Japan. Endless Discovery.

For Safe Travel in Japan

List the below links for the latest information.

◆International Atomic Energy Agency, IAEA (English)

http://www.iaea.org/

http://www.iaea.org/newscenter/news/tsunamiupdate01.html (Updates on Fukushima)

◆United Nations Scientific Committee on the Effects of Atomic Radiation, UNSCEAR (English)

http://www.unscear.org/unscear/index.html

◆World Health Organization, WHO (English, French, Chinese)

http://www.who.int/en/

◆Ministry of Education, Culture, Sports, Science & Technology in Japan, MEXT

Monitoring information of environmental radioactivity level (English, Chinese, Korean)

http://radioactivity.mext.go.jp/en/

Smartphone-accessible radioactivity monitoring maps and airborne levels of radioactivity across Japan (Japanese)

http://radioactivity.mext.go.jp/maps/ja/

◆Ministry of Health, Labour and Welfare in Japan

Food safety levels, shipment levels, and related information (Japanese)

http://www.mhlw.go.jp/shinsai_jouhou/shokuhin.html (Food)

http://www.mhlw.go.jp/shinsai_jouhou/suidou.html (Tap water)

Japan Tourism Agency

Published in October 2012, First edition

To People Considering a Trip to Japan

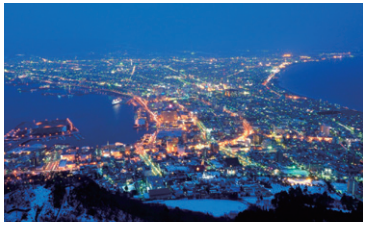
This leaflet was created under the supervision of a Working Group Investigating the Effects of Radioactivity on Sightseeing, to help ease the fears of people who want to visit Japan but are concerned about radiation issues.

This leaflet contains simple, easy-to-understand information that people should know when traveling to Japan, including explanations of radiation and radioactivity.

We hope this will help travelers understand the situation on the ground in Japan.

Hyogo (Himeji-jo Castle)

Kyoto (Ryoanji)



Hokkaido (Hakodate)

Tokyo (Asakusa)

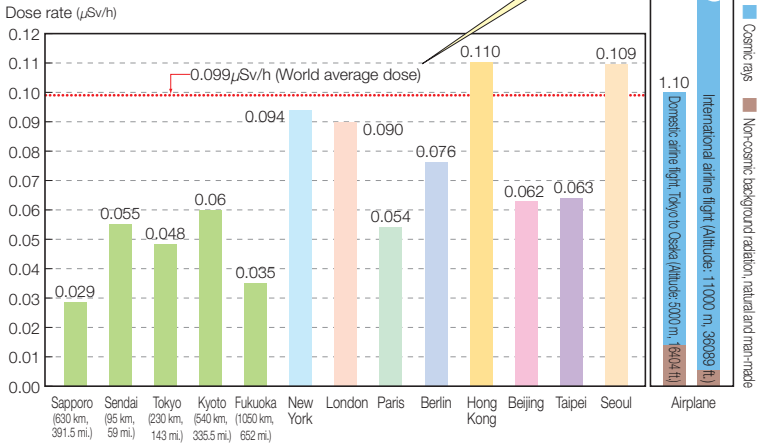
What are airborne radiation levels (rates)?

There is radiation in the air all around us as we go about our daily lives. It comes from cosmic rays and from other background radiation from the ground, stone buildings, concrete, and other sources. Airborne radiation levels (intensities) are a measure of the amounts of radiation in the air.

Airborne radiation levels in Japan have historically been low on average and remain relatively low compared to other major world cities even after the accident.

Fig. 1-2

■ Fig. 1-1: Airborne Radioactivity Levels in Major Cities around the World



*The distances in parentheses, ( ), are the distances from Fukushima Daiichi Nuclear Power Plant in km and mi.

*Source, Fig. 1-1: Created and compiled from public data from various world organizations, as of 9 July 2012.
Date of measurement for select cities: New York, 31 March 2011; Paris, 5 July 2012; Beijing, 8 July 2012
Fig. 1-2: Data from the Radiation Science Center Webpage

We Visited Popular Sightseeing Areas in Tokyo and Checked Airborne Radiation Levels in Different Locations

Measurement results: Airborne radioactivity levels

■ Date of measurements: 9 July 2012 (Monday) ■ Hours: 8 a.m. to 8 p.m.
■ Dosimeter used: RADCOUNTER DC-100 (made in Japan), Type of radiation: γ (gamma)

Two people visited popular sightseeing areas in Tokyo in a day and measured the airborne rates of radioactivity at each location. The food and drinks that they consumed for the three meals on that day were also tested to measure levels of radioactivity. (For details, see p. 6.)

8 a.m.

Tsukiji
(Street fish market)

Check out all the seafood!

Sushi for breakfast in Tsukiji

For food testing, go to P6

Airborne radiation level: 0.05 μSv/h

Subway (Tokyo Metro)

Asakusa
(Senso-ji Temple, Nakamise)

This area is always so lively with all the stores lined up selling souvenirs

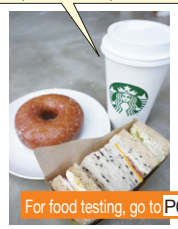
Cool and refreshing wind chime

Airborne radiation level: 0.08 μSv/h

Subway (Tokyo Metro)

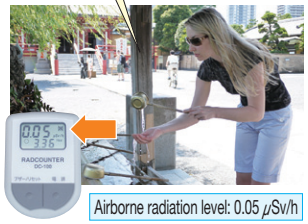
Ueno
(Ueno Park)

Starbucks for lunch



Café latte, sandwich, and doughnut

For food testing, go to P6

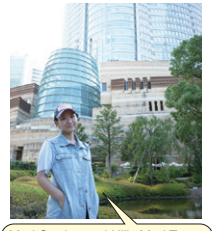


Bentendo Hall in Shinobazu Pond

Airborne radiation level: 0.05 μSv/h

Subway (Tokyo Metro)

Roppongi
(Roppongi Hills)

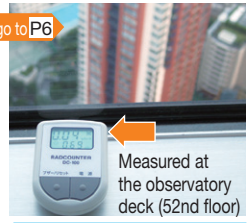


Mori Garden and Hills Mori Tower

Enjoying shopping

For food testing, go to P6

"Tonkatsu" pork cutlet for dinner



Measured at the observatory deck (52nd floor)

Airborne radiation level: 0.04 μSv/h

8 p.m.

How much radiation would a person be exposed while sightseeing in Tokyo (in a day)?

They took measurements at places along a sightseeing course in Tokyo from Tsukiji to Asakusa then Ueno and finishing in Roppongi, from 8 a.m. to 8 p.m. The total amount of radiation over the entire trip was 0.75 μSv, working out to an average dose of 0.06 μSv/h, which is lower than the worldwide average of 0.099 Sv/h (Fig. 1-1, p. 2). Radioactive particles of a dose on the order of 0.06 μSv/h would be metabolized by the internal organs of the human body and excreted out as waste products. They would thus have no chance to build up within the body and cause lasting harmful effects, even in exposure conditions at the same dose rates lasting over several years. Measurements taken of the three meals registered no radioactive particles (amounts were below the test limits of 3 Bq/kg). (See p. 6 for details on food tests.)

Reading at 8 p.m.

Total amount from 8 a.m. to 8 p.m.

The two people who assisted in taking measurements

SVETLANA KORNYUKH
(From Russia, has been in Japan 7 years)

I was in Japan when the earthquake and tsunami occurred. In the aftermath of the disaster, there was little accurate information available. And many of my friends left Japan. After a few months, however, they returned to Japan because they could see there was little effect from the nuclear power plant disaster. It was kind of strange to take measurements while sightseeing, but it made me feel relieved to see firsthand just how low the amounts were.

Lu Ruoyi
(From China, has been in Japan 1 year)

I came to Japan sometime after the earthquake struck. Before coming to Japan, I was really worried that it wasn't safe. After actually arriving, however, I saw that there was no need for any concern. I haven't thought at all about the possibility of radiation in the food I eat lately, either, but it was still a relief to see for myself how low the levels are.

Exposure to radiation in our daily lives

Most people probably have little experience with radiation. However, it should be known that we are exposed to radiation all the time in our daily lives. The solar and other cosmic rays that strike the earth are a form of radiation. There are also low levels of naturally occurring radioactivity in some of the essential nutrients found in food products. What this means is that we are absorbing radioactive particles all the time in the course of our daily lives.

Units used to measure radiation exposure doses

◆ Sv (sievert)…Unit used to express the degree of effect of radiation on the human body

Radioactive substance …Radioactive substance that emits radioactive particles

Radioactivity … Ability to emit radiation Radiation

◆ Bq (becquerel)…Unit used to express the activity of a radioactive material

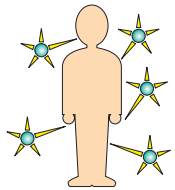
What levels are considered unsafe?

A one-time absorbed dose of 1 sievert (1 Sv) of radiation is enough to cause acute effects such as nausea and other symptoms. The microsievert, μSv, which is the unit of measure of the airborne rates listed in this pamphlet, is one millionth of a sievert.
It is thought to be difficult to demonstrate an increase in the risk for cancer due to radiation in internal exposure levels falling below 0.1 Sv. The reason for this is because the risk for cancer due to other causes is great, making the risk from internal radiation only too small to measure accurately.

External and internal exposure to radiation

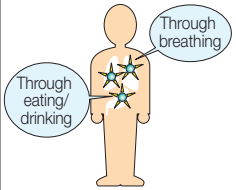
We conducted tests in order to evaluate the potential for effects from exposure to radiation using measurements of airborne radiation levels to check for external exposure (p. 3~p. 4) and tests on food to check for internal exposure (p. 6).

External exposure Unit: Sv



External exposure to radioactive particles

Internal exposure Unit: Bq



Internal exposure to radioactive particles taken into the body

In Japan, only those Products that have Passed Strict Testing Standards are Shipped into the Marketplace

Restrictions on acceptable levels of radioactive substance in specific food products

The restrictions on the amount of radioactive cesium allowed (listed in Note 1 on p. 6) that have been employed in Japan since April 2012 are extremely strict compared to other countries.

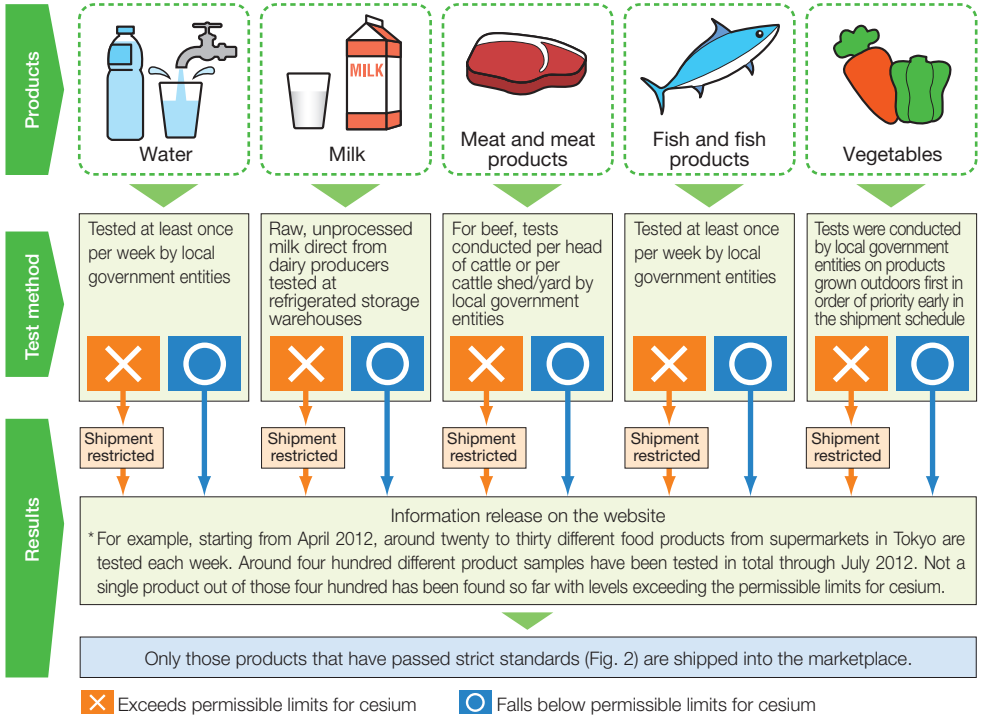
■ **Radiation level limits for major products as defined by select countries** (Fig. 2) (Bq/kg)

Product	Japan	U.S.A	EU	China	South Korea
Water	10	1200	200	–	370
Milk	50		200	330	370
Meat and meat products	100		500	800	370
Fish and fish products	100		500	800	370
Vegetables	100		500	210	370
Baby food	50		–	–	–

Data: Public data released by various governments throughout the world (current as of July 2012)
*Note that the EU uses the same limits for imported products from Japan as Japan uses.

Food product and water testing system

Products are tested with a high-precision detector such as a germanium detector in photo ❷ on p. 6 and shipped into the marketplace only when the results fall below permissible limits for cesium.



Measurement results: Food radioactivity levels

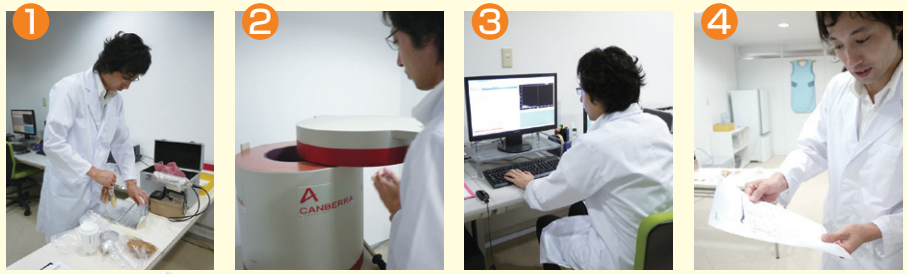
■ Dates for measurements:
9 July 2012 (Monday) to 10 July 2012 (Tuesday)
■ Detector used:
Germanium detector Canberra GC2020 (made in France)

The foods and beverages consumed by the two participants in the one-day model sightseeing course in Tokyo were tested to check radioactivity levels present. It is worth noting that food and drink ingredients produced in Japan are deemed safe by Starbucks Coffee Japan, for use.

■ Food tested:
Sushi (fish, rice), Sandwich (bread, cheese, and vegetables), Café latte (milk, water, and coffee), Tonkatsu set meal (pork, rice)

■ Target substances:
Three main nuclei (Note 1)
Iodine-131 (I-137), cesium-134 (Ce-134), and cesium-137 (Ce-137)

■ Lower test limit:
3 Bq/kg (lower detectable limit)



❶The same food and drink products consumed during the sightseeing trip were taken to the testing facility. (For details, see p. 3.)
❷They are tested for radioactivity using the germanium detector.
❸The stepwise analysis data is sent to the computer for analysis.
❹Tests were conducted down to 3 Bq, which is a stricter standard than the strictest limit level of 10 Bq for food and beverages.
❺The analysis results are printed out.

(Note 1)
Due to the incident at Fukushima Daiichi Nuclear Power Plant, radioactive isotopes such as I-131, Ce-134, and Ce-137 were released into the air. The main isotopes remaining that could have affects on people in the area are Ce-134 and Ce-137. Cesium is thus being used as the standard upon which acceptable levels of radioactivity are set for tests on food products.

Measurement results

	Product name	Test result	Lower test limit
Breakfast	Sushi (Fish, rice)	None detected	3Bq/kg
Lunch	Sandwich (Bread, cheese, and vegetables)	None detected	
	Doughnut		
	Café latte (Milk, water, and coffee)	None detected	
Supper	Tonkatsu set meal (Pork, rice)	None detected	

Come to Japan Anytime of the Year!

Spring — Relax and enjoy cherry blossoms

Spring in Japan coincides with the blossoming of the cherry blossoms. There have been no reports of high levels of radioactivity being detected in any cherry blossom petals themselves.
The data for radiation levels released by the Forest Agency in Japan in December 2011 would yield an exposure rate of about 0.000192 μSv/h, supposing that a person inhaled the pollen with the greatest amounts of cesium under conditions of record-high levels of pollen in the air. Thus the amount of radioactive particles inhaled or ingested together with pollen is minimal.
Many visitors to Japan may wonder why so many people wear masks in early spring. People wear masks to protect themselves against pollen.

Autumn — Feel the changing colors of autumn leaves

There are two potential sources for radioactive contamination in fallen leaves, radioactive particles adhering to the surface of the leaves themselves or being absorbed through the tree roots and then passed into the leaves. Even small amounts of radiation on a single leaf can be compounded when leaves are all piled together. However, the amounts of radioactive particles on or in the fallen leaves reflect in the airborne radiation levels. If the airborne radiation levels are low, the levels on or in fallen leaves should also be low, negating the need for concern. There have been no reports of ill effects on the health in any of the sightseeing spots throughout Japan due to radiation so far, meaning that people can walk on fallen leaves or touch them directly without suffering any problems due to radiation exposure.

Summer — Cool off while enjoying swimming and marine sports

Japan has proscribed indicator levels for water quality with regard to radioactive materials for sea bathing (cesium: 50 Bq/ℓ). The 50 Bq/ℓ limit is, as shown in Fig. 2 on the previous page, the same as the restricted value for milk in Japan. This permissible limits for cesium takes into account the possibility for exposure from accidentally swallowing seawater while swimming in the sea. It can be seen that this is rather a strict standard even compared to acceptable radioactivity levels for drinking water in other countries.
According to data for beaches and areas in Ibaraki (compiled in June 2012), one of the prefectures that neighbors Fukushima, no radioactive substances were detected in the water at any of the sea bathing beach areas in Ibaraki. Airborne radiation levels in beach areas have been measured to be about the same as or lower than levels in major cities.

Winter — Hit the slopes and enjoy skiing and snowboarding

If there were to be radioactive particles present in rain or snow, the airborne rate of radioactivity would go up because of the contaminated rain or snow. However, at present, no such data indicating an increase in the rate has been obtained. As there are no radioactive particles, there would be no ill effects even if the rain or snow should make direct contact with skin. For example, by slipping and falling on the ski slopes, becoming inundated with snow, or touching snow with your bare hands to make snowballs. The current airborne levels of radioactivity detected at ski resorts in the cities of Sapporo (Hokkaido) and Nagano (Nagano), popular skiing locales that hosted the past two Winter Olympics held in Japan, are 0.029 μSv/h and 0.039 μSv/h, respectively, at present, which are within normal levels. (As of 9 July 2012)

*The world average is 0.099 μSv. (p. 2)

Q&A about Radiation and Radioactivity

Q1 Would there be any possible effects from travel by airplane or train?

A No. Check out the graph (Fig. 1-2) on p. 2. People are exposed to radiation whenever they travel by airplane. The great majority of this radiation comes from cosmic rays from outside of earth's atmosphere with very little from the ground, buildings, or the nuclear power plant accident. People can also be exposed to airborne radiation along the path of travel when moving from place to place by car, bus, or other mode of transportation. The levels of airborne radiation in Japan currently are low enough not to cause any ill effects on health for people traveling throughtout Japan for sightseeing.

Q2 Are there any radioactive particles present in falling rain?

A No. Considering that most of the radioactive particles released into the air after the accident have already been deposited on the ground and on other surfaces, there is no need for concern about radioactivity in rain. Even if a person should get wet from rain containing radioactive particles, no radioactive particles that can be absorbed through the skin (such as tritium) have been detected from this accident, and there is thus no chance for contamination from rain to cause effects on the human body.

Q3 Are there any radioactive particles adhering to products sold at souvenir and other shops in Japan?

A No. Voluntary testing is being conducted on not only food products but also on other products such as containers and industrial products in regions where there may be radioactive particles present in the environment. There has been no radioactivity detected in any food products or traditional crafts from these regions and also none in the wrapping paper or boxes used in packaging for souvenirs and other purchases.

Q4 Is it considered safe to enjoy hot springs in Japan now?

A Yes. Local government agencies and tourist boards have been publishing the results of independent measurements of radioactivity levels in sightseeing locations with hot springs. No problem levels have been detected thus far.
There are hot springs in Japan that contain natural radium and other substances that have no connection to the accident. Most hot springs have been used to promote good health since long ago as they each contain a variety of substances that are thought to be good for the body. Radioactive hot springs are just one of these types of hot spring that are popular in Japan.

Q5 Are there any differences in the effect on the human body of radiation from natural sources compared to that from particles emitted from the nuclear power plant accident?

A No. There is no difference in the effects on the body from radiation, whether from naturally occurring sources or from sources from isotopes created within a nuclear power plant (manmade sources of radiation).

Q6 Have there been any adverse effects on health resulting from the nuclear power plant accident reported so far?

A No. Tests on radioactivity levels in areas around the nuclear power plant and possible adverse effects on the body are being conducted on a continual basis. Thus far, no effects attributable to radiation from the accident have been noted. Dr. Wolfgang Weiss, chair of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), stated at a press conference on January 31, 2012, in regards to the current testing that "Up to now there were no acute immediate effects seen" due to the accident at the nuclear power plant in Japan.
http://www.reuters.com/article/2012/01/31/us-japan-fukushima-health-idUSTRE80U1AS20120131 (from Reuters)

Q7 Will radioactivity from radioactive particles ingested, inhaled, or absorbed into the body continue to build up over time?

A No. Any cesium, the radioactive substance upon which standards for radiation limits are set, that is absorbed into the body is metabolized and excreted as waste products. There is thus no chance for any radioactive substances to build up in the body over time.

Q8 Are the effects from radiation greater on children than on adults?

A No. Children up to the age of fifteen are said to be two or three times more sensitive to the effects of radiation than adults. However, there is no need for concern regarding the health of children as there are currently no sightseeing places in Japan where anyone would possibly be exposed to the levels of airborne radioactivity that would have adverse effects on human health or touch foods that exceed permissible limits for cesium. It is therefore deemed safe for adults and children alike to be in Japan and consume food and drink products without worry about the buildup of radiation within the body. In addition, as described in Q7, as radioactive substances absorbed do not continue to build up over time, there is no need for concern over effects on the body from long-term internal exposure to radiation.

As a researcher specializing in nuclear power and as a mother of two small children

I sometimes have the opportunity to speak to people who are concerned about the effects of radiation on the human body and environment from the viewpoint of a mother with children. By meeting directly with people and talking to them about radiation, I am often able to help ease their worries about radioactivity and its potential effects. It is my hope that this pamphlet will have a similar effect in calming the fears of concerned residents and travelers in Japan.
Japan is a country blessed with rich, abundant natural beauty and a wide variety of facets from the traditional to the modern. I would like to extend a warm welcome to anyone interested in visiting our country.

Kyoko Oba, Associate Professor, Global Nuclear Human Resource Development for Safety, Security and Safeguard, Tokyo Institute of Technology

■ Edited/Supervised by Working Group Investigating the Effects of Radioactivity on Sightseeing

Takeshi Iimoto
Associate Professor, Division for Environment, Health and Safety, The University of Tokyo

Kyoko Oba
Associate Professor, Global Nuclear Human Resource Development for Safety, Security and Safeguard, Tokyo Institute of Technology

Yoshiya Shimada
Program Leader, Research Program Investigating the Effects of Radiation Exposure during the Developmental Period in Children, National Institute of Radiological Sciences (NIRS)

Hiromi Nakamura
Managing Director, Japan Travel Writer's Organization; science journalist; and aviation critic

■ Published by Japan Tourism Agency