# RADIOACTIVITY SURVEY DATA in Japan

NUMBER 13, NOV. 1966

National Institute of Radiological Sciences
Chiba, Japan

# Radioactivity Survey Data in Japan

## Number 13

Nov. 1966

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### DATA OF ROUTINE SURVEY



### DATA OF THE FOURTH NUCLEAR TEST BY THE PEOPLE'S REPUBLIC OF CHINA




**National Institute of Radiological Sciences**

# DATA OF ROUTINE SURVEY

## Dietary Data

### Strontium-90 and Cesium-137 in Vegetables

*(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 10 prefectures. Sampling locations are shown in Figure 1. Samples were taken twice at the same location during the harvest period. At the prefectural public health laboratories, several Kgs of the fresh vegetable samples were washed with water, the inedible parts removed, then only the edible parts ashed at 450°. 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 August 1965 to March 1966 are shown in Table 1.

Figure 2 shows the all Japan mean value of vegetables.

Figure 1.

1 Obihiro
2 Sapporo
3 Seiro
4 Niigata
5 Tokai
6 Mito
7 Sugito
8 Niiza
9 Yokohama
10 Miura
11 Odawara
12 Yoshiwara
13 Fujieda
14 Sanage
15 Akabane
16 Fukui
17 Tsuruga
18 Mihama
19 Fukuoka
20 Shime
21 Kokubu
22 Sendai

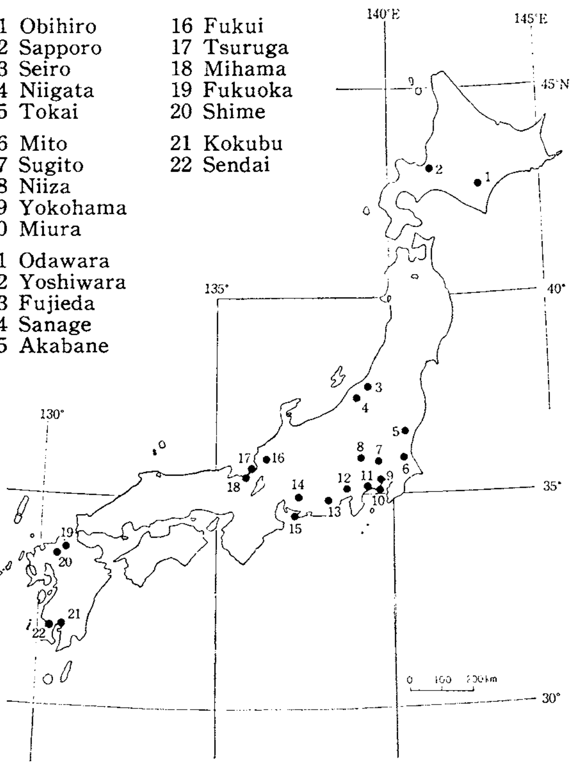


Table 1. $^{90}Sr$ and $^{137}Cs$ in Vegetables —Aug. 1965 to Mar. 1966—

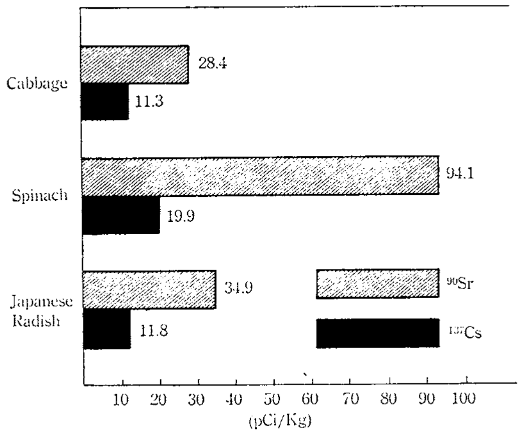
By T. Asari, M. Chiba and M. Kuroda

*(Japan Analytical Chemistry Research Institute)*

(Continued from Table 4. Issue No. 8, of this Publication)

| Location | Month Harvested | Component (% by Weight) | | | $^{90}Sr$ | | $^{137}Cs$ | |
|---|---|---|---|---|---|---|---|---|
| | | Ash (%) | Ca (%) | K (%) | pCi/kg | pCi/gCa | pCi/kg | pCi/gK |
| **(Cabbage)** | | | | | | | | |
| Obihiro, HOKKAIDO | Aug 65 | 0.56 | 0.038 | 0.217 | 10.2 | 27.2 | 5.8 | 2.7 |
| Sapporo, 〃 | Sept 〃 | 0.59 | 0.040 | 0.234 | 12.1 | 30.2 | 17.4 | 7.4 |
| Sanage, AICHI | Oct 〃 | 0.59 | 0.034 | 0.256 | 20.8 | 61.2 | 35.3 | 13.3 |
| Obihiro, HOKKAIDO | 〃 〃 | 1.52 | 0.046 | 0.215 | 14.4 | 31.3 | 1.7 | 1.9 |
| Akabane, AICHI | Nov 〃 | 0.54 | 0.028 | 0.154 | 20.7 | 73.9 | 15.6 | 10.1 |
| Fujieda, SHIZUOKA | 〃 〃 | 0.58 | 0.034 | 0.196 | 55.4 | 162.9 | 1.8 | 0.9 |
| Yoshiwara, 〃 | 〃 〃 | 0.47 | 0.051 | 0.172 | 40.6 | 79.7 | 10.6 | 6.2 |
| 〃 〃 | 〃 〃 | 0.87 | 0.077 | 0.302 | 77.1 | 100.1 | 13.6 | 4.5 |
| Fujieda, 〃 | Jan 66 | 0.71 | 0.044 | 0.252 | 42.8 | 9.7 | 5.2 | 2.0 |
| Shime, FUKUOKA | 〃 〃 | 0.65 | 0.015 | 0.094 | 9.5 | 63.5 | 8.9 | 9.5 |
| Fukuoka, 〃 | Feb 〃 | 0.56 | 0.013 | 0.087 | 9.1 | 70.2 | 8.1 | 9.3 |
| **(Spinach)** | | | | | | | | |
| Sanage AICHI | Oct 65 | 0.52 | 0.022 | 0.185 | 9.9 | 45.0 | 3.8 | 1.5 |
| Fukui, FUKUI | Nov 〃 | 0.13 | 0.089 | 0.257 | 39.6 | 44.5 | 14.0 | 5.5 |
| Akabane, AICHI | 〃 〃 | 1.74 | 0.071 | 0.614 | 522.3 | 735.6 | 10.9 | 1.8 |
| Mito, IBARAGI | 〃 〃 | 1.89 | 0.086 | 0.605 | 135.9 | 156.9 | 6.7 | 1.3 |
| Tsuruga, FUKUI | 〃 〃 | 1.15 | 0.058 | 0.324 | 15.1 | 26.0 | 4.7 | 1.5 |
| Tokai, IBARAGI | 〃 〃 | 1.60 | 0.125 | 0.509 | 30.2 | 24.2 | 7.5 | 3.3 |
| Shime, FUKUOKA | 〃 〃 | 1.39 | 0.054 | 0.479 | 140.9 | 260.9 | 6.4 | 1.3 |
| Fukuoka, 〃 | Dec 〃 | 1.46 | 0.087 | 0.510 | 102.3 | 117.6 | 4.7 | 0.9 |
| Niiza, SAITAMA | 〃 〃 | 1.80 | 0.072 | 0.716 | 281.7 | 391.3 | 19.1 | 2.7 |
| Sanage, AICHI | 〃 〃 | 1.75 | 0.061 | 0.666 | 20.5 | 33.6 | 12.9 | 1.9 |
| Tokai, IBARAGI | Jan 66 | 1.84 | 0.090 | 0.448 | 202.0 | 224.4 | 7.1 | 1.6 |
| Mito, 〃 | 〃 〃 | 1.56 | 0.062 | 0.541 | 13.0 | 21.0 | 10.2 | 1.9 |
| Yokohama KANAGAWA | 〃 〃 | 1.55 | 0.084 | 0.588 | 23.4 | 27.9 | 25.3 | 4.3 |
| Odawara, KANAGAWA | Feb 66 | 1.74 | 0.098 | 0.592 | 33.2 | 33.9 | 19.5 | 3.3 |
| Niiza, SAITAMA | Mar 〃 | 1.91 | 0.027 | 0.289 | 28.7 | 106.3 | 27.3 | 9.5 |
| Yokohama, KANAGAWA | 〃 〃 | 1.82 | 0.034 | 0.287 | 48.2 | 141.8 | 141.8 | 5.1 |
| Odawara, 〃 | 〃 〃 | 1.33 | 0.032 | 0.325 | 17.6 | 55.0 | 28.8 | 12.8 |
| Sugito, SAITAMA | 〃 〃 | 1.25 | 0.035 | 0.198 | 29.6 | 84.6 | 9.0 | 4.5 |
| **(Japanese Radish)** | | | | | | | | |
| Obihiro, HOKKAIDO | Aug 65 | 0.70 | 0.023 | 0.312 | 12.4 | 53.7 | 26.4 | 8.5 |
| Sapporo, 〃 | Sept 〃 | 0.65 | 0.027 | 0.285 | 36.8 | 138.0 | 19.8 | 7.0 |
| Kokubu, KAGOSHIMA | Oct 〃 | 1.39 | 0.126 | 0.384 | 157.2 | 124.8 | 14.4 | 2.4 |
| 〃 〃 | 〃 〃 | 0.55 | 0.023 | 0.212 | 11.1 | 48.3 | 58.9 | 15.3 |
| Sanage, AICHI | 〃 〃 | 0.65 | 0.029 | 0.265 | 19.9 | 68.6 | 15.7 | 2.5 |
| 〃 〃 | 〃 〃 | 1.55 | 0.110 | 0.641 | 117.5 | 106.8 | 7.4 | 3.3 |
| Sendai, KAGOSHIMA | 〃 〃 | 1.25 | 0.100 | 0.334 | 121.2 | 121.2 | 2.7 | 1.3 |
| 〃 〃 | 〃 〃 | 0.60 | 0.030 | 0.225 | 27.1 | 90.3 | 20.6 | 6.2 |
| Obihiro, HOKKAIDO | 〃 〃 | 0.56 | 0.022 | 0.180 | 7.5 | 34.1 | 4.2 | 2.3 |
| Akabane, AICHI | Nov 〃 | 0.60 | 0.082 | 0.433 | 35.5 | 43.3 | 7.7 | 1.8 |
| Yoshiwara, SHIZUOKA | 〃 〃 | 0.19 | 0.011 | 0.068 | 12.4 | 112.7 | 1.3 | 1.9 |
| Fujiede, 〃 | 〃 〃 | 0.35 | 0.020 | 0.122 | 3.9 | 19.7 | 2.3 | 1.9 |
| Tsuruga, FUKUI | 〃 〃 | 0.51 | 0.079 | 0.368 | 14.1 | 17.9 | 11.2 | 3.0 |
| 〃 〃 | 〃 〃 | 0.55 | 0.041 | 0.328 | 11.6 | 28.2 | 19.7 | 5.8 |
| Yokohama, KANAGAWA | 〃 〃 | 0.72 | 0.060 | 0.224 | 18.7 | 31.7 | 7.3 | 3.6 |
| Miura, KANAGAWA | 〃 〃 | 0.78 | 0.078 | 0.204 | 24.4 | 31.3 | 14.1 | 11.6 |
| Niigata, NIIGATA | 〃 〃 | 0.50 | 0.034 | 0.170 | 57.3 | 133.3 | 8.4 | 4.9 |
| Mihama, FUKUI | 〃 〃 | 0.36 | 0.033 | 0.269 | 9.1 | 27.5 | 8.8 | 3.3 |
| 〃 〃 | 〃 〃 | 0.45 | 0.038 | 0.287 | 13.4 | 35.2 | 7.9 | 2.8 |
| Seiro, NIIGATA | 〃 〃 | 0.37 | 0.028 | 0.122 | 59.2 | 211.4 | 14.1 | 11.6 |
| Niiza, SAITAMA | 〃 〃 | 0.61 | 0.035 | 0.218 | 21.4 | 61.1 | 0.8 | 0.4 |
| Sugito, 〃 | Dec 〃 | 0.56 | 0.030 | 0.233 | 12.9 | 43.0 | 3.8 | 1.6 |
| Yoshiwara, SHIZUOKA | 〃 〃 | 0.45 | 0.034 | 0.152 | 24.9 | 73.2 | 4.8 | 3.2 |
| Fujieda, SHIZUOKA | Jan 66 | 0.45 | 0.025 | 0.164 | 14.8 | 5.9 | 1.7 | 1.0 |
| Sendai, KAGOSHIMA | Feb 〃 | 0.74 | 0.042 | 0.119 | 33.5 | 79.7 | 10.2 | 11.9 |
| Kokubu, KAGOSHIMA | 〃 〃 | 0.71 | 0.041 | 0.113 | 29.3 | 71.5 | 13.4 | 11.9 |

Figure 2. $^{90}Sr$ and $^{137}Cs$ in Vegetables
—All Japan Mean Values—
—Aug. 1965 to Mar. 1966—




## Strontium-90 and Cesium-137 in Total Diet

*(Japan Analytical Chemistry Research Institute)*

Since June 1963, the Japan Analytical Chemistry Research Institute has conducted analyses of total diet samples from the 19 prefectures shown in Figure 3.

One city and one village in each prefecture was chosen as representative of urban and rural districts of these prefectures, respectively. Ten families from each location were chosen at random, and each family presented a normal portion of the regular diet consumed in one day by an adult or a child. Diet at special occasions was avoided.

Composite samples from the 10 families were ashed together and analyzed using the method recommended by the Science and Technology Agency.

Results obtained during the period November 1965 to February 1966 are shown in Table 2.

Figure 4. shows the all Japan mean value of total diet.

Figure 3. Total Diet Sampling Locations

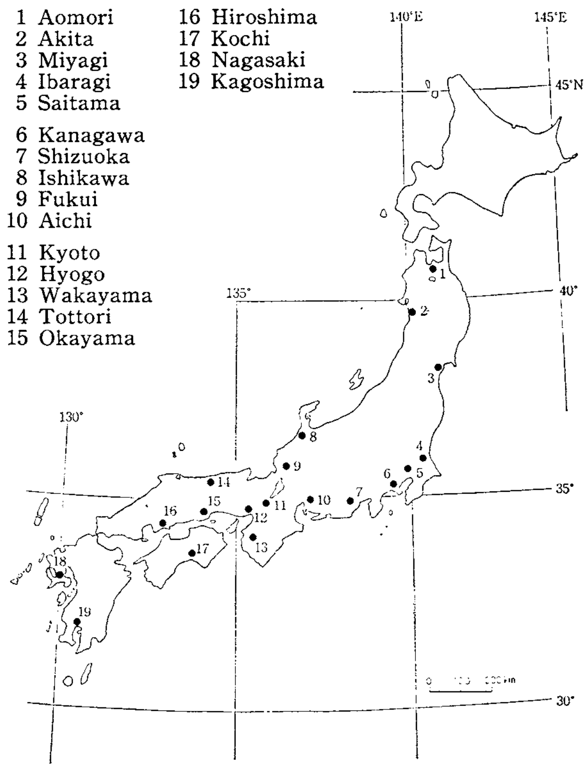


Table 2. $^{90}Sr$ and $^{137}Cs$ in Total Diet —Nov. 1965 to Feb. 1966—

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

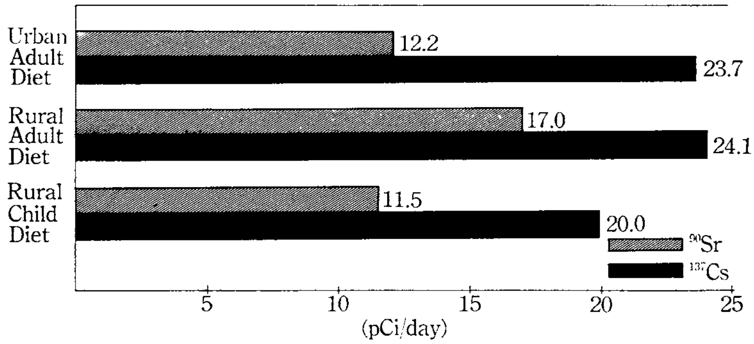
*(Japan Analytical Chemistry Research Institute)*

(Continued from Table 11, Issue No. 7, of this Publication)

| Location | Month | | Daily Intake | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Ash (g) | Ca (mg) | K (mg) | $^{90}Sr$ (pCi) | $^{137}Cs$ (pCi) | $^{90}Sr$ (pCi/gCa) | $^{137}Cs$ (pCi/gK) |
| **(URBAN ADULT DIET)** | | | | | | | | | |
| Aomori, AOMORI | Nov | 65 | 15.1 | 633 | 1909 | 13.3 | 31.8 | 21.0 | 16.7 |
| Akita, AKITA | 〃 | 〃 | 17.3 | 851 | 2206 | 12.8 | 13.5 | 15.0 | 6.1 |
| Sendai, MIYAGI | 〃 | 〃 | 23.8 | 576 | 2149 | 11.1 | 32.9 | 19.3 | 15.3 |
| Mito, IBARAGI | 〃 | 〃 | 19.8 | 539 | 1693 | 10.1 | 37.0 | 18.8 | 21.9 |
| Omiya, SAITAMA | 〃 | 〃 | 10.2 | 217 | 872 | 5.1 | 10.5 | 23.5 | 12.0 |
| Kamakura, KANAGAWA | 〃 | 〃 | 17.0 | 590 | 1853 | 10.1 | 42.0 | 17.1 | 22.7 |
| Kanazawa, ISHIKAWA | 〃 | 〃 | 22.0 | 478 | 996 | 30.5 | 19.1 | 63.9 | 19.2 |
| Fukui, FUKUI | 〃 | 〃 | 19.0 | 792 | 2284 | 13.7 | 38.7 | 17.3 | 16.9 |
| Numazu, SHIZUOKA | 〃 | 〃 | 12.0 | 336 | 1091 | 10.2 | 23.2 | 30.4 | 21.3 |
| Kariya, AICHI | 〃 | 〃 | 15.9 | 455 | 1294 | 9.0 | 22.2 | 19.8 | 17.2 |
| Kyoto, KYOTO | Dec | 〃 | 7.7 | 169 | 702 | 7.4 | 5.9 | 43.4 | 8.5 |
| Kakogawa, HYOGO | 〃 | 〃 | 20.7 | 513 | 1740 | 10.7 | 21.9 | 20.8 | 12.6 |
| Wakayama, WAKAYAMA | Feb | 66 | 15.9 | 650 | 1432 | 5.9 | 26.3 | 9.0 | 18.4 |
| Tottori, TOTTORI | Nov | 65 | 12.0 | 449 | 1123 | 9.8 | 18.0 | 21.8 | 16.0 |
| Okayama, OKAYAMA | 〃 | 〃 | 14.7 | 517 | 1577 | 7.9 | 14.6 | 15.3 | 9.3 |
| Hiroshima, HIROSHIMA | Dec | 〃 | 10.8 | 288 | 1155 | 7.9 | 11.8 | 20.2 | 10.2 |
| Kochi, KOCHI | 〃 | 〃 | 10.3 | 395 | 1293 | 13.2 | 10.5 | 33.5 | 8.1 |
| Nagasaki, NAGASAKI | 〃 | 〃 | 16.7 | 628 | 1633 | 13.4 | 24.7 | 21.3 | 15.1 |
| Kagoshima, KAGOSHIMA | Nov | 〃 | 18.7 | 565 | 1969 | 29.0 | 44.7 | 51.4 | 22.7 |
| **(RURAL ADULT DIET)** | | | | | | | | | |
| Aomori, AOMORI | Nov | 〃 | 17.7 | 455 | 1802 | 22.1 | 30.9 | 48.6 | 17.2 |
| Yuwa, AKITA | 〃 | 〃 | 13.5 | 515 | 1107 | 39.6 | 18.6 | 76.8 | 16.8 |
| Natori, MIYAGI | 〃 | 〃 | 21.9 | 771 | 2015 | 11.0 | 31.7 | 14.3 | 15.7 |
| Tokai, IBARAGI | 〃 | 〃 | 19.9 | 770 | 1897 | 11.2 | 32.0 | 14.5 | 16.9 |
| Niiza, SAITAMA | 〃 | 〃 | 19.5 | 979 | 2040 | 16.3 | 30.6 | 16.7 | 15.0 |
| Shiroyama, KANAGAWA | Nov | 65 | 13.8 | 453 | 1416 | 6.4 | 21.1 | 14.2 | 14.9 |
| Kashiwano, ISHIKAWA | 〃 | 〃 | 20.6 | 280 | 1338 | 34.4 | 26.6 | 122.9 | 19.9 |
| Miyama, FUKUI | 〃 | 〃 | 13.7 | 333 | 1305 | 10.3 | 22.6 | 30.9 | 17.3 |
| Hamaoka, SHIZUOKA | 〃 | 〃 | 14.7 | 475 | 1497 | 12.7 | 15.3 | 26.7 | 10.2 |
| Nishio, AICHI | 〃 | 〃 | 19.8 | 479 | 1440 | 11.7 | 20.3 | 24.4 | 14.1 |
| Yagi, KYOTO | 〃 | 〃 | 19.2 | 588 | 2208 | 19.3 | 19.5 | 32.9 | 8.8 |
| Kakogawa, HYOGO | Dec | 〃 | 10.4 | 367 | 1228 | 6.2 | 18.3 | 16.8 | 14.9 |
| Shimotsu, WAKAYAMA | Feb | 66 | 14.2 | 498 | 1299 | 7.7 | 13.6 | 15.4 | 10.5 |
| Fukube, TOTTORI | Nov | 65 | 17.3 | 526 | 1718 | 18.4 | 31.3 | 35.8 | 18.2 |
| Tsudaka, OKAYAMA | 〃 | 〃 | 12.9 | 285 | 1578 | 13.1 | 12.2 | 45.9 | 7.7 |
| Shiwa, HIROSHIMA | Dec | 〃 | 23.6 | 835 | 1664 | 20.8 | 32.3 | 24.9 | 12.1 |
| Haruno, KOCHI | 〃 | 〃 | 18.1 | 396 | 1721 | 13.4 | 18.3 | 22.5 | 10.6 |
| Tokitsu, NAGASAKI | 〃 | 〃 | 23.5 | 1001 | 2275 | 15.0 | 25.2 | 15.0 | 11.1 |
| Miyanojo, KAGOSHIMA | Nov | 〃 | 18.9 | 812 | 1971 | 32.5 | 38.2 | 40.0 | 19.4 |
| **(RURAL CHILD DIET)** | | | | | | | | | |
| Aomori, AOMORI | Nov | 〃 | 10.1 | 361 | 1908 | 10.5 | 20.7 | 29.1 | 18.9 |
| Yuwa, AKITA | 〃 | 〃 | 12.3 | 619 | 1055 | 13.5 | 17.1 | 21.8 | 16.2 |
| Natori, MIYAGI | 〃 | 〃 | 14.0 | 504 | 1348 | 7.0 | 35.2 | 14.0 | 26.1 |
| Tokai, IBARAGI | 〃 | 〃 | 15.5 | 800 | 2356 | 9.1 | 24.6 | 11.3 | 18.1 |
| Niiza, SAITAMA | 〃 | 〃 | 11.7 | 473 | 1182 | 11.0 | 20.6 | 23.3 | 17.4 |
| Shiroyama, KANAGAWA | 〃 | 〃 | 9.5 | 380 | 1032 | 5.6 | 20.6 | 14.8 | 19.9 |
| Matsuto, ISHIKAWA | 〃 | 〃 | 9.2 | 246 | 943 | 12.8 | 16.6 | 50.0 | 17.6 |
| Miyama, FUKUI | 〃 | 〃 | 13.2 | 438 | 1239 | 29.5 | 21.6 | 67.3 | 17.4 |
| Hamaoka, SHIZUOKA | 〃 | 〃 | 7.3 | 255 | 621 | 6.6 | 8.5 | 26.0 | 13.7 |
| Nishio, AICHI | 〃 | 〃 | 9.9 | 341 | 977 | 6.1 | 18.0 | 17.8 | 18.4 |
| Yagi, KYOTO | Dec | 〃 | 12.3 | 394 | 1224 | 8.5 | 22.9 | 21.6 | 18.7 |
| Kakogawa, HYOGO | 〃 | 〃 | 15.0 | 711 | 1487 | 8.9 | 24.9 | 12.4 | 16.7 |
| Shimotsu, WAKAYAMA | Feb | 66 | 6.5 | 179 | 639 | 3.2 | 10.1 | 17.6 | 15.8 |
| Fukube, TOTTORI | Nov | 〃 | 12.2 | 575 | 1274 | 27.5 | 20.7 | 47.9 | 16.3 |
| Tsudaka, OKAYAMA | 〃 | 〃 | 7.1 | 273 | 694 | 7.0 | 8.8 | 25.7 | 12.7 |
| Shiwa, HIROSHIMA | Dec | 65 | 16.6 | 559 | 1537 | 15.1 | 22.5 | 27.0 | 14.6 |
| Haruno, KOCHI | 〃 | 〃 | 17.1 | 676 | 1582 | 12.5 | 21.3 | 18.5 | 13.5 |
| Tokitsu, NAGASAKI | 〃 | 〃 | 15.4 | 322 | 1478 | 12.1 | 18.9 | 37.6 | 12.8 |
| Miyanojo, KAGOSHIMA | Nov | 〃 | 9.2 | 361 | 1020 | 11.7 | 26.4 | 32.4 | 25.9 |

Figure 4. $^{90}Sr$ and $^{137}Cs$ in Total Diet —Nov. 1965 to Feb. 1966—

—All Japan Mean Values—



# Human Data

## Total Body Burden of Cesium-137 as Assessed by Blood Analysis

*(Institue of Public Health)*

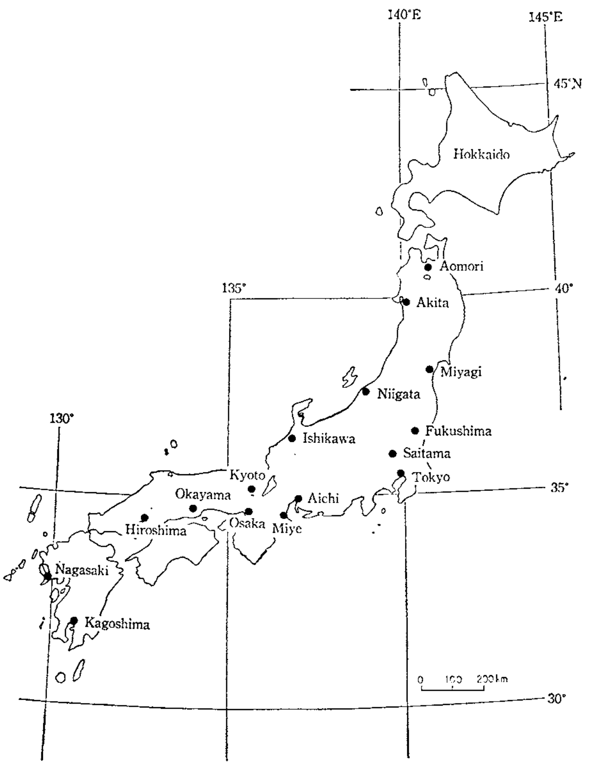
Basic investigation conducted at the Institute of Public Health since 1963 through 1965 on the assessment of total body burden of cesium-137 by the analysis of blood revealed such assessment justifiably be made under limited conditions[1,2]. Citrated whole blood samples (200 ml each) were purchased through blood banks throghout this country since 1964 and analyzed for cesium-137 content by a radiochemical method[3]. Sampling locations are shown in Figure 5. The results for 1964-1966 are shown in Table 3.

To estimate the body levels of cesium-137, the relation factor of 6 was multiplied to the blood concentration to get the body burden per unit body weight (pCi/kg), which was then divided by an assumed concentration of potassium in unit body weight (2 g/kg) to get the concentration of cesium-137 per gram of potassium in the body (pCi/gk). The relation factor is defined as:

$$\text{Factor} = \frac{\text{Total body burden of } ^{137}\text{Cs in pCi}}{\text{Body weight (kg)} \times {}^{137}\text{Cs in blood (pCi/kg)}}$$

Total body burdens thus estimated for 1964-1966 are shown in Table 4.

Figure 5. Blood Sampling Location




1) N. Yamagata and T. A. Iinuma, Total body burden of cesium-137 in Japanese in 1964 as assessed by blood analysis. Health Physics **12**, No. 7 (1966)
2) N. Yamagata et al., In vivo experiment on the metabolism of cesium in human blood with reference to rubidium and potassium. J. Rad. Res. Japan, **7**, 30-47 (1966)
3) N. Yamagata, The currently used methods of radiochemical separation of cesium-137 in blood and low-background counting with a 4 counter. Bull. Inst. Publ. Health **13**, 153-8 (1964)

Table 3. $^{137}$Cs in Whole Blood Samples from Blood Banks —1964 to 1966—
By N. Yamagata
*(Institute of Public Health)*

(pCi/kg)

| Prefecture | | July 1964, | June 1965, | Apr.-May 1966 |
|---|---|---|---|---|
| Hokkaido | | 43.4 | 28.5 | 24.8 |
| | | 33.8 | 25.1 | 27.7 |
| | | 53.0 | 28.5 | 25.7 |
| | | 46.4 | 41.9 | 25.9 |
| | | 42.4 | 37.5 | 22.3 |
| | **Mean** | **43.8** | **32.3** | **25.3** |
| Aomori | | | | 21.1 |
| | | | | 21.7 |
| | | | | 21.3 |
| | | | | 35.4 |
| | | | | 18.2 |
| | **Mean** | | | **23.5** |
| Miyagi | | 48.7 | 15.0 | 38.5 |
| | | 40.5 | 34.2 | 20.4 |
| | | 32.4 | 23.9 | 17.2 |
| | | 29.3 | 35.9 | 23.5 |
| | | 32.2 | 23.0 | 28.4 |
| | **Mean** | **36.6** | **26.4** | **25.6** |

| Prefecture | July 1964, | June 1965, | Apr.-May 1966 |
|---|---|---|---|
| Fukushima | 40.7 | | 21.5 |
| | 39.2 | | 16.9 |
| | 40.6 | | 12.1 |
| | 44.6 | | 22.9 |
| | 43.6 | | 10.3 |
| **Mean** | **41.7** | | **16.7** |
| Akita | | 29.4 | |
| | | 43.2 | |
| | | 28.6 | |
| | | 968* | |
| | | 35.1 | |
| **Mean** | | **34.1** | |
| Niigata | 45.9 | | 29.4 |
| | 45.0 | | 36.0 |
| | 80.8 | | 19.0 |
| | 58.5 | | 24.2 |
| | 99.8 | | 24.1 |
| **Mean** | **66.0** | | **26.5** |
| Ishikawa | | 26.2 | |
| | | 22.9 | |
| | | 22.2 | |
| | | 22.3 | |
| | | 34.3 | |
| **Mean** | | **25.6** | |
| Saitama | | 27.5 | |
| | | 27.5 | |
| | | 28.6 | |
| | | 28.3 | |
| | | 21.9 | |
| **Mean** | | **26.8** | |
| Tokyo | 34.8 | 23.0 | 15.4 |
| | 28.3 | 29.5 | 16.1 |
| | 37.6 | 26.3 | 15.7 |
| | 22.6 | 22.3 | 17.0 |
| | 27.8 | 21.1 | 18.1 |
| **Mean** | **30.2** | **24.4** | **16.5** |
| Aichi | | | 26.8 |
| | | | 20.0 |
| | | | 48.8* |
| | | | 24.1 |
| | | | 19.2 |
| **Mean** | | | **22.5** |
| Miye | | 22.2 | |
| | | 23.5 | |
| | | 27.8 | |
| | | 19.8 | |
| | | 32.0 | |
| **Mean** | | **25.1** | |
| Kyoto | 29.1 | | 15.2 |
| | 27.7 | | 19.1 |
| | 43.8 | | 15.3 |
| | 49.2 | | 15.7 |
| | 40.1 | | 15.3 |
| **Mean** | **38.0** | | **16.1** |
| Osaka | 24.9 | 30.4 | 25.8 |
| | 27.6 | 29.8 | 15.4 |
| | 28.8 | 23.4 | 22.8 |
| | 25.2 | 20.8 | 25.6 |
| | | 26.7 | 17.4 |
| **Mean** | **26.6** | **26.2** | **21.4** |
| Okayama | | 24.4 | |
| | | 20.3 | |
| | | 21.3 | |
| | | 16.0 | |
| | | 18.4 | |
| **Mean** | | **20.1** | |
| Hiroshima | 25.0 | | 19.0 |
| | 20.4 | | 21.2 |
| | 23.2 | | 23.5 |
| | 29.1 | | 16.3 |
| | 27.6 | | 23.9 |
| **Mean** | **25.1** | | **20.8** |
| Nagasaki | 22.0 | | |
| | 48.0 | | |
| | 38.8 | | |
| | 31.5 | | |
| | 34.3 | | |
| **Mean** | **34.9** | | |
| Kagoshima | | | 30.7 |
| | | | 27.6 |
| | | | 18.9 |
| | | | 22.7 |
| | | | 27.9 |
| **Mean** | | | **25.6** |
| **Over-all mean** | **38.1** | **26.6** | **21.9** |

* Excluded in Obtaining the mean

Table 4. Total Body Burden of $^{137}Cs$ in Japanese People as Assessed by Blood Analysis
By N. Yamagata
*(Institute of Public Health)*

(pCi/gk)

| Prefecture | July 1964, | June 1965, | Apr.-May 1966 |
|---|---|---|---|
| Hokkaido | 131 | 97 | 76 |
| Aomori | — | — | 71 |
| Miyagi | 110 | 79 | 77 |
| Fukushima | 125 | — | 50 |
| Akita | — | 102 | — |
| Niigata | 198 | — | 80 |
| Ishikawa | — | 77 | — |
| Saitama | — | 80 | — |
| Tokyo | 91 | 73 | 50 |
| Aichi | — | — | 68 |
| Miye | — | 75 | — |
| Kyoto | 114 | — | 48 |
| Osaka | 80 | 79 | 64 |
| Okayama | — | 60 | — |
| Hiroshima | 75 | — | 62 |
| Nagasaki | 105 | — | — |
| Kagoshima | — | — | 77 |
| **Mean** | **114** | **80** | **66** |

# DATA OF THE FOURTH NUCLEAR TEST BY THE PEOPLE'S REPUBLIC OF CHINA

## Meteorological Data

### Gross Beta-radioactivity and activity of Radio-iodine in Rain and Dry Fallout

Part 1 *(Meteorological Agency)*

The determination of gross beta-activity in precipitation and airborne dusts near the ground has been conducted at the 13 stations in the network of the Meteorological Agency shown in Figure 6. Sampling and counting procedures are the same as described in the Issue No. 5 of this publication series (see page 2 of No. 5).

Radioactive fallout caused by the 4th nuclear detonation of People's Republic of China was clearly detected in the monitoring network mentioned above. The daily data of the radioactivity concentration in precipitaion and air near the ground and radioactive deposition obtained for the period of Oct. 23 through Nov. 13. 1966 are shown in Tables 5, 6 and 7.

Forecast of arrival of the nuclear cloud to Japan was performed by drawing air trajectories in the lower troposphere. In this case, source condition of the cloud was assumed as follows: (1) location; 40°N. 90°E (2) altitude; the lower height above the ground (3) time: Oct. 27, $00^h00^m$ GMT ($00^h00^m$ JST). Anticyclone extending over the region of testing site of the detonation made drawing of the air trajectory rather difficult. Based on the information of meteorlogical condition, i. e., synoptic weather charts acquired till Oct. 29 $00^h00^m$ GMT, 700 mb trajectory and track of the traveling anticyclone were estimated as shown in the Figure 7. Arrival date of the nuclear fallout was announced to probably be Oct. 31 to Nov. 1 basing on this result.

Actual Situation of the radioactive fallout is seen in the Figure 8. which is the day-to-day variation of the gross beta concentration in rain and air. The highest value of 13 data evey day is plotted in the figure 8. The first detection of the fresh fallout was on Nov. 1 for both rain and airborne dust and successively the peak value of it appeared on Nov. 2. Comparatively dry days prevailing in the period concerned gave rise to a little sampling of wet fallout. After an intermission of a few days, the radioactive contamination extended toward north covering Hokkaido. As the result, the second peak of the beta-activity concentration occurred on Nov. 7 in the Hokkaido Island. This date onward, the activity concentration decreased by both the radioactive decay and transfer of the cloud.

The after-the-event air trajectories were depicted for the 4 levels i. e., 300, 500, 700 and 850 mb in the troposphere. The most fitting trajectory, that of 700 mb, is shown in Figure 9. Lateral spread normal to the trajectory line implies 4 times sigma of the Fickian diffusion assumed here. The feature of the 700 mb level trajectory suggests that the nuclear cloud past the altitude exceeding this level over Japan, taking into account the fall time of radioactive particulate to the ground. On the contrary, the 500 mb trajectory passes on 30th over Japan. In considering the meteorological situations mentioned above, the most likely passage of the nuclear cloud over Japan may be estimated on date of Oct. 30 and the altitude between the 700 mb and 500 mb levels.

The asterisk in Table 5 and 6 indicates the value when precipitation stops the day before that sampling day.

Figure 6. Fallout Observation Network of Meteorological Ageney

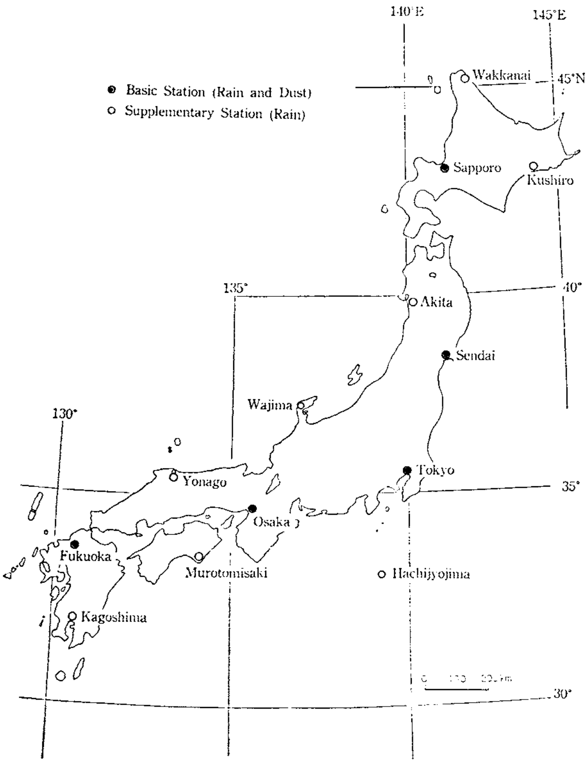



Table 5. Gross $\beta$-activity in Rain —Oct. 23. to Nov. 13, 1966—
Compiled by N. Murayama, H. Fujimoto, and M. Kamiyama.
*(Meteorological Agency)*

(pCi/ml)

| Station | Oct 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Nov 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wakkanai | 0.0 | 0.0 | | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 |
| Sapporo | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Kushiro | | | | | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Sendai | | | | | 0.0 | 0.0 | 0.1* | | | | |
| Akita | 0.0 | | | 0.1 | 0.1 | | 0.1 | 0.0 | 0.0 | | |
| Tokyo | | | | 0.0 | 0.0 | 0.0 | | | | | |
| Wajima | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.9 | |
| Hachijojima | | | | | | | | | | | |
| Osaka | | | 0.1 | 0.1 | | | | | | | |
| Yonago | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.1* | | | | |
| Murotomisaki | | | 0.0 | 0.0 | 0.1 | | | | | | |
| Fukuoka | | | | | 0.1 | 0.0 | | | | | |
| Kagoshima | | | | | | | | | | | |

| Station | Nov 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wakkanai | 0.0 | | | | 5.0 | 1.7* | | 1.5 | | 0.3 | |
| Sapporo | | | | | | | | | 0.3 | 0.3 | 0.1* |
| Kushiro | | | | | 2.7 | | | | | | |
| Sendai | | | | | | | | | | | |
| Akita | | | 4.6 | 1.0 | 1.1 | | | 1.3 | | | |
| Tokyo | | | | | | | | | | | |
| Wajima | | | | 1.1 | | | | | 0.0 | | |
| Hachijojima | | | | | | | | | | | |
| Osaka | | | | | 0.3 | | | | | | |
| Yonago | 0.2 | | | | 1.5 | | | | | | |

| Station | Nov 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Murotomisaki | | | | | 0.1 | | | | | | |
| Fukuoka | | | | 0.5 | | | | | | | |
| Kagoshima | | | | | | | | | | | |

Table 6. Gross $\beta$-deposits —Oct. 23 to Nov. 13, 1966—

Compiled by N. Murayama, H. Fujimoto, and M. Kamiyama

*(Meteorological Agency)*

(mCi/km²)

| Station | Oct 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Nov 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wakkanai | 0.0 | 0.0 | | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 |
| Sapporo | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | |
| Kushiro | | | | | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Sendai | | | | | 0.0 | 0.0 | 0.1* | | | | |
| Akita | 0.0 | | | 0.3 | 1.2 | | 2.2 | 0.0 | 0.0 | | |
| Tokyo | | | | 0.0 | 0.0 | 0.0 | | | | | |
| Wajima | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 4.4 | |
| Hachijojima | | | | | | | | | | | |
| Osaka | | | 0.3 | 0.4 | | | | | | | |
| Yonago | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.2* | | | | |
| Murotomisaki | | | 0.0 | 0.0 | 2.7 | | | | | | |
| Fukuoka | | | | | 0.3 | 0.0 | | | | | |
| Kagoshima | | | | | | | | | | | |

| Station | Nov 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wakkanai | 0.0 | | | | 5.0 | 13.0* | | 3.3 | | 2.0 | |
| Sapporo | | | | | | | | | 2.7 | 0.8 | 0.2 |
| Kushiso | | | | | 3.8 | | | | | | |
| Sendai | | | | | | | | | | | |
| Akita | | | 42.3 | 3.2 | 5.2 | | | 1.8 | | | |
| Tokyo | | | | | | | | | | | |
| Wajima | | | | 4.2 | | | | | 0.0 | | |
| Hachijojima | | | | | | | | | | | |
| Osaka | | | | | 0.8 | | | | | | |
| Yonago | 0.6 | | | | 15.0 | | | | | | |
| Murotomisaki | | | | | 1.0 | | | | | | |
| Fukuoka | | | | 10.0 | | | | | | | |
| Kagoshima | | | | | 0.0 | | | | | | |

Table 7. Gross $\beta$-activity in Dust —Oct. 24 to Nov. 12, 1966—

Compiled by N. Murayama, H. Fujimoto, and M. Kamiyama.

*(Meteorological Agency)*

(pCi/m³)

| Station | Oct 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Nov 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sapporo | 0.2 | | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| Sendai | 0.2 | | 0.5 | | 0.2 | 0.2 | 0.0 | 0.0 | 2.9 | 0.5 |
| Tokyo | 0.5 | | 1.3 | | 0.5 | 0.3 | 1.0 | 0.4 | 0.9 | 20.0 |
| Osaka | 0.7 | | 0.2 | | 0.2 | 0.2 | 0.2 | 1.0 | 0.5 | 17.0 |
| Fukuoka | 0.7 | | 0.7 | | 0.0 | 0.5 | 0.2 | 0.5 | 1.4 | 15.0 |

| Station | Nov 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sapporo | 0.2 | 0.2 | 1.7 | 0.5 | 9.0 | 0.5 | 0.2 | 0.2 | 1.2 | 0.2 |
| Sendai | 0.2 | 0.2 | 2.6 | 8.0 | 6.0 | 1.7 | 1.4 | 0.7 | 0.7 | 0.5 |
| Tokyo | 1.2 | 0.3 | 0.9 | 2.0 | 7.0 | 4.9 | 3.2 | 2.4 | 0.8 | 2.7 |
| Osaka | 0.2 | 0.7 | 1.0 | 6.0 | 4.8 | 4.1 | 3.1 | 3.4 | 0.7 | 1.2 |
| Fukuoka | 0.2 | 0.5 | 0.7 | 5.0 | 1.9 | 3.1 | 2.6 | 1.9 | 1.7 | 1.7 |

Figure 7. The Meteorological Trajectory at that Time The 4th Nuclear Test was carried out by The People's Republic of China.

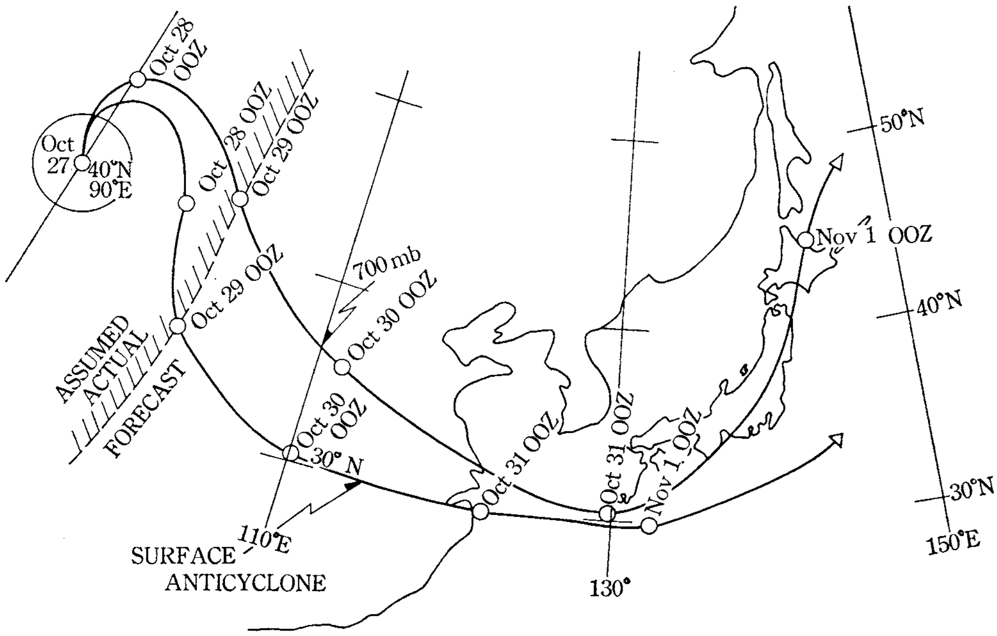



Figure 8. Temporal Variation Gross $\beta$-activity in Rain and Dust near the Ground (Maximum Value: in Japan)

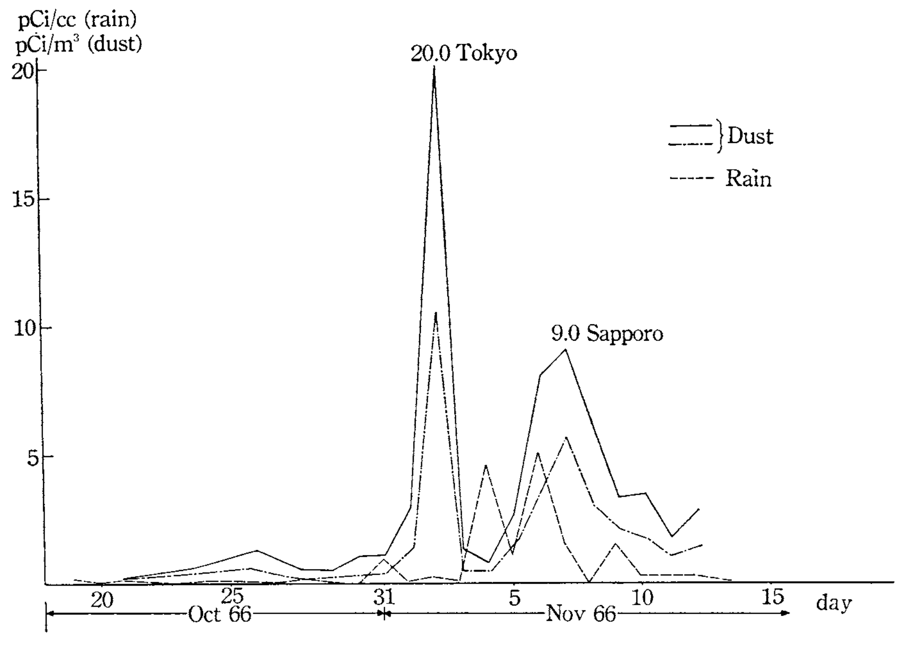
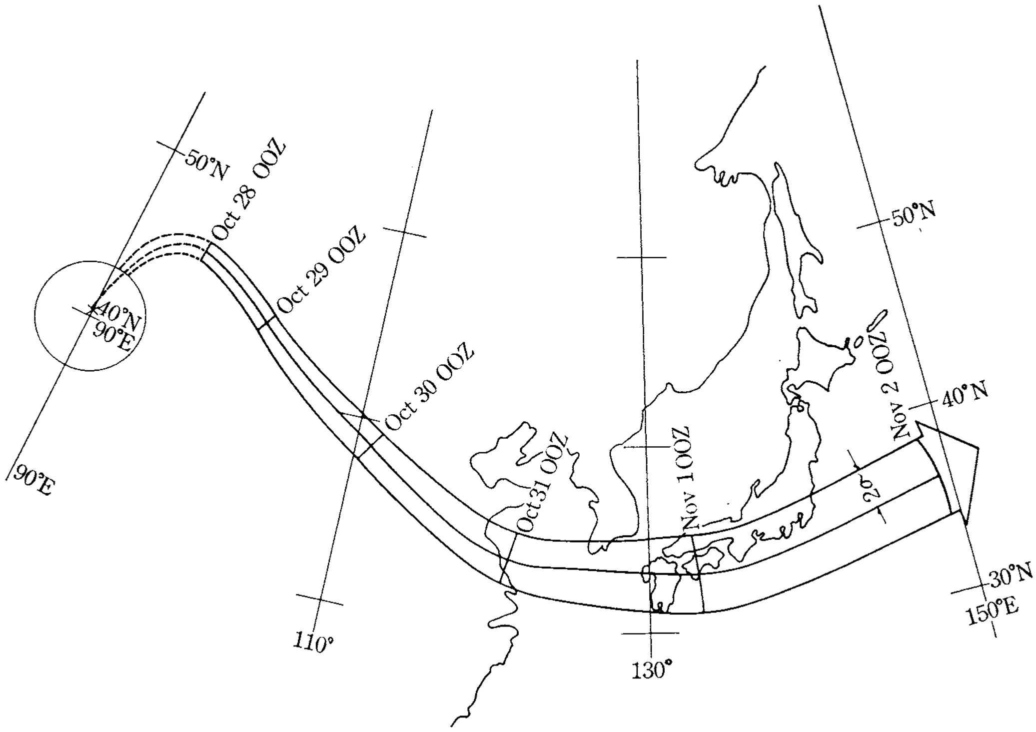


Figure 9. Actual Meteorological Trajectory of 700 mb.




Part 2 *(Meteorological Research Institute)*

The Meteorological Research Institute, Tokyo, is measuring beta-radioactivity in rain and dry fallout collected in a tray at the institute.

Results of measurements obtained during the period from October 26, to November 12, 1966. When the effect of Chinese atomic bomb was noticed, are shown in Table 8.

Table 8. Deposits of Radioactive fallout
—Oct. 26 to Nov. 12, 1966—
By Y. Miyake, K. Saruhashi, Y. Katsuragi, T. Kanazawa, and Y. Sugimura
*(Meteorological Research Institute, Tokyo)*

| Date of Sampling | Collection time (hr) | Total β-activity (mCi/km²) | Remarks |
|---|---|---|---|
| **Oct 1966** | | | |
| 9 h, 26th to 9 h, 27th | 24 | 0.12 | rain (16.2 mm) |
| 〃 27th 〃 〃 28th | 〃 | 0.09 | 〃 ( 9.0 mm) |
| 〃 28th 〃 〃 29th | 〃 | 0.03 | dry fallout |
| 〃 29th 〃 〃 30th | 〃 | 0.03 | 〃 |
| 〃 30th 〃 〃 31th | 〃 | 0.03 | 〃 |
| 〃 31th 〃 〃 1st | 〃 | 0.03 | 〃 |
| **Nov 1966** | | | |
| 9 h, 1st to 9 h, 2nd | 24 | 7.90 | dry fallout |
| 〃 2nd 〃 〃 4th | 48 | 2.15 | 〃 |
| 〃 4th 〃 〃 5th | 24 | 2.00 | rain ( 0.8 mm) |
| 〃 5th 〃 〃 7th | 48 | 0.11 | dry fallout |
| 〃 7th 〃 〃 8th | 24 | 0.07 | 〃 |
| 〃 8th 〃 〃 9th | 〃 | 0.04 | 〃 |
| 〃 9th 〃 〃 10th | 〃 | 0.07 | 〃 |
| 〃 10th 〃 〃 11th | 〃 | 0.04 | 〃 |
| 〃 11th 〃 〃 12th | 〃 | 0.08 | 〃 |

Part 3 *(National Institute of Radiological Sciences)*

Daily rain and dry fallout samples were continuously (9 AM. to 9 AM.) collected by the National Institute of Radiological Sciences at Chiba City, to determine the gross beta-activity and activity of radio-iodine. Gross beta-radioactivity was measured using the standard of Uranium oxide ($U_3O_8$) with a Geiger-Müller counter.

After the addition of an iodine carrier to the fallout samples, the iodine was chemically separated for radioactivity determination, using as iodine-131 standard with a beta-ray low background counter.

Results obtained during the period 28 October to 28 November, 1966 on gross beta-activity and radioactive-iodine are shown in Table 9.

In the afternoon 27 October 1966, the fourth nuclear explosion test was carried out by the People's Republic of China. The radioactivity of initial precipitation of the fallout shows the lowest level in that of past three nuclear explosion test of the China.

Table 9. Gross $\beta$-radioactivity and Radioactivity of Iodine in Rain and Dry Fallout collected in a tray at Chiba City —Oct. 28 to Nov. 28, 1966—

by M. Saiki, H. Kamada, Y. Ohmomo, E. Nakano and H. Yamaguchi
*(National Institute of Radiological Sciences)*

| Date of Sampling | Date of Determination | Gross $\beta$-activity ($mCi/Km^2$) | $\beta$-activity of Iodine at the Time of Sampling ($mCi/km^2$) | Remarks |
|---|---|---|---|---|
| 28～29 Oct. 1966 | 29 Oct. 1966 | 0.05 | <0.04 | Rain (<2 mm) |
| 29～30 〃 | 30 〃 | 0.03 | <0.05 | |
| 30～31 〃 | 31 〃 | 0.00 | <0.01 | |
| 31～1 Nov. 1966 | 1 Nov. 1966 | 0.01 | <0.02 | |
| 1～2 〃 | 2 〃 | 0.49 | 0.07 | Rain (<2 mm) |
| 2～3 〃 | 3 〃 | 0.99 | 0.13 | |
| 3～4 〃 | 4 〃 | 0.13 | 0.02 | |
| 4～5 〃 | 5 〃 | 0.27 | 0.03 | |
| 5～7 〃 | 7 〃 | 0.19 | 0.03 | |
| 7～8 〃 | 8 〃 | 0.05 | <0.04 | |
| 8～9 〃 | 9 〃 | 0.14 | 0.03 | |
| 9～10 〃 | 10 〃 | 0.06 | 0.01 | |
| 10～11 〃 | 11 〃 | 0.12 | | |
| 11～12 〃 | 12 〃 | 0.13 | | |
| 12～14 〃 | 14 〃 | 1.13 | | Rain (<2 mm) |
| 14～15 〃 | 15 〃 | 0.33 | | |
| 15～16 〃 | 16 〃 | 0.22 | | |
| 16～17 〃 | 17 〃 | 0.73 | | Rain (<2 mm) |
| 17～18 〃 | 18 〃 | 0.71 | | |
| 18～19 〃 | 19 〃 | 0.21 | | |
| 19～21 〃 | 21 〃 | 0.29 | | |
| 21～22 〃 | 22 〃 | 0.15 | | |
| 22～24 〃 | 24 〃 | 0.11 | | |
| 24～25 〃 | 25 〃 | 0.07 | | |
| 25～26 〃 | 26 〃 | 0.45 | | Rain (<2 mm) |
| 26～28 〃 | 28 〃 | 0.11 | | |

## Highly Radioactive Fallout Particles

Part 1 *(Meteorological Research Institute)*

The Meteorological Research Institute carried out radiochemical analysis of fallout particles collected on 2nd November when the effects of 4th Chinese bomb was detected.

Results obtained are indicated in Table 10.

Table 11 shows the contents and the ratio of uranium-237 and neptunium-239 in fallout particles originated from bombs by the People's Republic of China.

Table 10. Radiochemical Analysis of Fallout Particles
—Nov. 12, 1966—
By Y. Miyake, K. Saruhashi. Y. Katsuragi
T. Kanazawa and Y. Sugimura
*(Meteorological Research Institute, Tokyo)*

| Nuclides | (Percentage in Activity) Fission and induced product |
|---|---|
| Np-239 | 3.4% |
| U-237 | 1.0 |
| Mo-99, Te-132, Ru-103, 106 | 3.8 |
| Zr-95, Nb-95 | 17.5 |
| Sr-89, 90, Ba-140 | 4.9 |
| rare-earth elments | 69.5 |

Table 11. Contents and The Ratio of $^{237}U$ and $^{239}Np$ from the bomb by the People's Republic of China.
By Y. Miyake, K. Saruhashi, Y. Katsuragi T. Kanazawa, and Y. Sugimura
*(Meteorological Research Institute, Tokyo)*

| Date of test | Oct. 16, 1964 | May 14, 1965 | May 9, 1966 | | Oct. 27, 1966 |
|---|---|---|---|---|---|
| Days after test | 5 | 7 | 5 | 7 | 7 |
| | dry fallout | rainout | dust particles | | dust particles |
| U—237 (%) | 2.5 | 1.0 | 0.6 | 0.8 | 1.0 |
| Np—239 (%) | 64.0 | 31.2 | 2.8 | 2.5 | 21.4 |
| U—237/Np—239 | 0.04 | 0.03 | 0.2 | 0.3 | 0.05 |

Part 2. *(National Institute of Radiological Sciences)*

In the morning of 1 November 1966, five particles, having high radioactivity of about 0.8~8 mμCi, were collected in seven square metre on the roof of building in the campus of the National Institute of Radiological Sciences, in Chiba City.

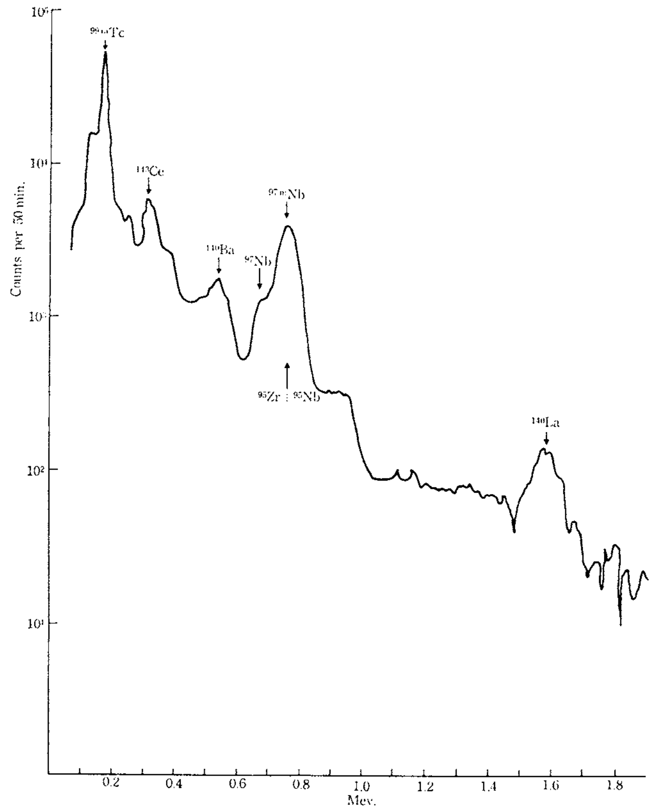
The particles could be easily detected with a Geiger-Müller survey meter of end window type.

The gamma-ray spectrum of the highly radioactive fallout particles is shown in Figure 10.

According to energy distribution of photo peaks of gamma-ray spectrum, main gamma-ray emitting radionuclides of the particles were estimated.

The major radioactivity are emitted from Molybdenum-99+Technetium-99 m, Cerium-143, Zirconium-97+Niobium-97 m+Niobium-97, Zirconium-95+Niobium-95 and Barium-140+Lanthanum-140 at 2 November 1966. The gamma-ray spectrum were observed to be similar to that of the particles from the third nuclear explosion test by the People's Republic of China.

Figure 10. Gamma-ray Spectrum of Highly Radioactive Fallout Particles. —2 Nov. 1966—
by M. Saiki, H. Kamada, K. Kimura and E. Nakano
*(National Institute of Radiological Sciences)*




## Gross Beta-activity in Upper Air

*(Research and Development H.Q., Japan Defense Agency)*

Since 1960, Research and Development H.Q., Japan Defense Agency has measured the beta-radioactivity of dust in the lower layer of the stratosphere and tropopause using aircraft as collectors.

The samples were taken over three areas of Japan using gummed paper and dust samplers attached to the front of the aircraft wings.

The sampling flight was made using two aircraft at the same time, one of which made a normal sampling flight and the other only upward and downward flight. The difference between the amounts of radioactivity of the samples collected by the two aircraft is taken as the value at the flight altitude.

But, at this time, the value of sample collected by the aircraft which made a level sampling flight for an hour was rather lower than the one by only upward and downward flight.

It seems that this result was caused by the radioactive airborne dust and fallout particles which were floating unequal at the lower altitude than that of level sampling flight.

On this occasion, the quantitative value was not obtained.

So, the true value obtained shown in Table 12.

Figure 11 shows three sampling areas of Japan, and Table 12 shows the results obtained.

Table 12. Gross β-radioactivity in Upper Air —Oct. 28 to 7 Nov. 1966—

By T. Urai and T. Igarashi

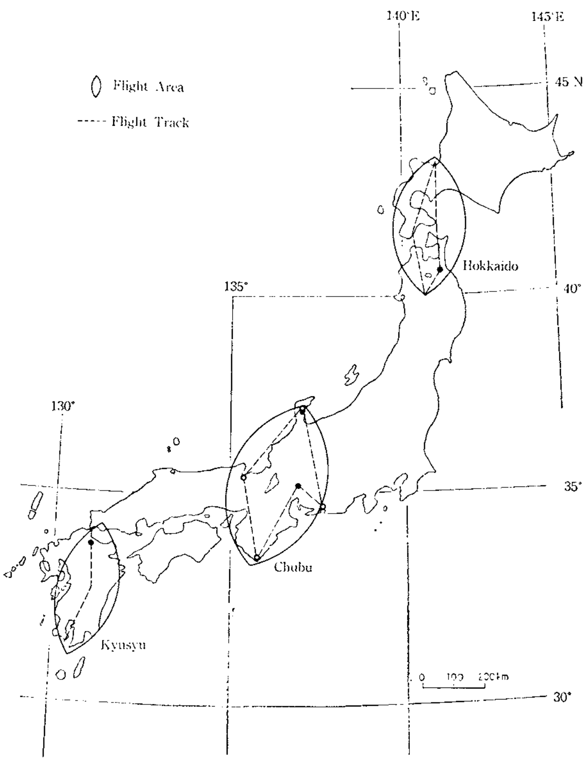
*(Research and Development H.Q., Japan Defense Agency)*

(pCi/$m^3$)

| Sky Area | Hokkaido 12,000 m | Hokkaido 10,000 m | Chubu 12,000 m | Chubu 10,000 m | Chubu 6,000 m | Kyushu 12,000 m | Kyushu 10,000 m |
|---|---|---|---|---|---|---|---|
| **1966** | | | | | | | |
| 28 Oct | 0.78 | | 0.69 | | | | |
| 29 〃 | | 0.72 | | * 0.21 (a.m)<br>1.15 (p.m) | | | 1.03 |
| 30 〃 | 2.56 | | * 4105.3<br>10833.3 | | | 1.47 | |
| 31 〃 | | 1.99 | | 6.5 | | | * 312.0<br>361.1 |
| 1 Nov | * 918.8<br>1092.6 | | * 14.7<br>22.9 | | | * 1.3<br>2.6 | |
| 2 〃 | | 0.9 | | 3.0 | | | * 51.3<br>105.2 |
| 3 〃 | 1.4 | | 0.92 | | | 0.75 | |
| 4 〃 | | * 14.8<br>21.0 | | 0.4 | | | 0.09 |
| 5 〃 | 1.38 | | * 10.8<br>27.0 | | | 6.1 | |
| 6 〃 | | * 28.6<br>34.9 | | 3.2 | | | * 13.6<br>36.3 |
| 7 〃 | | | | | 0.13 | | |

* Upper rank: the value of level sampling flight (pCi/1 gummed paper)
  Lower rank: the value of upward and downward sampling flight (pCi/1 gummed paper)

Figure 11. Three Sampling Areas of Japan



## Radioactive Zirconium+Niobium, Ruthenium and Cerium in Air borne Dust

*(National Institute of Radiological Sciences)*

An air borne dust samples were collected from 1~1.5 m above the ground in the campus of National Institute of Radiological Sciences in Chiba City, using a dust collector, composed of a pre-filter, a cottrell type dust collector and a spongy polyurethane filter, and that is designed to collect and deposite up to 99% particles, size of 10 mμ under flow rate of 10 $m^3$ per minute. The samples were incinerated in a muffle furnace at 450°C. Radioactivities of nuclides in ash samples were measured by gamma-ray spectrometry. To calculate radioactivity of Zirconium+Niobium (0.75 Mev.), Ruthenium (0.51 Mev.) and Cerium (0.14 Mev.), radioactivities from standard samples of Zirconium-95+Niobium-95, Ruthenium-106+Rhodium-106 and Cerium-144 were taken.

Results obtained are shown in Table 13.

Table 13. Radioactive Zr+Nb, Ru and Ce in Air borne Dust —Oct 1966 to Dec 1966—
by M. Saiki H. Kamada and K. Kimura.
*(National Institute of Radiological Sciences)*

| Location | Month Collected | Duration (days) | Air inhaled ($m^3$) | Ash Weight (g) | Radioactive Zr+Nb ($pCi/m^3$)$\times 10^{-3}$ | Radioactive Ru ($pCi/m^3$)$\times 10^{-3}$ | Radioactive Ce ($pCi/m^3$)$\times 10^{-3}$ | * Remarks |
|---|---|---|---|---|---|---|---|---|
| Chiba | 1~15 Oct. 1966 | 15 | 216000 | 6.1 | 0.34 | 8.00 | 0.45 | |
| 〃 | 16~31 〃 | 16 | 230400 | 8.8 | 0.38 | 4.09 | *2.25 | (+$^{99}$Mo+$^{99m}$Tc) |
| 〃 | 1~15 Nov. 1966 | 15 | 216000 | 9.0 | 50.00 | 217.00 | *120.79 | (+$^{99}$Mo+$^{99m}$Tc) |
| 〃 | 16~30 〃 | 15 | 216000 | 15.0 | 9.38 | 47.84 | 21.26 | |
| 〃 | 1~15 Dec. 1966 | 15 | 216000 | 15.7 | 1.82 | 15.95 | 4.34 | |

# Dietary Data

## Radioactive Iodine in Milk

*(National Institute of Radiological Sciences)*

Radioactive concentration in milk, which was collected from two districts in the northern part of Chiba prefecture daily from 28th of October to 7th of November in 1966, was measured in order to know the effect of the fourth nuclear explosion test by the People's Republic of China.

Efficient concentration was not detected during the above period.