

Measures and current situation of Radionuclides in Food

Department of Environmental Health and Food Safety,
Pharmaceutical Safety and Environmental Health Bureau,
Ministry of Health, Labour and Welfare

- **Management system of radioactive materials in food**

- **Establish Limits**
- **Monitoring System**
- **Correspondences when exceeds the Limits**

- **Detection Status of radioactive materials in food**

- **Results of Measurements**
- **Surveys of radionuclides in food on the market**

■ Control of radioactive materials in foods

■ Establish limits for radioactive materials in foods

- The indicator values given by the Nuclear Safety Commission were set as the provisional regulation values. (March 17, 2011 - March 31, 2012)
- The present limits for radioactive materials in foods took effect. (April 1, 2012 -)



■ Monitor radioactive materials in foods

- The monitoring is conducted by the local governments around the 17 prefectures. (March 18, 2011 -)
- The Nuclear Emergency Response Headquarters established guidelines on the local governments' formulation of monitoring plans for radioactive materials in foods. (April 4, 2011)



■ Recall and dispose of foods containing radioactive materials above the limits

All the articles in a lot in which the levels are exceeded are recalled or disposed of.

■ Restrict the distribution of foods [Nuclear Emergency Response Headquarters]

Distribution is restricted on a prefecture basis (or a smaller area basis in a prefecture), judging from the spreading of places where radioactive materials above the limits are detected as a result of inspections. (March 21, 2011-)

■ Lift restrictions [Nuclear Emergency Response Headquarters]

Every testing result from samples collected within the past one month from at least three different locations in a municipality must be below the corresponding limits.

Standard Limits for Radioactive Materials in Foods

- The limits of radioactive materials in food are based on **1 mSv per year** which is used as an index by Codex Alimentarius Commission, which develops harmonized international food standard. Also, it is established under the risk assessment by the Food Safety Commission.

※ (The joint committee of FAO (Food and Agriculture Organization of the United Nations) and WHO (World Health Organization))

Limits for radioactive cesium

(April, 2012~present)

Maximum Limit of dose from food (effects on the human body)
↓
1 mSv/year

Terms of the amount of per food 1kg

Category	Limit
Drinking water	10
Milk	50
Infant Foods	50
General Foods	100

(Unit: Bq/kg)



■ The concept of radionuclides to be regulated (1)

Standard limits set the radioactive cesium as an indicator

- Targets to be regulated are all radionuclides based on the evaluation of the Nuclear and Industrial Safety Agency as substances emitted by the Fukushima nuclear power plant accident, and whose half-life is over 1 year.

Regulated Radionuclides	Physical Half-life
Cs-134	2.1years
Cs-137	30years

Sr-90	29years
Pu	14years or more
Ru-106	374days

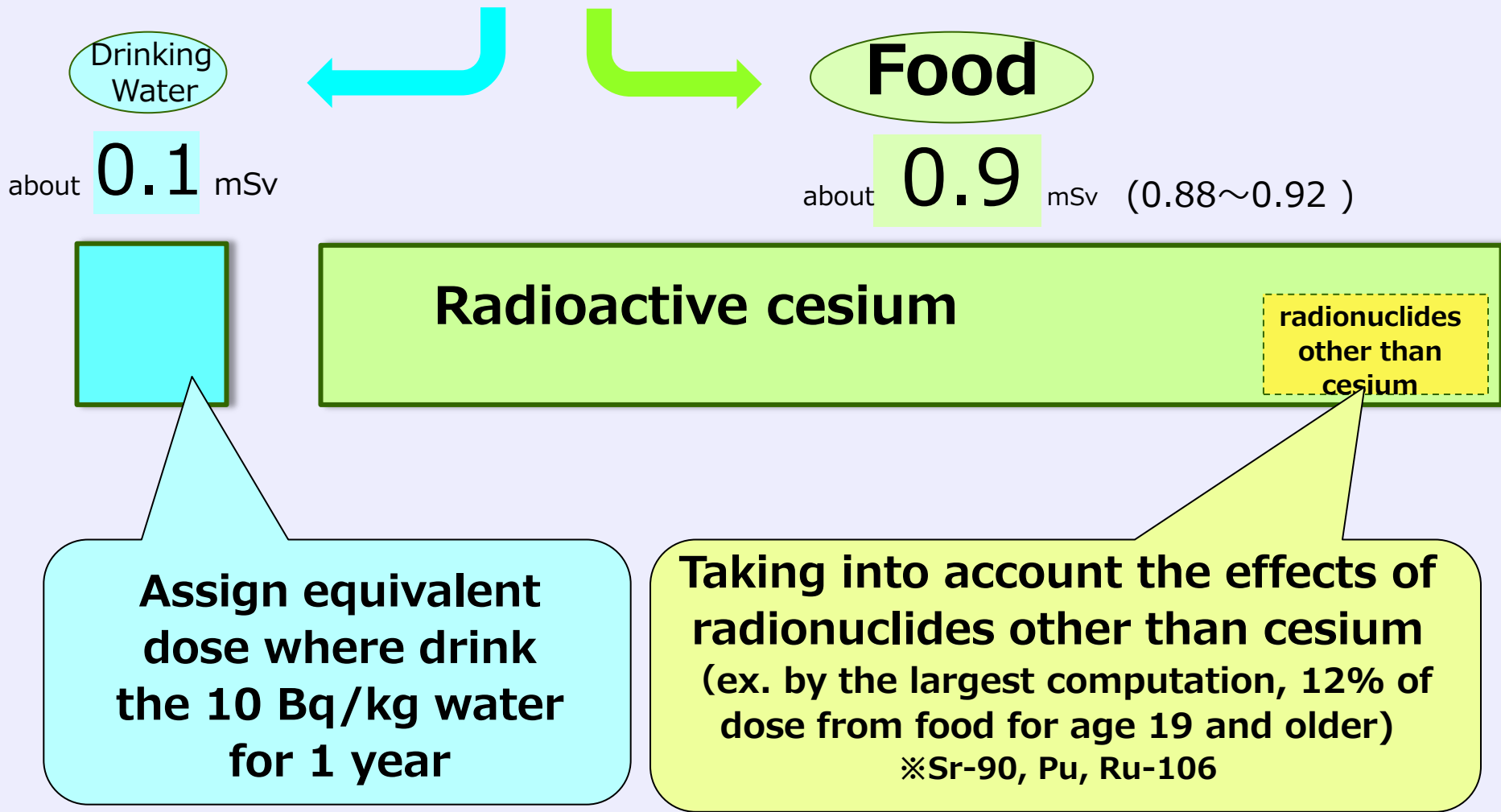
Note: The limits are not established for radioactive Iodine, which has a short half-life (8 days) and has been no longer detected, and for Uranium, whose level is almost the same in the nuclear power plant site as in the natural environment.

- Because radionuclides other than Cs-134 and Cs-137 require a longer time for measurement, the limits for radioactive cesium are established for effective dose of radionuclides (including Sr-90, Ru-106, Pu) not to exceed 1 mSv/year.




■ The concept of radionuclides to be regulated (2)

Dose limit of 1 year per person for the standard limits
1 mSv



■ The concept of radionuclides to be regulated (3)

Determine the dose to be allocated to the general foods (about 0.9 mSv)



Age Category	Intake	Derived concentration(Bq/kg)
under 1	Average	460
1-6	Male	310
	Female	320
7-12	Male	190
	Female	210
13-18	Male	120
	Female	150
19 and older	Male	130
	Female	160
pregnant	Female	160
Minimum		120

Set the limit below the strongest (minimum) value out of derived concentrations of each age category



Standard Limit 100Bq/kg

- ※ Calculated using the effective dose coefficients and the amount of food intake for each age group
- ※ Assuming that half of the food distribution contains a radioactive materials of the standard limit



■ Concepts of Inspection Plan for Radioactive Materials in Foods (1)

Formulation by The Nuclear Emergency Response Headquarters (Latest Revision: 2016/3/25)

Government sets the guideline of monitoring plan, including items subject to inspection and frequency of inspections. The inspections are implemented by local governments and focused on items especially in which higher level of radioactive cesium might be detected.

Instructed based on the detected levels of radionuclides previous fiscal year

- Local governments subject to inspections
- Items subjected to inspections as follows;
 - Food items from which radioactive cesium above the limits has been detected (ex: mushrooms, wild plants, birds and animals)
 - Items that are greatly influenced by the management of feeding (ex: milk, beef)
 - Fishery products
 - Food items that the restriction of distribution was cancelled since management system are settled
 - Foods distributed in the market
- The designation of municipalities subject to inspection
- The frequency of inspections
 - ⇒ *Inspection Plan of each local government is designed according to actual situation such as level of detections, amounts of production, and seasons of shipment.*

http://www.mhlw.go.jp/english/topics/2011eq/dl/food_revision_March25_2016.pdf

■ Concepts of Inspection Plan for Radioactive Materials in Foods (2)

Items	Prefecture																
	Aomori	Iwate	Akita	Miyagi	Yamagata	Fukushima ^a	Ibaraki	Tochigi	Gunma	Chiba	Saitama	Tokyo	Kanagawa	Niigata	Yamanashi ⁱ	Nagano	Shizuoka
Mushrooms, Wild edible plants, etc.	■	⊙	■	⊙	⊙	⊙	●	⊙	⊙	⊙	■	■	■	⊙	⊙	⊙	⊙
Wild bird and Animal meat	■	⊙	■	⊙	■	⊙	⊙	⊙	⊙	●	■	■	■	■	■	■	■
Buckwheat in Cereals		⊙		■													
Vegetables						●											
Fruits						●											
Mushrooms, Wild edible plants, etc.	■	■	●	●	■	●	●	●	●	■	■	■	■	■	■	■	■
Rice in Cereals						●											
Soybean in Pulse		■				●											
Honey						●											
Milk, Beef		■		■		■		■	■								
Marine fishery products		■		■		⊙											
Inland water fishes		⊙		⊙		⊙	⊙	⊙	⊙	⊙							

Categorized based on the results of inspections conducted between April 1, 2015 and February 29, 2016.

- ⊙ Radioactive cesium above the maximum limits (for fishery products, 1/2 of the limits) has been detected.
- Radioactive cesium above 1/2 of the maximum limits has been detected (excluding those from which radioactive cesium above the maximum limits has been detected.)
- Items whose inspections require consideration for their migratory behavior and the difficulty of the management, etc.



■ Rigorous Monitoring System of Radionuclides in Foods

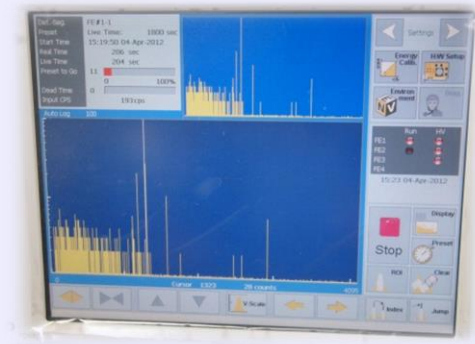
- ① Nuclides analysis by using germanium semiconductor detectors
- ② Screening analysis by using NaI scintillation spectrometers and other instruments

Shredding

Weighing

Measurement

Analysis



[Reference] To ensure the reliability of tests

Correct treatments for measuring equipment and samples are necessary for accurate measurements

Treatment for measuring equipment

1. Perform daily background measurements to confirm that the background does not exceed the normal range.
2. Perform daily blank measurements using a blank vessel to confirm that the analysis system is free of radioactive surface contamination.
3. Perform periodically calibration using volume radioactivity standard.
4. Check the energy scale stability daily.

Treatment for samples

1. When packing the sample into the measurement vessel, make sure that no void is left, particularly in areas around the detector.
2. Avoid radioactive surface contamination of the analysis system by the samples or cross-contamination among different samples. Take appropriate measures to prevent contamination of the detection parts, e.g., by covering the detectors with polyethylene bags, preventing the samples from contacting the outside of measurement vessels, etc.
3. When repeating measurements using the same measurement vessel, take appropriate measures to prevent contamination of the vessel, e.g., by placing polyethylene bags inside the vessel and packing the samples into the bags.
4. Take appropriate measures to prevent mixing up of the samples.

Correct measurement method is informed to local governments and inspection agencies by the notification, "Testing Methods for Radioactive Substances in Food" and others.

■ Restriction of Distribution and/or Consumption of Foods

Order by Act on Special Measures Concerning Nuclear Emergency Preparedness

“Restriction of Distribution”

When areas producing the items exceeding the limits have been spread out, relevant areas and items become subject to restriction.

“Restriction of Consumption”

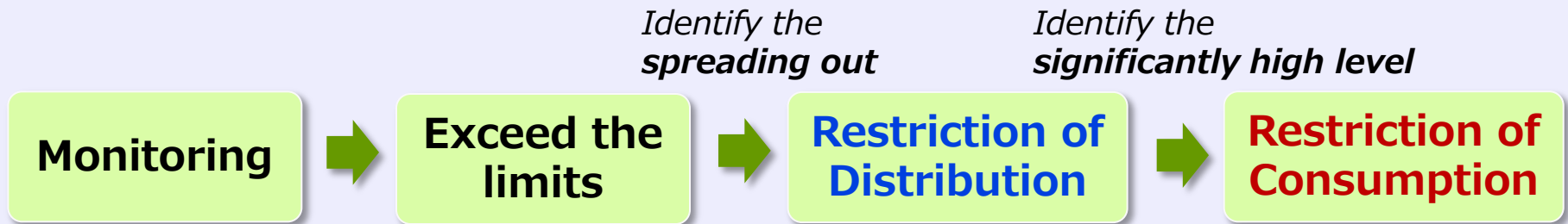
When significantly high level of concentration is detected in items, the restriction of consumption is immediately established.

■ The requirements for establishing items and areas of restriction

- When it is considered that areas producing the items exceeding the limits have been spread out, relevant areas and items become to restriction.
- Unit of Restriction is prefecture basis. Prefectures can be divided into multiple number of areas if they can be administered by prefectures and municipalities.

■ The requirements for cancellation of restriction

- Based on the application of the relevant prefecture.
- Prefectures can be divided into a multiple zones, in the light of the actual situations of the shipments of the items.
- As a general rule, the results of radioactive cesium inspections conducted at 3 or more locations per municipality within the last month must all fall below the limits.



※ Monitoring of radioactive materials in food are mainly carried out before shipment. Most of the food items exceeding the limits are derived from areas where restrictions of distribution have been instructed.

The list of Instructions on the Restriction of Distribution of Food

Prefecture	Restriction of Distribution (As of the end of September 2016)
Fukushima	(Some areas) Raw milk, Non-head type leafy Vegetables (e.g. Spinach, Komatsuna), Head type leafy vegetables (e.g. Cabbage), Flowerhead brassicas (e.g. Broccoli, Cauliflower), Turnip, Log-grown shiitake (outdoor・indoor cultivation) ^{※1} , Log-grown pholiota nameko (outdoor cultivation), Wild mushrooms, Bamboo shoot, Hatakewasabi, Wild Aralia cordata, Ostrich fern, Koshiabura, Japanese royal fern, Wild Uwabamisou, Aralia sprout (limiting wild plant), Giant butterbur, Wild Japanese butterbur scape, Pteridium aquilinum, Japanese apricot (Ume), Yuzu, Chestnut, Kiwi fruit, Rice (produced in 2011・2012・2013・2014・2015・2016) ^{※1} , Cherry salmon (excluding farmed fish), Japanese dace, Japanese eel, Ayu sweetfish (excluding farmed fish), Whitespotted char (excluding farmed fish), Common carp (excluding farmed fish), Any crucian carp (excluding farmed fish), Bear meat (Whole area) 16Fishery products、Beef ^{※1} , Boar meat, Spot-billed duck meat, Green pheasant meat, Hare meat, Copper pheasant meat
Aomori	(Some areas) Wild mushrooms ^{※2}
Iwate	(Some areas) Log-grown shiitake (outdoor cultivation) ^{※1} , Log-grown brick cap (outdoor cultivation), Log-grown pholiota nameko (outdoor cultivation), Wild mushrooms, Bamboo shoot, Koshiabura, Japanese royal fern, Japanese parsley (limiting wild plant), Pteridium aquilinum (limiting wild plant), Japanese black porgy, Whitespotted char (excluding farmed fish) (Whole area) Beef ^{※1} , Deer meat, Bear meat, Copper pheasant meat
Miyagi	(Some areas) Log-grown shiitake (outdoor cultivation) ^{※1} , Wild mushrooms, Bamboo shoot, Ostrich fern, Koshiabura, Japanese royal fern, Aralia sprout (limiting wild plant), Whitespotted char (excluding farmed fish), Ayu sweetfish (excluding farmed fish), Cherry salmon (excluding farmed fish), Japanese dace (Whole area) Japanese black porgy, Beef ^{※1} , Boar meat, Bear meat
Yamagata	(Whole area) Bear meat ^{※1}
Ibaraki	(Some areas) Log-grown shiitake (outdoor・indoor cultivation) ^{※1} , Bamboo shoot, Wild Koshiabura, Channel catfish (excluding farmed fish), Japanese eel (Whole area) Boar meat ^{※1}
Tochigi	(Some areas) Log-grown shiitake (outdoor・indoor cultivation) ^{※1} , Log-grown brick cap (outdoor cultivation), Log-grown pholiota nameko (outdoor cultivation), Wild mushrooms, Bamboo shoot, Ostrich fern (limiting wild plant), Wild Koshiabura, Japanese pepper (limiting wild plant), Japanese royal fern (limiting wild plant), Aralia sprout (limiting wild plant), Pteridium aquilinum (limiting wild plant), Chestnut (Whole area) Beef ^{※1} , Boar meat ^{※1} , Deer meat
Gunma	(Some areas) Wild mushrooms, Whitespotted char (excluding farmed fish), Cherry salmon (excluding farmed fish) (Whole area) Boar meat, Bear meat, Deer meat, Copper pheasant meat
Saitama	(Some areas) Wild mushrooms
Chiba	(Some areas) Log-grown shiitake (outdoor・indoor cultivation) ^{※1} , Silver crucian carp, Common carp, Japanese eel (Whole area) Boar meat ^{※1}
Niigata	(Some areas) Bear meat
Yamanashi	(Some areas) Wild mushrooms
Nagano	(Some areas) Wild mushrooms ^{※3} , Koshiabura
Shizuoka	(Some areas) Wild mushrooms

※1) Excluding items which are managed based on shipment and inspection policy set by each local government
 ※2) Excluding Honey mushroom produced in some areas
 ※3) Excluding Matsutake mushroom produced in some areas



■ Outline

- **Management system of radioactive materials in food**
 - Establish Limits
 - Monitoring System
 - Correspondences when exceeds the Limits

- **Detection Status of radioactive materials in food**
 - Results of Measurements
 - Surveys of radionuclides in food on the market

■ Monitoring of radioactive materials in foods

The monitoring of radioactive materials in foods is conducted by the local governments around the 17 prefectures on the basis of the inspection plan.

March 18, 2011 – March 31, 2012

137,037 of which 1,204 were detected as above the provisional regulation values.
(violation rate:0.88%)

April 1, 2012 – March 31, 2013

278,275 of which 2,372 were detected as above the present limits.
(violation rate:0.85%)

April 1, 2013 – March 31, 2014

335,860 of which 1,025 were detected as above the present limits.
(violation rate:0.31%)

April 1, 2014 – March 31, 2015

314,216 of which 565 were detected as above the present limits.
(violation rate:0.18%)

April 1, 2015 – March 31, 2016

340,311 of which 291 were detected as above the present limits.
(violation rate:0.09%)

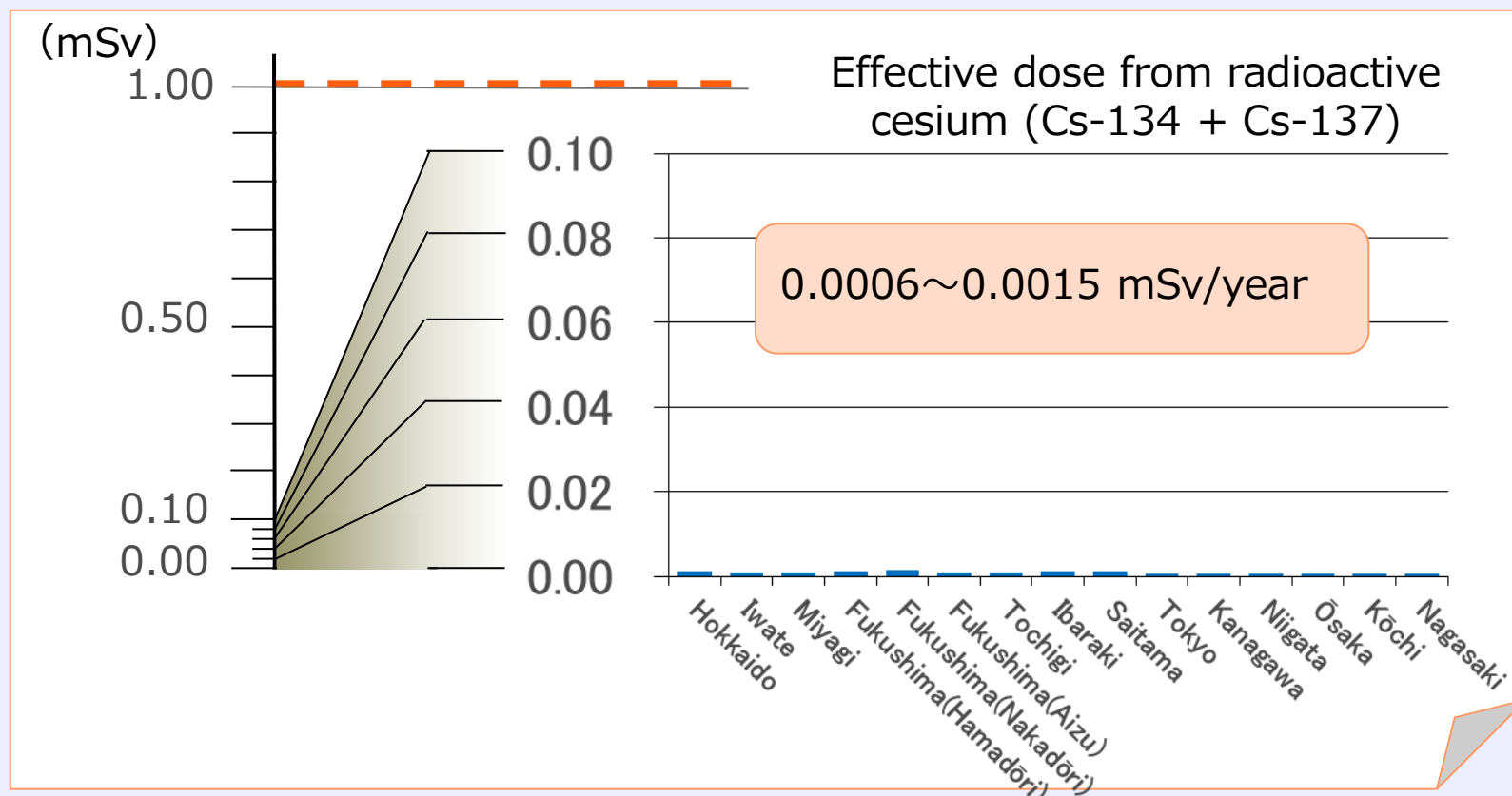
※The number of food samples tested includes test results of foods distributed in the market and test results implemented by the local governments other than the 17 prefectures designated by the guideline.



Estimations of effective dose from radioactive materials in foods

- The Ministry of Health, Labour and Welfare (MHLW) surveyed the dietary intake of radionuclides in 15 areas across Japan in the September–October 2015 period and estimated the annual effective doses from radioactive materials derived from standard meals.

※ Foods were purchased in 15 areas in Japan including three areas in Fukushima Prefecture. Local grown products were selected, wherever possible.



The annual effective doses from radioactive cesium in foods were less than 1 % of 1 mSv/year as the basis of setting of the current limits in this study.

■ Conclusion

- ◆ **Based on international standards, the standard limits are established taking account of all ages including children.**
- ◆ **The inspection of radioactive materials in foods is conducted by the prefectural governments on the basis of the inspection plan. The MHLW aggregates and publishes the inspection results.**
- ◆ **The annual effective doses from radioactive cesium in foods were less than 1 % of 1 mSv/year as the basis of setting of the current limits.**

Information Dissemination on MHLW Website

● 「Food - Information on the Great East Japan Earthquake」

http://www.mhlw.go.jp/english/topics/2011eq/index_food.html

→ "Information on the Great East Japan Earthquake"
on the top page of Ministry of Health, Labour and Welfare,
→ "Food"

or

mhlw food radioactive Search



The screenshot shows a web browser window with the URL <http://www.mhlw.go.jp/english/>. The page header features the MHLW logo and the text '厚生労働省 Ministry of Health, Labour and Welfare'. The main content area is titled 'Information on the Great East Japan Earthquake' and has a sub-section 'Food'. The text in the 'Food' section reads: 'Immediately after the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Plant in March 2011, the Government of Japan had taken comprehensive actions, such as establishing provisional regulatory values, monitoring of foods and materials for agricultural production, restriction of distribution of food with higher radionuclide levels than the regulatory values, and decontamination of farm land in order to ensure sufficient supply of safe foods distributed Japan, including foods to be exported. In April 2012, new limits were established for foods on a basis of intervention exemption level of 1 mSv/year, equivalent to the Codex Standard and monitoring results accumulated. The results of monitoring conducted after April 2012 indicate that the violation rates are extremely low, much less than 1%, for agricultural products including cereals, vegetables and fruits, meat and milk, fish and fishery products and edible fungi grown on media. Estimations of exposure (effective dose) to radioactive cesium in foods are decreasing constantly and now less than 1% of 1 mSv/year. Japan continues to make utmost efforts for prompt and accurate information sharing regarding this issue. Also, Japan intends to respond to this issue in close cooperation with the relevant international organizations.' Below the text is a 'detail' link. At the bottom of the page, there are three menu items: 'Basic Policies & Related Notifications', 'Press Releases', and 'Levels of Radioactive Contaminants in Foods Tested in Respective Prefectures' (dated Oct 14, 2016). A 'JAPANESE PAGE' button is also visible.