Ota River sf. and rb.	19 Aug	0.52	0.09	6.8	slight muddy
Kochi, KOCHI	Kagami River rb.	6 Aug	1.31	0.05	6.8	clear
Fukuoka, FUKUOKA	Muromi River rb.	30 Aug	0.45	0.10	6.8	slight muddy (white)
Nagasaki, NAGASAKI	Storing Reservoir sf.	6 Aug	0.37	0.24	6.7	slight muddy (white)
Kagoshima, KAGOSHIMA	Nanakubo Spring	6 Aug	0.02	0.03	7.5	clear
* * *						
Yoshida-mura, FUKUI	Stream sf.	5 Aug	0.20	0.21	6.8	
October, November 1963						
Sapporo, HOKKAIDO	Toyohira River sf.	10 Oct	0.32	0.11	7.1	slight muddy
Aomori, AOMORI	Yokouchi River sf.	15 Nov	0.22	0.20	6.8	clear
Sendai, MIYAGI	Okura and Aoshita River sf.	28 Oct	0.46	0.17	6.6	clear
Akita, AKITA	Asahi River sf.	10 Oct	0.62	0.31	6.9	clear
Mito, IBARAGI	Naka River sf. and rb.	3 Oct	0.35	0.21	7.2	slight muddy
Urawa, SAITAMA	Well	14 Oct	0.01	0.06	7.4	clear
Odawara, KANAGAWA	Sakawa River rb.	Nov	0.03	0.22		
Kanazawa, ISHIKAWA	Sai River sf. and rb.	15 Oct	0.65	0.14	7.2	
Shimizu, SHIZUOKA	Okitsu River rb.	18 Oct	0.03	0.03	7.6	clear
Nagoya, AICHI	Kino River sf.	12 Oct	0.31	0.16	6.9	slight muddy
Kyoto, KYOTO	Biwa Lake sf.	4 Nov	1.32	0.23	7.4	slight muddy (white)
Kobe, HYOGO	Chikari River sf.	15 Oct	0.44	0.09	6.7	slight muddy (yellow)
Wakayama, WAKAYAMA	Kino River sf. and rb.	22 Oct	0.12	0.07	6.8	clear
Tottori, TOTTORI	Bitani storing Reservoir sf.	2 Oct	0.53	0.28	7.0	slight muddy (brown)
Okayama, OKAYAMA	Asahi River rb.	18 Nov	0.33	0.02	7.2	clear
Hiroshima, HIROSHIMA	Ota River sf. and rb.	21 Oct	0.30	0.18	7.2	slight muddy
Kochi, KOCHI	Kagami River rb.	7 Oct	0.20	0.05	7.2	clear
Fukuoka, FUKUOKA	Muromi River rb.	31 Oct	0.43	0.14	6.8	clear
Nagasaki, NAGASAKI	Storing Reservoir sf.	4 Oct	0.37	0.33	6.9	slight muddy (white)
Kagoshima, KAGOSHIMA	Nanakubo Spring	4 Oct	0.01	0.05	6.9	clear
* * *						
Yoshida-mura, FUKUI	Stream sf.	7 Oct	0.18	0.06	7.6	

Table 8. ^{90}Sr and ^{137}Cs in Source Water —May 63 to Mar 64— (*continued*)

City	Source	Date	^{90}Sr $\mu\mu c/l$	^{137}Cs $\mu\mu c/l$	Nature of Water *1	
					pH	Appearance
December 1963, January 1964						
Sapporo, HOKKAIDO	Toyohira River sf.	4 Dec	0.28	0.10	7.1	clear
Aomori, AOMORI	Yokouchi River sf.	16 Jan	0.47	0.28	7.0	clear
Sendai, MIYAGI	Okura and Aoshita River sf.	16 Dec	0.40	0.20	7.3	slight muddy (white)
Akita, AKITA	Asahi River sf.	10 Dec	0.48	0.38	6.5	clear
Mito, IBARAGI	Naka River sf. and rb.	12 Dec	0.14	0.09	7.0	clear
Urawa, SAITAMA	Well	7 Dec	0.01	0.02	7.4	clear
Odawara, KANAGAWA	Sakawa River rb.	Jan	0.05	0.06		
Kanazawa, ISHIKAWA	Sai River sf. and rb.	10 Dec	0.45	0.06	7.2	slight muddy
Shimizu, SHIZUOKA	Okitsu River rb.	17 Dec	0.06	0.06	7.6	clear
Nagoya, AICHI	Kino River sf.	7 Dec	0.22	0.07	6.9	clear
Kyoto, KYOTO	Biwa Lake sf.	8 Jan	1.05	0.13	6.8	clear
Kobe, HYOGO	Chikari River sf.	18 Dec	0.35	0.08	6.8	clear
Wakayama, WAKAYAMA	Kino River sf. and rb.	23 Dec	0.18	0.03		slight muddy
Tottori, TOTTORI	Bitani Storing Reservoir sf.	7 Dec	0.50	0.20	6.8	slight muddy (brown)
Okayama, OKAYAMA	Asahi River rb.	13 Jan	0.35	0.04	7.2	clear
Hiroshima, HIROSHIMA	Ota River sf. and rb.	11 Dec	0.41	0.13	7.1	slight muddy
Kochi, KOCHI	Kagami River rb.	5 Dec	0.16	0.02	7.2	clear
Fukuoka, FUKUOKA	Muromi River rb.	11 Dec	0.48	0.13	6.8	clear
Nagasaki, NAGASAKI	Storing Reservoir sf.	7 Dec	0.43	0.29	6.9	slight muddy (white)
Kagoshima, KAGOSHIMA	Nanakubo Spring	5 Dec	0.01	0.04	6.8	clear
* * *						
Yoshida-mura, FUKUI	Stream sf.	5 Dec	0.15	0.10	7.3	clear
February, March 1964						
Sapporo, HOKKAIDO	Toyohira River sf.	3 Feb	0.39	0.14	7.2	clear
Aomori, AOMORI	Yokouchi River sf.	6 Mar	0.59	0.54	7.0	clear
Sendai, MIYAGI	Okura and Aoshita Rivers sf.	4 Feb	0.44	0.16	6.9	clear
Akita, AKITA	Asahi River sf.	18 Feb	0.68	0.45	6.5	
Mito, IBARAGI	Naka River sf. and rb.	17 Feb	0.15	0.18		
Urawa, SAITAMA	Well	3 Feb	0.01	0.03	7.4	clear
Kanazawa, ISHIKAWA	Sai River sf. and rb.	13 Feb	0.75	0.32	7.1	clear
Shimizu, SHIZUOKA	Okitsu River rb.	12 Feb	0.03	0.04	7.2	clear
Nagoya, AICHI	Kino River sf.	7 Feb	0.27	0.20	6.9	clear
Kobe, HYOGO	Chikari River sf.	10 Feb	0.35	0.10	6.9	slight muddy (yellow)
Wakayama, WAKAYAMA	Kino River sf. and rb.	26 Feb	0.18	0.19	7.2	slight muddy
Tottori, TOTTORI	Bitani storing Reservoir sf.	4 Feb	0.92	0.76	6.7	
Hiroshima, HIROSHIMA	Ota River sf. and rb.	3 Feb	0.43	0.21	7.0	clear
Kochi, KOCHI	Kagami River rb.	5 Feb	0.14	0.03	7.2	clear
Fukuoka, FUKUOKA	Muromi River rb.	5 Mar	0.45	0.10	6.8	clear
Nagasaki, NAGASAKI	Storing Reservoir sf.	4 Feb	0.62	0.32	6.9	slight muddy (white)
Kagoshima, KAGOSHIMA	Nanakubo Spring	3 Feb	0.01	0.02	6.5	clear
* * *						
Yoshida-mura, FUKUI	Stream sf.	14 Feb	0.23	0.18	7.3	clear

*1 By notice from each prefectural public health laboratorys

Strontium-90 and Cesium-137 in Stream Water

(Japan Analytical Chemistry Research Institute)

Since May 1963, the Japan Analytical Chemistry Research Institute, on commission by the Science and Technology Agency, has analyzed the strontium-90 and cesium-137 content in water which is used for drinking purposes by people near the stream. The sampling and pre-treatment for concentration has been made by prefectural public health laboratories.

Samplings were carried out twice a year, once in a season without snow, and the other in snow season. The former samples were collected in July and October at 7 prefectures, —Hokkaido, Akita, Shizuoka, Wakayama, Tottori, Hiroshima and Kochi, and the latter collected twice in the snow season at 6 prefectures, Hokkaido, Niigata, Fukui, Kyoto, Hyogo and Tottori. In each prefecture, 2 sampling stations were selected.

To concentrate the strontium-90 and cesium-137, the ion exchange method has been used. An "A" type column, filled with sodium cation exchange resin (Dowex 50W x8, 50-80 mesh), and 100 m*l* of carrier solution containing both 100 mg of strontium and cesium, were sent in advance from the Japan Analytical Chemistry Research Institute to each prefectural public health laboratory. The column used was illustrated in Figure 4, Issue No. 2 of this publication. At each prefectural public health laboratory, a 100 liter of water sample was passed through the column at the rate of 12 liters per hour, then the column was returned to the Japan Analytical Chemistry Research Institute.

At the Japan Analytical Chemistry Research Institute, after 2 liters of 5%—oxalic acid was passed through the column to remove other metals by complex ionization, strontium and cesium adsorbed on the resin were eluted by 3 liters of 3N-hydrochloric acid. The hydrochloric acid fraction was analyzed using the method recommended by the Science and Technology Agency.

Results obtained during the period July 1963 to March 1964 are shown in Table 9.

Table 9. ^{90}Sr and ^{137}Cs in Potable Stream Water and Snow —Jul 63 to Mar 64—
By T. Asari, M. Chiba and M. Kuroda
(Japan Analytical Chemistry Research Institute)

Location (Stream)	Date	^{90}Sr $\mu\mu c/l$	^{137}Cs $\mu\mu c/l$	Nature of Water*	
				pH	Appearance
STREAM, SNOWLESS SDASON (Jul, Nov 63)					
Urakawa, HOKKAIDO	Jul 63	0.43	0.04	5.4	clear
//	Nov 63	0.45	0.03	5.2	slight muddy (yellow)
Wakkanai, HOKKAIDO	Jul 63	0.71	0.16	5.2	slight muddy (yellow)
//	Nov 63	0.64	0.15	5.2	slight muddy
Akita, AKITA	Jul 63	0.56	0.13	6.5	clear
(Asahi River)	Nov 63	0.39	0.12	6.9	
Akita, AKITA	Jul 63	2.75	0.35	6.2	clear
//	Nov 63	0.65	0.54	7.3	
Okochi, SHIZUOKA	Jul 63	0.13	0.07	7.5	slight muddy (brown)
(Abe River u.s.)	Nov 63	0.29	0.23	7.4	clear
Fujinomiya, SHIZUOKA	Jul 63	0.11	0.10	7.4	slight muddy (brown)
(Shiba River b.s.)	Nov 63	0.07	0.06	7.4	clear

Table 9. ^{90}Sr and ^{137}Cs in Potable Stream Water and Snow —Jul 63 to Mar 64— *(continued)*

Location (Stream)	Date	^{90}Sr $\mu\mu c/l$	^{137}Cs $\mu\mu c/l$	Nature of Water *	
				pH	Appearance
STREAM, SNOWLESS SDASON (Jul., Nov. 63) *(continued)*					
Kozagawa, WAKAYAMA	Jul 63	0.23	0.06	6.8	clear
(Koza River b.s.)	Nov 63	0.16	0.05	6.9	clear
Kudoyama, WAKAYAMA	Jul 63	0.27	0.10	6.8	clear
(Kino River b.s.)	Nov 63	0.24	0.04	7.2	slight muddy
Chizu, TOTTORI	Jul 63	0.02	0.13	7.5	clear
//	Nov 63	0.14	0.05	7.0	
Togo, TOTTORI	Jul 63	0.22	0.07	7.0	
//	Nov 63	0.06	0.09	6.9	
Onomi, KOCHI	Jul 63	2.96	0.23	6.2	clear
//	Nov 63	0.10	0.08	6.2	slight muddy
Kitagawa, KOCHI	Jul 63	0.12	0.07	7.5	clear
//	Nov 63	0.25	0.64	6.0	clear
Miyoshi, HIROSHIMA	Jul 63	0.30	0.09	7.1	
(Umaarai River)	Nov 63	0.25	0.09	7.1	clear
Fuchu, HIROSHIMA	Jul 63	0.41	0.13	7.0	
(Asahi River)	Nov 63	0.25	0.14	7.0	slight muddy
STREAM, SNOW SEASON (Jan, Mar 64)					
Fukui, FUKUI	Jan 64	0.07	0.12	7.2	clear
//	Mar 64	0.08	0.75	7.4	clear
Ono, FUKUI	Jan 64	0.04	0.05	7.4	clear
//	Mar 64	0.04	0.10	7.4	clear
Maizuru, KYOTO	Feb 64	0.10	0.14	6.8	clear
(Tani River)	Mar 64	0.12	0.10	7.3	clear
Mineyama, KYOTO	Feb 64	1.68	0.86	7.0	clear
//	Mar 64	0.18	1.11	6.7	clear
Toyooka, HYOGO					
(Maruyama River)	Mar 64	0.50	0.05	7.1	clear
Kasai, HYOGO	Mar 64	0.62	1.19	7.1	clear
//	Mar 64	0.59	0.13	7.0	clear
Chizu, TOTTORI	Jan 64	0.11	0.05	6.7	clear
//	Mar 64	0.23	0.26	6.6	
Togo, TOTTORI	Jan 64	0.11	0.05	6.7	clear
//	Mar 64	0.09	0.26	6.7	
SNOW (Jan, Feb 64)					
Wakkanai, HOKKAIDO	Jan 64	13.89	19.09	4.8	clear
	Feb 64	14.63	17.67	5.0	clear
Hippu, HOKKAIDO	Jan 64	7.69	8.22	5.0	clear
	Feb 64	6.28	8.19	5.0	clear
Shiozawa, NIIGATA	Jan 64	2.1	0.66	7.0	clear
	Mar 64	1.12	0.56	5.7	clear
Shimoda, NIIGATA	Jan 64	0.64	0.43	6.4	clear
Toyooka, HYOGO	Feb 64	15.80	18.52	5.8	clear

* By notice from each prefectural public health laboratory b.s. and u.s. indicates branch stream and upper stream respectively

Dietary Data

Strontium-90 and Cesium-137 in Total Diet

Analysis of strontium-90 and cesium-137 content in total diet samples have been carried out at the National Institute of Nutrition and the Institute of Public Health. In April 1963, this work was transfered to the National Institute of Radiological Sciences and the Japan Analytical Chemistry Research Institute. The samples were collected by prefectural public health laboratories.

Part I (*National Institute of Radiological Sciences*)

The National Institute of Radiological Sciences is in charge of analyses of the total diet samples from 5 prefectures Hokkaido, Niigata, Tokyo, Osaka, and Fukuoka.

One city and one village in each prefecture, indicated with open circles in Figure 3, were chosen as representative of urban and rural districts of those prefectures respectively. Ten families from each location were chosen at random, and each familly submitted a normal portion of the regular diet consumed in one day for an adult or a child. Diet at special occasions was avoided. At Osaka Prefecture indicated with semisolid circle in Figure 3, however, in addition to the urban adult samples from 10 families, 10 dietary samples provided in 10 hospitals and factories were collected.

The total diet was roughly grouped in 4 categories

1) Staple Food: rice, barley, bread, macaroni, etc.
2) Vegetable Food: root vegetables, leaf vegetables, bean, fruit, etc.
3) Animal Food (Animal Protein Source): meat, fish, milk, eggs, etc.
4) Soup: soup, tea, drinking water, etc.

Composite samples from the 10 families, hospital and factories were ashed together. The analysis of strontium-90 content in a 20 g ashed sample was carried out using the fuming acid separation method. For cesium-137, a 10 g of ash including 50 mg of cesium carrier was treated with ammonium molybdate then with chloroplatinic acid.

Results obtained during 1963 are shown in Table 10.

Table 10. ^{90}Sr and ^{137}Cs in Total Diet —1963—

By M. Saiki, T. Ueda, Y. Suzuki and Z. Murakoshi
(*National Institute of Radiological Sciences*)

Category	Daily Intake				^{90}Sr $\mu\mu c$/gCa	^{137}Cs $\mu\mu c$/gK
	Ca mg	K mg	^{90}Sr $\mu\mu c$	^{137}Cs $\mu\mu c$		
(URBAN LDULT DIET —Jun~Aug 63—)						
(Sapporo, HOKKAIDO)						
Staple Food	55.3	324.5	1.3	24.0	23.5	73.8
Vegetable Food	34.8	674.4	2.2	17.6	63.1	26.2
Animal Food	162.0	591.7	1.1	28.4	6.8	36.9
Soup	185.0	301.6	1.5	11.8	8.1	39.1
Total*	437.1	1892.2	6.1	81.8	14.0	43.2
(Tokyo)						
Staple Food	34.8	212.7	1.7	10.7	48.8	50.3
Vegetable Food	25.9	644.5	2.2	18.2	85.1	28.2
Animal Food	83.3	202.0	1.6	26.2	19.2	129.9
Soup	122.0	195.0	1.9	5.9	15.5	30.8
Total	266.0	1052.2	7.4	65.6	27.8	62.3

Table 10. ^{90}Sr and ^{137}Cs in Total Diet —1963— (*continued*)

Category	Daily Intake				^{90}Sr $\mu\mu c$/gCa	^{137}Cs $\mu\mu c$/gK
	Ca mg	K mg	^{90}Sr $\mu\mu c$	^{137}Cs $\mu\mu c$		
(URBAN ADULT DIET —Jun~Aug 63—) (*continued*)						
(Niigata, NIIGATA)						
Staple Food	51.2	268.3	2.0	9.5	39.1	35.3
Vegetable Food	119.0	1170.0	11.3	40.0	95.1	34.2
Animal Food	119.0	788.5	1.1	59.0	9.2	74.8
Soup	164.0	318.4	1.4	14.3	8.5	45.0
Total	453.2	2545.2	15.7	122.7	34.6	48.2
(Osaka, OSAKA)						
Staple Food	30.0	309.8	1.3	12.4	48.1	39.9
Vegetable Food	43.3	1213.3	2.3	27.3	53.1	22.5
Animal Food	132.0	603.9	1.2	27.2	9.0	45.0
Soup	107.8	197.8	1.6	19.0	14.9	80.2
Total	312.8	2324.8	6.4	85.8	20.5	36.9
(Fukuoka, FUKUOKA)						
Staple Food	110.0	345.6	5.9	17.8	53.1	51.5
Vegetable Food	124.0	1350.5	9.3	20.6	75.5	15.2
Animal Food	294.0	522.5	1.0	10.3	3.5	19.8
Soup	155.5	198.6	1.5	6.7	13.0	33.9
Total	643.5	2417.2	17.7	55.5	27.5	23.0
(Provided in Hospital and Factory)						
(Osaka, OSAKA)						
Staple Food	31.5	293.5	1.5	21.4	47.6	73.0
Vegetable Food	61.5	1018.1	9.6	25.3	156.0	24.9
Animal Food	173.0	477.5	1.4	15.1	8.1	31.7
Soup	88.9	223.4	1.2	9.7	13.5	43.6
Total	354.9	2012.5	13.7	71.6	38.6	35.6
(RURAL ADUIA DIET —Jun~Aug 63—)						
(Sapporo, HOKKAIDO)						
Staple Food	59.7	53.3	0.2	4.2	33.5	79.2
Vegetable Food	34.9	1093.6	2.3	17.9	65.8	16.4
Animal Food	207.0	333.9	1.8	4.1	8.7	11.7
Soup	166.0	533.5	1.4	11.1	8.4	20.7
Total	467.6	2014.3	5.7	37.2	12.2	18.5
(Tokyo)						
Staple Food	15.0	293.2	0.8	5.4	53.3	18.5
Vegetable Food	24.3	248.6	1.9	8.0	78.2	32.3
Animal Food	51.6	674.0	0.8	35.2	15.5	52.3
Soup						
Total						
(Niigata, NIIGATA)						
Staple Food						
Vegetable Food	119.0	2172.7	9.5	48.7	80.1	22.4
Animal Food	105.0	248.0	0.9	3.3	8.6	13.1
Soup	191.0	442.8	3.1	35.3	16.2	40.8
Total						
(Fukuoka, FUKUOKA)						
Staple Food	110.0	414.8	5.3	9.6	48.1	23.1
Vegetable Food	103.0	1178.0	8.4	15.1	81.3	12.8
Animal Food	38.4	419.3	3.3	2.9	8.6	7.0
Soup	111.6	194.7	1.3	2.5	11.6	12.6
Total	708.6	2206.8	18.3	30.0	25.8	13.6

Table 10. ^{90}Sr and ^{137}Cs in Total Diet —1963— (*continued*)

Category	Daily Intake				^{90}Sr $\mu\mu c/gCa$	^{137}Cs $\mu\mu c/gK$
	Ca mg	K mg	^{90}Sr $\mu\mu c$	^{137}Cs $\mu\mu c$		
(RURAL CHILD DIAT —Jun~Aug 63—)						
(Sapporo, HOKKAIDO)						
Staple Food	29.2	160.0	0.9	11.1	30.8	69.6
Vegetable Food	13.0	363.5	1.0	9.3	76.6	25.5
Animal Food	148.0	433.0	2.0	8.0	13.5	18.4
Soup	145.0	348.4	1.2	12.1	8.3	34.6
Total	335.0	1304.5	5.1	40.4	15.2	31.0
(Tokyo)						
Staple Food	4.8	58.4	0.3	2.8	62.0	47.1
Vegetable Food	24.2	279.2	1.3	9.6	53.5	34.2
Animal Food	49.0	149.1	0.5	6.6	10.2	44.4
Soup	111.0	96.5	0.4	3.1	3.6	32.0
Total	189.0	583.2	2.5	22.0	13.2	37.7
(Niigata, NIIGATA)						
Staple Food	10.4	133.9	0.4	6.8	38.5	50.8
Vegetable Food	168.0	1387.5	9.0	34.8	53.5	25.1
Animal Food	258.0	273.8	1.6	35.2	6.2	128.4
Soup	80.0	240.7	1.2	5.1	15.0	21.3
Total	2037.9	516.4	12.2	81.9	23.3	40.2
(Fukuoka, FUKUOKA)						
Staple Food	85.7	228.0	2.7	5.0	31.5	22.1
Vegetable Food	85.4	764.0	4.4	8.4	52.0	11.0
Animal Food	363.0	492.0	4.5	9.4	12.5	19.1
Soup	98.4	104.3	1.1	2.2	11.1	20.6
Total	633.0	1588.3	12.7	25.0	20.1	15.7
(URBAN ADULTS VIET —Nov~Dec 63—)						
(Sapporo, HOKKAIDO)						
Staple Food	52.1	369.7	1.8	42.8	34.5	115.7
Vegetable Food	85.1	1062.8	6.0	31.7	70.5	29.8
Animal Food	132.0	792.5	3.0	27.2	22.7	34.4
Soup	138.1	595.7	2.5	13.8	18.1	23.1
Total	407.3	2820.7	13.3	115.5	32.7	41.0
(Tokyo)						
Staple Food	48.1	317.2	1.0	15.8	20.7	49.7
Vegetable Food	67.1	1329.9	5.9	45.4	87.9	34.2
Animal Food	85.5	151.9	0.4	4.8	4.7	31.7
Soup	125.5	218.5	0.9	5.0	7.2	22.9
Total	326.2	2017.5	8.2	71.0	25.1	35.1
(Niigata, NIIGATA)						
Staple Food	63.5	277.5	2.3	17.1	36.2	61.6
Vegetable Food	81.6	1604.4	14.3	49.3	175.2	30.7
Animal Food	12.1	521.6	1.6	16.7	13.2	32.0
Soup	101.5	588.6	3.6	22.6	35.5	38.4
Total	367.6	2992.1	21.8	105.7	59.3	35.4
(Fukuoka, FUKUOKA)						
Staple Food	45.5	378.0	1.8	22.3	39.7	88.9
Vegetable Food	88.9	1422.8	8.2	17.8	92.2	12.5
Animal Food	146.1	52.6	1.5	10.6	10.3	20.3
Soup	128.5	455.5	1.3	16.4	10.2	36.0
Total	409.0	2777.9	12.8	67.1	31.3	24.1

Table 10. ^{90}Sr and ^{137}Cs in Total Diet --1963— *(continued)*

Category	Daily Intake				^{90}Sr $\mu\mu c$/gCa	^{137}Cs $\mu\mu c$/gK
	Ca mg	K mg	^{90}Sr $\mu\mu c$	^{137}Cs $\mu\mu c$		
(RURAL ADULT DIET —Nov~Dec 63—)						
(Sapporo, HOKKAIDO)						
Staple Food	48.5	396.2	2.8	54.8	57.7	138.4
Vegetable Food	88.4	883.2	5.6	28.4	63.6	32.2
Animal Food	152.0	521.7	2.5	5.5	16.5	10.5
Soup	156.7	730.0	3.6	14.6	23.0	20.0
Total	445.3	2531.1	14.5	103.3	32.6	40.9
(Tokyo)						
Staple Food	36.6	304.3	1.3	17.9	35.5	58.9
Vegetable Food	39.9	387.0	1.1	9.3	27.6	24.1
Animal Food	67.7	491.4	1.1	15.1	16.2	30.6
Soup	121.3	682.7	2.2	30.6	18.1	44.8
Totol	265.5	1865.4	5.7	72.9	21.5	39.0
(Niigata, NIIGATA)						
Staple Food	61.0	456.7	2.7	33.8	44.3	73.9
Vegetable Food	80.5	1789.9	22.1	39.2	274.5	21.9
Animal Food	131.0	407.1	2.1	5.5	16.0	13.6
Soup	163.2	890.2	5.9	14.3	36.2	16.1
Total	435.7	3543.9	32.8	92.8	75.3	26.1
(Fukuoka, FUKUOKA)						
Staple Food	46.6	506.0	1.5	15.0	32.2	29.5
Vegetable Food	85.4	1576.6	7.3	23.7	85.5	15.0
Animal Food	138.5	339.2	0.9	3.2	6.5	9.3
Soup	135.1	443.5	1.0	14.8	10.1	33.3
Total	405.6	2865.3	10.7	56.7	26.4	19.7
(RURAL CHILDREN DIET —Nov~Dec 63—)						
(Sapporo, HOKKAIDO)						
Staple Food	41.6	155.9	0.7	14.4	16.8	92.5
Vegetable Food	90.5	948.8	6.1	41.9	67.4	44.1
Animal Food	111.0	398.3	1.2	7.2	10.8	18.2
Soup	118.8	231.8	1.8	5.6	15.2	24.2
Total	351.9	1734.8	9.8	69.1	27.8	40.0
(Tokyo)						
Staple Food	29.8	174.9	1.6	7.6	53.7	43.6
Vegetable Food	41.5	332.3	1.5	9.0	35.1	27.0
Animal Food	101.5	1231.6	6.4	46.8	63.0	38.0
Soup	100.1	111.1	0.6	2.4	6.0	21.3
Total	272.9	1849.9	10.1	65.8	37.0	35.5
(Niigata, NIIGATA)						
Staple Food	55.5	203.8	2.6	12.8	46.8	62.8
Vegetable Food	85.5	1760.1	23.9	47.3	279.5	26.9
Animal Food	128.0	353.8	1.5	6.3	11.7	17.7
Soup	151.5	473.5	2.5	8.1	16.5	17.1
Total	420.5	2791.2	30.5	74.5	72.5	26.7
(Fukuoka, FUKUOKA)						
Staple Food	40.1	429.5	1.3	14.0	32.4	32.5
Vegetable Food	81.7	1284.8	6.3	24.7	77.2	19.2
Animal Food	113.1	438.6	1.0	6.7	8.8	15.2
Soup	128.1	496.7	1.2	8.1	9.4	16.5
Total	363.0	2644.6	9.8	53.5	27.0	20.3

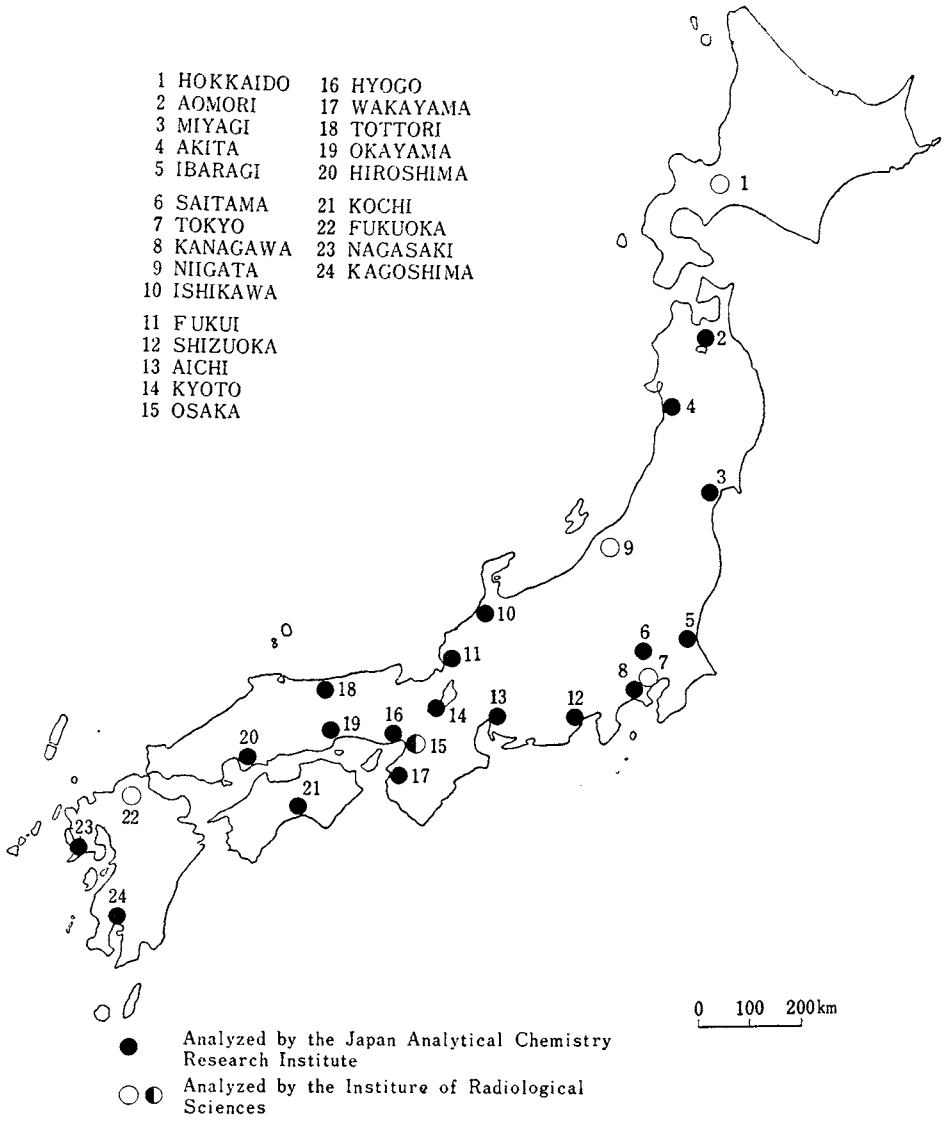


Figure 3. Sampling Location —Total Diet Part I and II—

Part II (*Japan Analytical Chemistry Research Institute*)

Since June 1963, the Japan Analytical Chemistry Research Institute has been in charge of analyses for total diet samples from the 19 prefectures shown with solid circles in Figure 3.

Sampling and analytical procedures applied, with the exception of grouping in 4 categories, are the same as that in Part I (National Institute of Radiological Sciences).

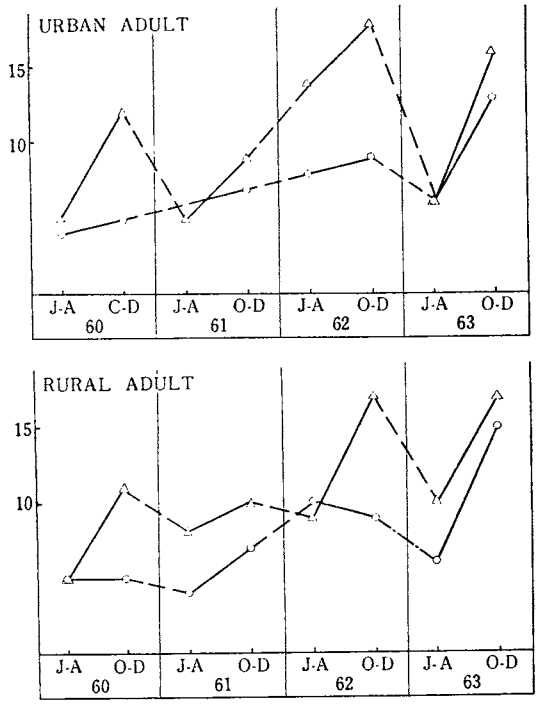
Results obtained during the period October to December 1963 are shown in Table 11.

Table 11. ^{90}Sr and ^{137}Cs in Total Diet —Oct to Dec 1963—

By T. Asari, M. Chiba and M. Kuroda
(*Japan Analytical Chemistry Research Institute*)

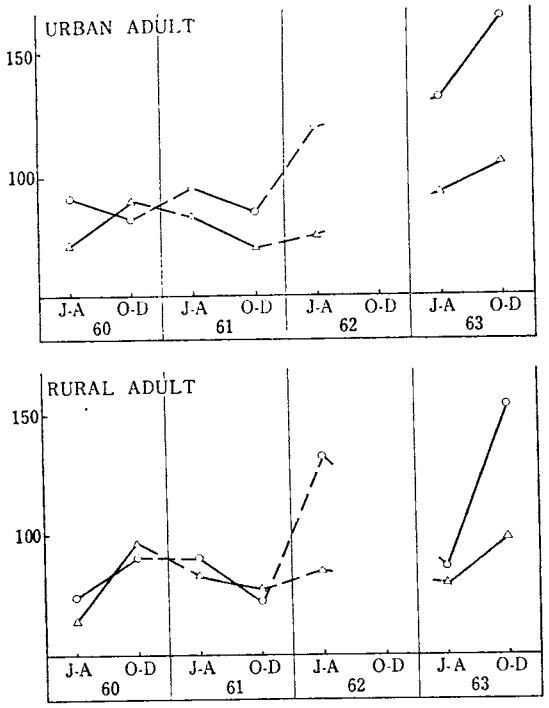
Location	Month	Daily Intake					^{90}Sr	^{137}Cs
		Ash g	Ca mg	K mg	^{90}Sr $\mu\mu c$	^{137}Cs $\mu\mu c$	$\mu\mu c/gCa$	$\mu\mu c/gK$
(URBAN ADULT DIET)								
Aomori, AOMORI	Nov	18.90	427	1351	20.1	81.5	47.1	60.3
Sendai, MIYAGI	Nov	18.08	264	1459	10.0	88.1	38.6	60.3
Akita, AKITA	Dec	21.40	582	2112	32.6	93.4	55.9	44.2
Mito, IBARAGI	Nov	19.90	346	1385	6.8	85.3	19.7	61.6
Omiya, SAITAMA	Oct	14.76	456	1104	13.2	97.0	28.9	87.9
Hiratsuka, KANAGAWA	Nov	20.40	553	2166	22.2	119.2	40.2	55.0
Kanazawa, ISHIKAWA	Dec	18.04	698	1164	16.2	55.4	23.3	47.6
Fukui, FUKUI	Nov~Dec	15.60	443	1181	14.7	86.4	33.1	73.2
Shimada, SHIZUOKA	Nov	12.84	552	1027	12.1	38.9	21.9	37.8
Anjo, AICHI	Nov	17.56	262	1837	10.2	60.3	39.0	32.8
Kyoto, KYOTO	Nov	14.75	488	1126	13.1	83.4	26.9	74.0
Kakogawa, HYOGO	Dec	17.20	695	1311	8.3	66.0	12.0	50.3
Wakayama, WAKAYAMA	Nov~Dec	14.76	1377	1147	8.4	27.7	6.1	24.1
Tottori, TOTTORI	Nov	19.87	1150	2208	38.2	104.7	33.2	47.4
Okayama, OKAYAMA	Nov	17.05	215	1438	10.5	45.3	48.8	31.5
Hiroshima, HIROSHIMA	Nov~Dec	16.27	462	1636	10.6	74.3	23.1	45.4
Kochi, KOCHI	Nov	14.0	375	1256	12.5	78.0	33.3	62.1
Nagasaki, NAGASAKI	Nov	14.72	539	1356	3.7	48.0	6.8	35.4
Kagoshima, KAGOSHIMA	Nov	15.20	541	1805	22.5	127.2	41.6	70.5
(RURAL ADULT DIET)								
Aomori, AOMORI	Nov	12.22	268	966	14.6	48.7	54.5	50.4
Natori, MIYAGI	Nov	21.10	452	2275	18.3	77.2	40.5	33.9
Oga, AKITA	Dec	26.20	1433	1810	22.3	78.1	15.6	43.0
Tokai, IBARAGI	Nov	17.30	498	1642	8.8	70.0	17.6	42.6
Menuma, SAITAMA	Oct	18.64	347	1409	15.7	58.1	45.4	41.2
Atsugi, KANAGAWA	Nov	24.90	782	2318	14.6	99.4	18.7	42.7
Kanazawa, ISHIKAWA	Dec	13.39	743	861	17.2	49.4	23.2	57.3
Asahi, FUKUI	Nov~Dec	14.50	305	843	33.5	62.9	110.0	74.2
Shibakawa, SHIZUOKA	Nov	16.59	495	1467	12.4	56.8	25.1	38.7
Anjo, AICHI	Nov	16.67	508	1825	10.5	68.7	20.7	37.6
Otokuni, KYOTO	Nov	14.72	319	1497	6.1	90.8	19.1	60.6
Kakogawa, HYOGO	Dec	15.90	576	1108	9.1	43.7	15.8	39.4
Iwade, WAKAYAMA	Dec	18.16	1476	1673	9.0	37.9	6.1	22.6
Fukube, TOTTORI	Nov	18.96	1102	1511	35.3	79.3	32.0	52.5
Tsudaka, OKAYAMA	Nov	15.60	527	1965	11.5	75.6	21.9	38.5
Shiwa, HIROSHIMA	Nov~Dec	12.35	410	1452	12.9	57.7	31.4	39.7
Haruno, KOCHI	Nov	15.10	652	1357	20.3	41.9	31.2	30.9
Tokitsu, NAGASAKI	Nov	24.72	895	2005	23.8	100.9	26.6	50.3
Turuta, KAGOSHIMA	Nov	14.90	274	1235	20.8	59.7	75.9	48.3
(RURAL CHILD DIET)								
Aomori, AOMORI	Nov	19.10	113	1191	25.9	62.4	229.2	52.4
Natori, MIYAGI	Nov	14.45	290	1621	14.0	58.4	48.3	36.0
Oga, AKITA	Dec	8.31	405	745	12.2	32.6	30.0	43.7
Tokai, IBARAGI	Nov	13.64	476	1487	11.7	73.4	24.5	49.4
Menuma, SAITAMA	Oct	10.51	128	1124	5.7	44.9	44.5	40.0
Atsugi, KANAGAWA	Nov	11.30	312	947	9.0	68.6	28.7	72.4
Kanazawa, ISHIKAWA	Dec	13.64	162	981	21.3	40.6	18.3	41.3
Asahi, FUKUI	Nov~Dec	14.00	309	1253	30.7	59.8	99.3	47.7
Shibakawa, SHIZUOKA	Dec	8.52	368	835	6.2	49.9	16.7	59.7
Anjo, AICHI	Nov	9.87	154	743	6.1	39.3	39.6	53.0
Otokuni, KYOTO	Nov	12.17	458	839	14.0	25.7	30.6	30.7
Kakogawa, HYOGO	Dec	9.10	379	778	5.3	45.6	14.1	58.5
Iwade, WAKAYAMA	Dec	17.74	555	1520	7.6	46.3	13.8	30.4
Fukube, TOTTORI	Nov	8.90	385	815	5.8	40.6	15.2	49.8
Tsudaka, OKAYAMA	Dec	15.60	527	1965	11.5	75.6	21.9	38.5
Shiwa, HIROSHIMA	Nov~Dec	11.16	360	1598	12.1	88.1	33.5	55.1
Haruno, KOCHI	Nov	10.80	585	708	27.5	46.3	47.0	65.3
Tokitsu, NAGASAKI	Nov	9.82	392	870	11.7	30.6	29.8	35.1
Tsuruta, KAGOSHIMA	Nov	9.51	301	725	12.9	42.2	42.9	58.2

Table 12 is a rearrangement of results obtained from urban and rural adults since 1960, to show time and local variations. These data were obtained from Issue No. 1 and No. 3 and this issue. Results up to 1962 are contributed by the Institute of Public Health (^{137}Cs) and National Institute of Nutrition (^{90}Sr), and results during 1963 are contributed by the National Institute of Radiological Sciences (5 prefectures) and the Japan Analytical Research Institute (19 prefectures). In the Table, only the results of two periods, June to August and October to November, are presented. Figure 4 shows annual and seasonal variations at Hokkaido and Ishikawa, where the daily intake has been continuously measured since 1960.



Note -·-·—HOKKAIDO,-‹›— ISHIKAWA
J-A June to August, O-D October to December

Figure 4-1. Daily Intake of ^{90}Sr ($\mu\mu c$/day. person)



Note -○-HOKKAIDO,-‹›— ISHIKAWA
J-A June to August, O-D October to December

Figure 4-2. Daily Intake of ^{137}Cs ($\mu\mu c$/day. person)

Table 12. Daily Intake of ^{90}Sr and ^{137}Cs-1960 to 1963-(rearranged)

Location		^{90}Sr μμc/day·person								^{137}Cs μμc/day·person							
		1960		1961		1962		1963		1960		1961		1962		1963	
		J-A	O-D	J-A	O-D	J-A	O-D	J-A	O-D	J-A	O-D	J-A	O-D	J-A	O-D	J-A	O-D
HOKKAIDO	U A	4	5	6	7	8	9	6	13	43	32	45	35	69		82	116
	R A	5	5	4	7	10	9	6	15	24	41	40	28	82		37	103
AOMORI	U A							14	20							38	82
	R A							37	15							76	59
MIYAGI	U A	6				4	8	11	10							70	88
	R A	9				4	12	30	18							69	77
AKITA	U A					20	19	43	33					24		98	93
	R A					19	19	41	22					39		51	78
YAMAGATA	U A			11	7							21	9				
	R A			6	13							8	15				
IBARAGI	U A							7	7							70	85
	R A							9	9							50	70
SAITAMA	U A	4	8					7	13	16	33	31	82			114	97
	R A	4	4					8	16	19	18	26	64			36	58
TOKYO	U A							7	8					45		66	71
	R A								6					54			73
KANAGAWA	U A							11	22							86	119
	R A							10	15							60	99
NIIGATA	U A							16	22							123	106
	R A							3	33							35	93
ISHIKAWA	U A	6	12	5	9	14	18	6	16	21	40	33	19	24		43	55
	R A	5	11	8	10	9	17	10	17	14	46	33	28	35		30	49
FUKUI	U A							6	15							49	86
	R A							11	34							54	63
SHIZUOKA	U A							9	12							61	39
	R A							9	12							72	57
AICHI	U A					6	7	10	10					116		35	60
	R A					4	11	6	6					94		43	39
MIE	U A	8	7	4						21	42	18					
	R A	6	7							27	38						
KYOTO	U A							20	13							92	83
	R A							8	6							43	91
OSAKA	U A					4	8	6								86	
	R A					4	10										
HYOGO	U A								8							99	66
	R A								9								44
WAKAYAMA	U A							4	8							34	28
	R A							3	9							40	38
TOTTORI	U A					16	19	23	38					43		95	105
	R A					11	13	27	35					57		60	79
OKAYAMA	U A			4	3			9	11			21		66		56	45
	R A			5	6			88	6			37		47		35	16
HIROSHIMA	U A							12	11							82	74
	R A							12	13							57	58
EHIME	U A	4	6	3	5					15	22	20	45				
	R A	9	8	5	6					19	18	42	48				
KOCHI	U A							15	13							73	78
	R A							10	20							87	42
FUKUOKA	U A					6	8	18	12							56	67
	R A					6	13	18	11							30	57
NAGASAKI	U A							9	4							52	48
	R A							13	24							83	101
KUMAMOTO	U A							9	23							41	13
	R A							10	21							82	60
KAGOSHIMA	U A	6	6	4	6					18	19	26	23				
	R A	8	10	7	10					26	37		35				

Note; J-A and O-D indicates June to August and October to December respectively.

Strontium-90 and Cesium-137 in Vegetables

The analysis of strontium-90 and cesium-137 content in vegetable sent from the prefectural public health laboratories, which had been previously carried out both at the National Institute of Radiological Sciences and the Japan Analytical Chemistry Research Institute, has been transfered to the latter institute. The data obtained are shown in Part I. In addition, the Ibaragi Prefecture Institute of Health, has also analyzed the strontium-90 content in vegetables as shown in Part II.

Part I (*Japan Analytical Chemistry Research Institute*)

The Japan Analytical Chemistry Research Institute, on commission by the Science and Technology Agency, has analyzed the strontium-90 and cesium-137 content in vegetables obtained from 12 prefectures. Each prefecture has 2 sampling stations, as shown in Figure 5. Samples were taken twice at the same station during the harvest period. At the prefectural public health laboratories, inedible parts were removed from the fresh vegetable samples, and only the edible parts were ashed at 450°C. These samples were then sent to the Japan Analytical Chemistry Research Institute and analyzed for strontium-90 and cesium-137 content using the method recommended by the Science and Technology Agency.

Results obtained during the period October 1963 to March 1964 are shown in Table 13.

Figure 5. Sampling Location —Vegetables Oct 63 to Mar 64—

Table 13. ^{90}Sr and ^{137}Cs in Vegetables —Oct 63 to Mar 64 –

By T. Asari, M. Chiba and M. Kuroda
(*Japan Analytical Chemistry Research Institute*)

(Continued from Table 11, Issue No. 2 of "Radioactivity Survey Data in Japan")

Location	Month Harvested	Component %			^{90}Sr		^{137}Cs	
		Ash	Ca	K	μμc/kg	μμc/gCa	μμc/kg	μμc/gK
LEAF VEGETABLES								
(Spinach)								
Fujieda, SHIZUOKA	Oct 63	1.37	0.086	0.45	45	52	43	10
Yoshiwara, SHIZUOKA	〃	1.31	0.106	0.36	82	78	96	27
Tokai, IBARAGI	Nov 63	1.46	0.073	0.57	40	55	135	24
Mito, IBARAGI	〃	1.13	0.065	0.32	29	45	66	21
Niiza, SAITAMA	〃	1.75	0.106	0.52	45	43	102	19
Sugito, SAITAMA	〃	1.44	0.096	0.38	64	67	91	24
Odawara, KANAGAWA	Jan 64	1.40	0.134	0.22	73	55	87	39
Atsugi, KANAGAWA	〃	1.40	0.153	0.25	76	50	96	39
Fujieda, SHIZUOKA	Feb 64	1.30	0.107	0.37	100	94	95	26
Yoshiwara, SHIZUOKA	〃	2.31	0.158	0.67	81	52	150	22
Sanage, AICHI	〃	1.24	0.048	0.42	38	79	62	15
Akabane, AICHI	〃	1.43	0.048	0.48	100	211	84	18
Mito, IBARAGI	Mar 64	1.34	0.081	0.31	40	49	71	18
〃 〃	〃	1.31	0.081	0.44	34	42	155	35
Atsugi, KANAGAWA	〃	1.34	0.081	0.44	66	83	102	23
Odawara, KANAGAWA	〃	1.38	0.057	0.40	43	75	106	27
(Potherb mustard)								
Shime, FUKUOKA	Feb 64	0.80	0.081	0.22	120	148	117	54
〃 〃	〃	0.74	0.032	0.21	17	53	31	15
Yame, FUKUOKA	〃	0.83	0.061	0.29	67	110	69	24
〃 〃	Mar 64	1.00	0.083	0.28	88	107	82	30
Shime, FUKUOKA	〃	0.87	0.106	0.22	147	139	129	58
LEAF TEGETABLES								
(Tsuke-na greens for salting)								
Niiza, SAITAMA	Nov 63	0.92	0.122	0.20	49	40	39	19
Sugito, SAITAMA	〃	0.77	0.103	0.26	34	33	42	16
(Japanese Radish Leaf)								
Sugito, SAITAMA	Nov 63	1.29	0.113	0.28	95	84	172	62
Odawara, KANAGAWA	〃	1.30	0.245	0.19	159	65	184	97
Miura, KANAGAWA	〃	1.36	0.354	0.16	489	138	90	56
Niiza, SAITAMA	Dec 63	1.41	0.201	0.18	124	62	144	80
Ei, KAGOSHIMA	Jan 64	1.79	0.248	0.30	459	185	239	78
Kokubu, KAGOSHIMA	〃	1.16	0.184	0.14	464	253	231	160
HEAD VEGETABLES								
(Cabbage)								
Obihiro, HOKKAIDO	Oct 63	0.57	0.049	0.17	13	28	38	22
Yoshiwara, SHIZUOKA	〃	0.57	0.046	0.16	26	57	28	17
Fujieda, SHIZUOKA	〃	0.47	0.032	0.14	36	110	42	30
Sapporo, HOKKAIDO	Nov 63	0.63	0.036	0.17	23	65	92	54
Miura, KANAGAWA	〃	0.56	0.044	0.18	8	18	38	21
Odawara, KANAGAWA	〃	0.40	0.038	0.11	14	38	34	32
Sanage, AICHI	Dec 63	0.58	0.030	0.22	13	43	18	8
Akabane, AICHI	〃	0.61	0.046	0.22	29	64	26	12
Shime, FUKUOKA	Jan 64	1.01	0.092	0.35	52	56	48	14
Yame, FUKUOKA	〃	0.63	0.035	0.25	14	39	27	11
Fujieda, SHIZUOKA	Feb 64	0.60	0.025	0.17	13	51	19	12
Yoshiwara, SHIZUOKA	〃	0.71	0.045	0.17	33	74	43	25
Yame, FUKUOKA	〃	0.74	0.028	0.23	11	39	29	12

Table 13. ^{90}Sr and ^{137}Cs in Vegetables —Oct 63 to Mar 64— (*continued*)

Location	Month Harvested	Component %			^{90}Sr		^{137}Cs	
		Ash	Ca	K	μμc/kg	μμc/gCa	μμc/kg	μμc/gK
(Chinese Cabbage)								
Furukawa, MIYAGI	Oct 63	0.65	0.047	0.23	17	37	21	10
Shiroishi, MIYAGI	//	0.61	0.038	0.22	13	34	22	10
Mito, IBARAGI	//	1.03	0.137	0.66	83	61	68	42
Tokai, IBARAGI	//	0.64	0.047	0.21	24	52	30	15
Sapporo, HOKKAIDO	Nov 63	0.54	0.021	0.15	26	121	76	51
Mito, IBARAGI	//	0.77	0.082	0.21	99	121	49	23
Tokai, IBARAGI	//	0.73	0.045	0.23	13	29	36	16
Furukawa, MIYAGI	Dec 63	0.57	0.035	0.15	14	38	30	20
Shiroishi, MIYAGI	//	0.53	0.038	0.17	19	51	36	21
Odawara, KANAGAWA	//	0.51	0.041	0.16	19	46	23	15
Yokohama, KANAGAWA	//	0.43	0.035	0.13	6	17	22	16
Sanage, AICHI	//	0.56	0.033	0.21	13	40	32	15
Akabane, AICHI	//	1.44	0.129	0.39	60	47	68	17
Shime, FUKUOKA	//	0.55	0.035	0.13	15	42	74	56
Yame, FUKUOKA	//	0.62	0.033	0.23	36	108	52	23
Yokohama, KANAGAWA	Jan 64	0.43	0.034	0.13	5	16	37	30
Odawara, KANAGAWA	//	0.53	0.029	0.14	10	33	52	36
Shime, FUKUOKA	//	0.51	0.025	0.13	32	129	38	29
Yame, FUKUOKA	//	0.61	0.034	0.19	50	147	30	15
ROOT VEGETEBLE								
(Japanese Radish Root)								
Seiro, NIIGATA	Oct 63	0.50	0.021	0.18	29	137	33	18
Nagaoka, NIIGATA	//	0.47	0.023	0.16	29	126	39	25
Yoshiwara, SHIZUOKA	//	0.52	0.024	0.20	32	132	28	14
Sapporo, HOKKAIDO	Nov 63	0.42	0.017	0.10	31	178	34	34
Akita, AKITA	//	0.42	0.015	0.09	17	107	24	26
Tenno, AKITA	//	0.43	0.028	0.15	58	207	24	16
Sugito, SAITAMA	//	0.55	0.025	0.18	13	52	39	22
Miura, KANAGAWA	//	0.46	0.020	0.11	20	100	26	23
Odawara, KANAGAWA	//	0.39	0.031	0.10	12	36	27	27
Fujieda, SHIZUOKA	//	0.65	0.025	0.24	38	153	27	11
Fukuyama, HIROSHIMA	//	0.44	0.020	0.10	20	100	14	14
Kabe, HIROSHIMA	//	0.66	0.033	0.27	13	39	20	7
Niiza, SAITAMA	Dec 63	0.51	0.040	0.14	11	27	23	16
Ei, KAGOSHIMA	Jan 64	0.60	0.033	0.22	66	198	43	19
Kokubu, KAGOSHIMA	//	0.47	0.031	0.15	89	286	46	30
Fujieda, SHIZUOKA	Feb 64	0.67	0.044	0.20	40	91	12	6
Yoshiwara, SHIZUOKA	//	0.54	0.046	0.15	46	100	53	35

Part II (*Ibaragi Prefectural Institute of Health*)

Since 1961, the Ibaragi Prefectural Institute of Health, one of the prefectural public health laboratories, on commission by the Science and Technology Agency, has analyzed strontium-90 and cesium-137 content in vegetables.

In this sampling, the vegetables were washed and inedible parts were removed. The analysis of strontium-90 was carried out using the method recommended by the Science and Technology Agency.

Results obtained during the period March 1960 to May 1962 are shown in Table 14.

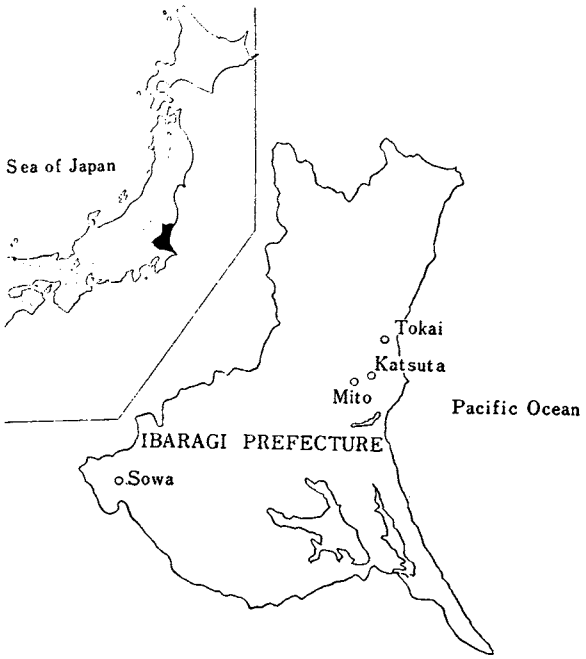


Figure 6. Sampling Location of Vegitables
—Oct 60 to Jan 64—

Table 14. ^{90}Sr in Vegetable —Oct 60 to Jan 64—

By R. Koike, Y. Nakazawa and K. Asano
(*Ibaragi Prefectural Institute of Health*)

Location	Date	Component		Strontium-90	
		Ash (%)	Ca (%)	$\mu\mu$c/kg	$\mu\mu$c/gCa
(Spinach)					
Mito	Oct 61	1.54	0.075	39.0	52.6
//	Dec 61	2.60	0.125	46.3	37.0
Sowa	Jan 62	1.38	0.125	27.8	22.2
Mito	Apr 62	1.57	0.061	48.5	79.5
//	May 62	1.28	0.090	122.6	136.2
Sowa	Nov 62	1.59	0.062	57.4	92.6
//	Dec 62	1.58	0.092	63.3	68.8
Katsuta	//	2.07	0.079	106.7	135.1
//	//	1.45	0.056	101.3	180.9
Tokai	Nov 63	1.45	0.073	39.7	54.4
Mito	Nov 63	1.24	0.065	28.9	44.5
//	Jan 64	1.31	0.081	39.9	49.3
Tokai	//	1.25	0.081	33.8	41.7
(Radish)					
Mito	Dec 60	0.64	0.028	7.7	27.7
Katsuta	Nov 61	0.71	0.089	22.7	25.6
Sowa	//	0.75	0.068	4.8	7.0
Katsuta	Aug 62	0.78	0.048	36.3	16.2
//	Nov 62	0.59	0.041	24.0	58.5
Sowa	Aug 62	0.78	0.049	36.3	74.1
//	Nov 62	0.53	0.057	14.5	25.4
(Radish leaf)					
Sowa	Nov 62	0.94	0.115	74.9	65.1
Katsuta	//	1.01	0.139	90.3	64.9
(Sweet Potato)					
Mito	Oct 60	0.58	0.009	4.3	47.7
(Chinese Cabbage)					
Mito	Oct 63	1.07	0.137	83.3	60.6
Tokai	//	0.64	0.047	24.1	51.6
//	Nov 63	0.72	0.045	12.9	28.9
Mito	//	0.60	0.082	99.0	120.7

Strontium-90 and Cesium-137 in Nilk

(Japan Analytical Chemistry Research Institute)

Since December 1961, milk samples from various part of Japan have been collected by 24 prefectural public health laboratories and analyzed for strontium-90 and cesium-137 content at the Japan Analytical Chemistry Research Institute.

Three liters of fresh milk was purchased at a represental farm in each prefecture, and carbonized by the 24 public health laboratories. The carbonized samples were then sent to the Japan Analytical Chemistry Research Institute, and ashed and analyzed using the method recommended by the Science and Technology Agency.

Results obtained during the period January to March 1964 are shown in Table 15.

Table 15. ^{90}Sr and ^{137}Cs in Milk —Jan 64 to Mar 64—

By T. Asari, M. Chiba and M. Kuroda
(Japan Analytical Chemistry Research Institute)

(Continuation of Table 9, Issue 3, "Radioactive Survey Data in Japan")

Location	Date	Ash	Component g/l		^{90}Sr		^{137}Cs	
			Ca	K	μμc/l	μμc/gCa	μμc/l	μμc/gK
Sapporo, HOKKAIDO	16 Jan 64	7.17	1.17	1.37	13.7	11.7	146	106
Aomori, AOMORI	27 Jan 64	7.14	0.96	1.43	10.0	10.3	64	45
//	7 Mar 64	6.86	0.96	1.16	17.0	17.7	143	123
Tsukidate, MIYAGI	3 Feb 64	7.39	0.97	1.12	17.3	17.8	163	145
Akita, AKITA	13 Jan 64	7.00	1.04	1.22	36.0	34.5	164	135
//	2 Mar 64	8.19	1.25	1.07	31.6	25.2	137	128
Katsuta, IBARAGI	11 Feb 64	7.22	1.00	1.20	23.0	23.1	142	118
Kawamoto, SAITAMA	17 Jan 64	7.08	0.97	1.02	6.2	6.5	80	79
//	5 Mar 64	7.08	0.88	1.23	10.2	11.3	73	59
Izu-oshima, TOKYO	27 Jan 64	8.63	1.28	1.28	20.3	15.9	184	144
//	3 Mar 64	7.37	1.06	1.27	19.3	18.2	215	170
Atsugi, KANAGAWA	9 Mar 64	6.94	1.02	1.52	16.2	16.0	121	80
Koshiji, NIIGATA	6 Feb 64	5.44	0.84	0.82	32.2	38.5	136	165
Kanazawa, ISHIKAWA	12 Feb 64	7.00	1.04	1.51	14.6	14.0	139	92
Nonoichi, ISHIKAWA	28 Mar 64	6.50	1.02	1.48	18.4	18.0	124	84
Fukui, FUKUI	16 Jan 64	6.67	1.04	1.40	18.0	17.4	97	65
//	2 Mar 64	7.22	1.03	1.29	16.9	16.3	85	65
Gotenba, SHIZUOKA	17 Jan 64	7.33	1.08	0.70	20.6	19.1	201	288
Sanage, AICHI	13 Feb 64	5.67	0.93	1.07	8.9	9.6	58	54
Nose, OSAKA	31 Mar 64	7.50	1.07	1.35	12.5	11.6	111	82
Akashi, HYOGO	26 Feb 64	7.56	1.17	1.53	11.4	9.8	116	76
//	24 Mar 64	7.50	1.31	1.41	10.9	8.3	175	124
Wakayama, WAKAYAMA	5 Feb 64	5.70	0.82	1.13	5.0	6.1	45	40
Aimi, TOTTORI	27 Feb 64	7.28	1.06	1.57	17.2	16.2	120	77
Tsuyama, OKAYAMA	21 Jan 64	7.11	1.03	1.40	13.3	13.0	95	68
Kabe, HIROSHIMA	31 Jan 64	7.94	1.09	1.42	13.3	12.2	79	56
//	12 Mar 64	8.00	0.94	1.15	5.6	6.0	84	73
Kochi, KOCHI	7 Feb 64	7.08	0.84	1.52	11.8	14.0	111	73
Koga, FUKUOKA	10 Mar 64	7.33	1.16	1.00	6.8	5.9	58	58
Nagasaki, NAGASAKI	9 Jan 64	7.72	1.31	1.53	13.0	10.0	126	82
//	5 Mar 64	8.25	1.25	1.32	16.1	12.8	131	99
Taniyama, KAGOSHIMA	5 Feb 64	7.94	1.44	1.25	18.7	13.0	88	71

Strontium-90 and Cesium-137 in Powdered Milk

(Japan Analytical Chemistry Research Institute)

Since 1960, the Japan Analytical Chemistry Research Institute, on commission by the Science and Technology Agency, has analyzed strontium-90 and cesium-137 content in powdered milk.

The samples were purchased on the open market in Tokyo. The analysis of strontium-90 and cesium-137 content was carried out using the method recommended by the Science and Technology Agency.

Results obtained are shown in Table 16.

Table 16. ^{90}Sr and ^{137}Cs in Powdered Milk

By T. Asari, M. Chiba and M. Kuroda

(Japan Analytical Chemistry Research Institute)

Location Produced	Date	Component			Strontium-90		Cesium-137	
		Ash %	Ca %	K %	μμc/kg	μμc/gCa	μμc/kg	μμc/gK
(Modified Milk Powder)								
Obihiro, HOKKAIDO	Apr 63	4.49	0.621	0.752	109	17.5	621	82.5
Kenebetsu, HOKKAIDO	Sep 63	4.30	0.476	0.698	203	42.6	1930	277
Obihiro, HOKKAIDO	Oct 63	4.22	0.585	0.728	276	47.2	1670	231
YAMANASHI	Nov 63	3.42	0.410	0.648	47	11.5	515	79.5
NAGANO	Jan 64	3.33	0.482	0.656	92	19.0	502	76.5
(Whole Milk Powder)								
Kenebetsu, HOKKAIDO	May 63	6.42	0.955	1.284	313	32.8	3973	309
〃 〃	Sep 63	7.26	0.926	1.195	556	60.1	9370	784

Human Data

Strontium-90 in Humtn Deciduous Teeth

(National Institute of Health)

The National Institute of Health has analyzed the strontium-90 content in human deciduous teeth, to establish relationship between strontium-90 content in infant hard tissue and the form of feeding. Since the beginning of this investigation in December 1961, about 18,000 human deciduous teeth from various areas in Japan have been collected.

The teeth from children were classified into groups according to the year of birth, type of teeth, and form of feeding, namely breast, bottle or mixed, and also to the location where they were raised. One sample consists of 100 to 200 incisors or 50 to 100 molars in the same group.

The content of strontium-90 in human deciduous teeth has been analyzed using the method recommended by the Science and Technology Agency.

Results of teeth from children raised in the Kanto District are shown in Table 17, and Figure 7 shows the yearly variation according to form of feeding.

Since 1954, strontium-90 content in deciduous teeth showed a rising tendency, and strontium-90 content in deciduous teeth from bottle fed children was apparently higher than those from breast fed children in 1955 and 1956.

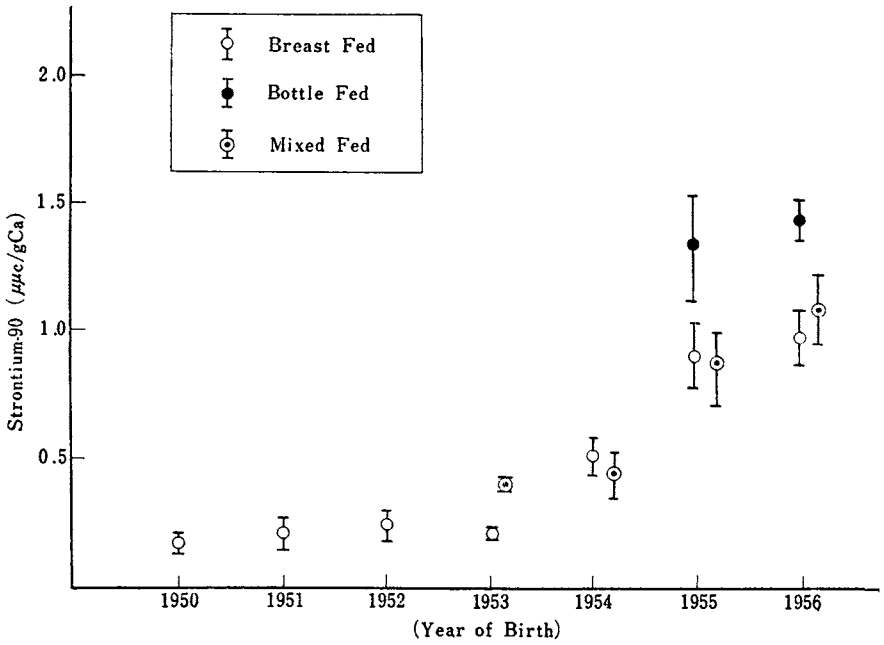


Figure 7. Deposition of ^{90}Sr in Human Deciduous Teeth

Table 16. ^{90}Sr in Human Deciduous Teeth —1950 to 1956 (birth)—

By T. Nagai, S. Okada, T. Komai, and E. Onishi
(*National Institute of Health*)

Year of Birth	Infant feeding	Teeth type	Number of teeth	^{90}Sr $\mu\mu c/g$ Ca
50		C	50	0.11
//		D	30	0.23
51	Breast	C	100	0.12
//	Breast	E	50	0.29
52	Breast	C	120	0.20
//	Breast	C	100	0.13
//	Breast	D	70	0.39
53	Breast	C	120	0.23
//	Breast	C	100	0.20
//	Mixed	C	100	0.29
54	Breast	A, B	120	0.59
//	Mixed	A, B	110	0.43
//	Breast	C	100	0.41
55	Breast	A, B	170	0.86
//	Breast	A, B	200	0.62
//	Breast	A, B	150	1.18
//	Bottle	A, B	120	1.31
//	Mixed	A, B	150	0.84
56	Breast	A, B	150	1.04
//	Breast	A, B	150	1.27
//	Breast	A, B	100	0.84
//	Breast	A, B	135	0.66
//	Bottle	A, B	150	1.54
//	Bottle	A, B	135	1.28
//	Mixed	A, B	150	1.07

Note; A~E indicate Central Incisors (A), Lateral Incisors (B), Cuspids (C), First Molars (D), Second Molars (E), respectively.

Contributor

The analytical results quoted in this issue were contributed by the following institutes.

Institute and Address	Item
Ibaragi Prefectural Institute of Health 119, Kita-san-no-maru, Mito-shi	Vegetables
Japan Analytical Chemistry Research Institute 17, Kikukawa-cho, 2-chome, Sumida-ku, Tokyo	Rain and Dry Fallout, Soil, City Water, Streat Water, Total Diet, Vegetables, Powdered Milk
National Institute of Health 284, Kamiosaki-chojamart, Shinagawa-ku, Tokyo	Deciduous Teeth
National Institute of Radiological Sciences 250, Kurosuna-cho, Chiba-shi	Soil, City Water, Total Diet