Japan's Challenges

Concerning the Domestic and International Implications of TEPCO Fukushima Dai-ichi Nuclear Power Station

17th May ,2011

National Institute of Radiological Sciences
Executive Director
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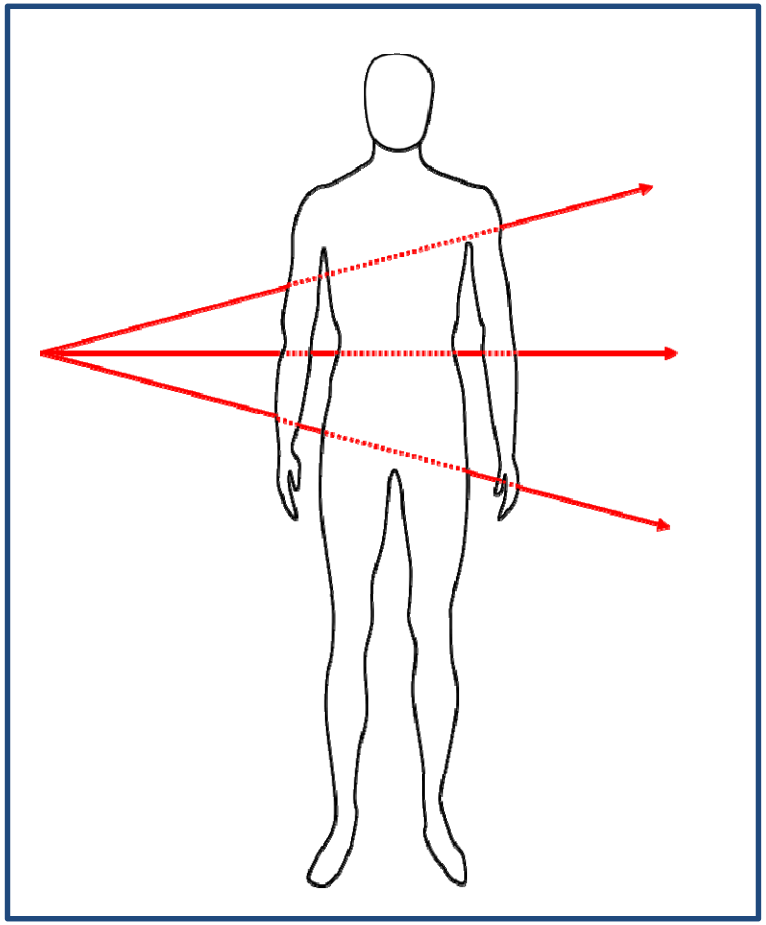
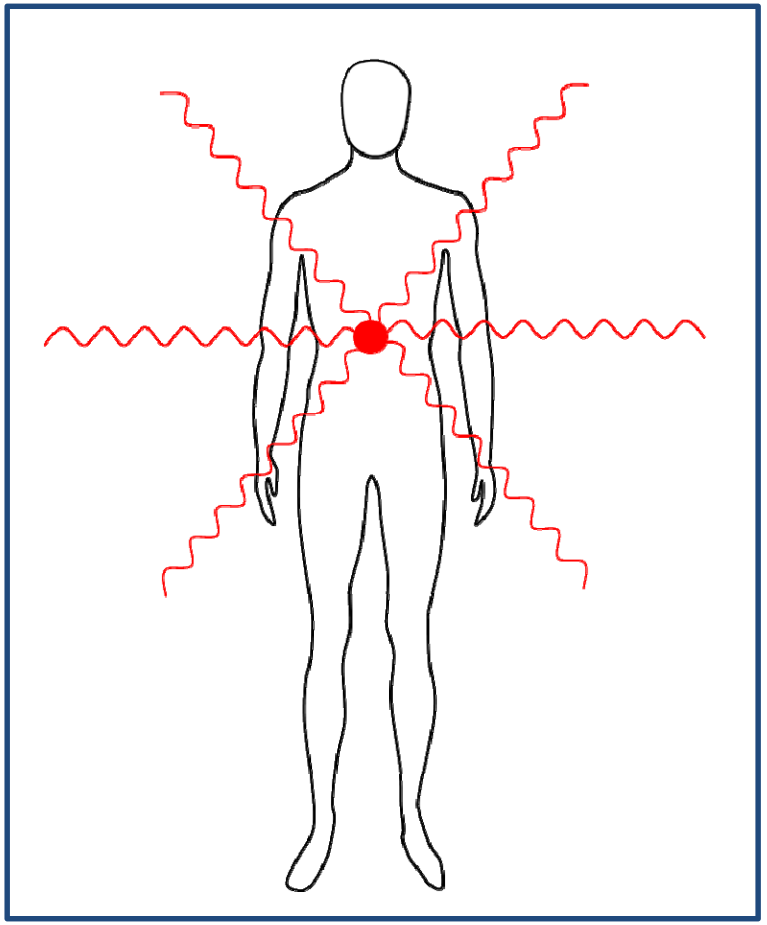
Types of Radiation Exposure

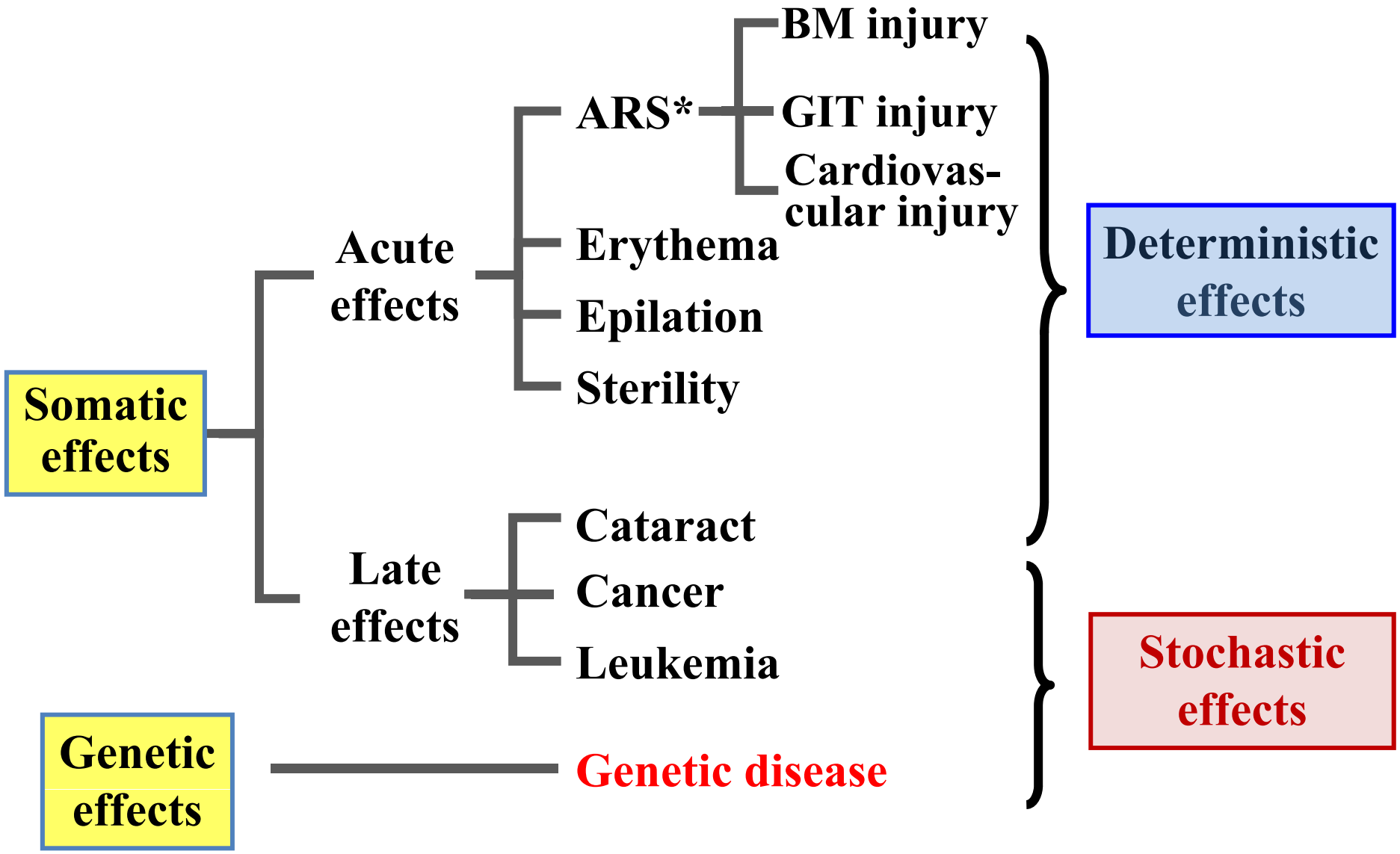


External Irradiation



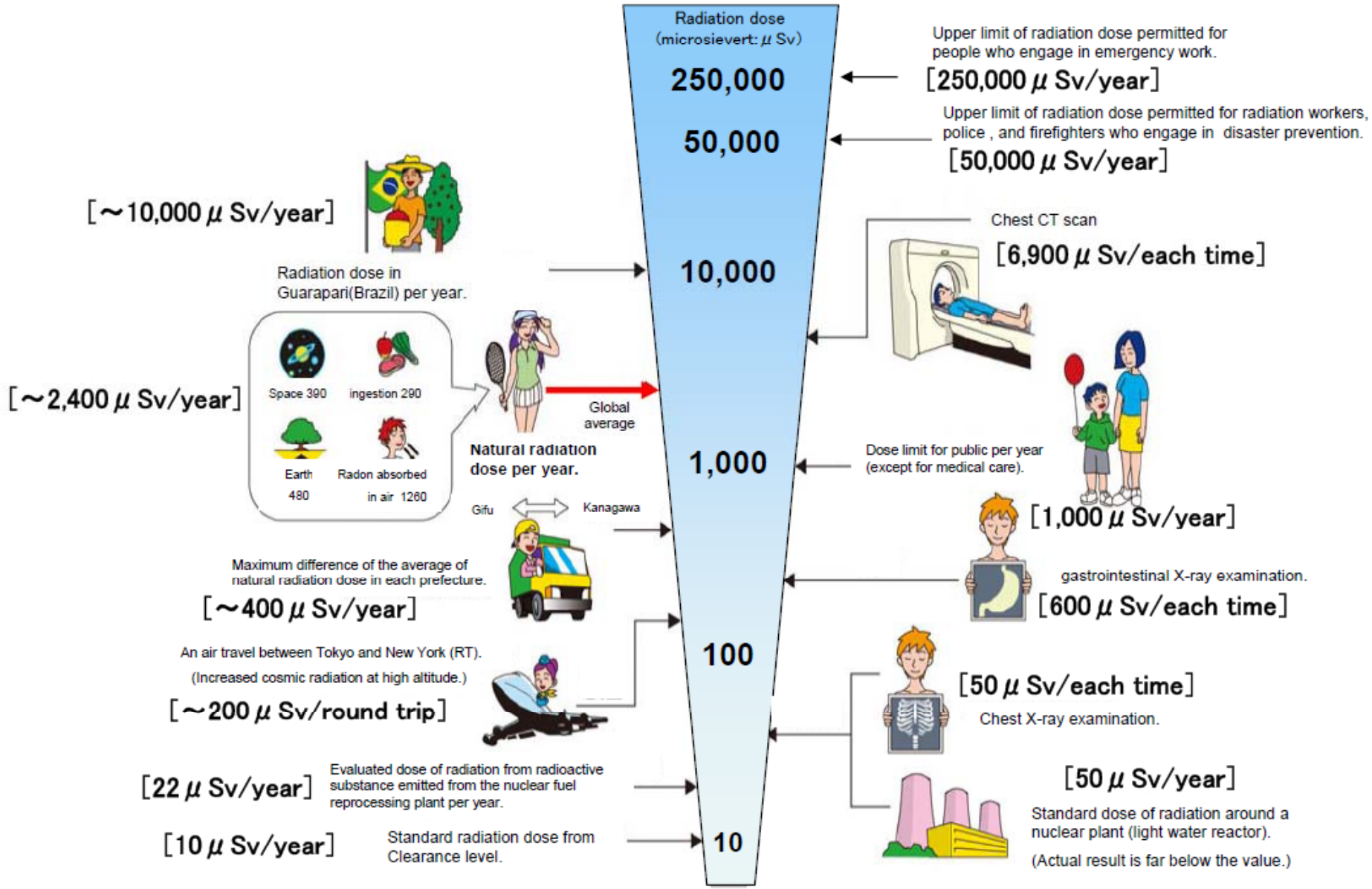
Internal Irradiation

Human Effects of Radiation



* acute radiation syndrome

Radiation in Daily-life



※ Sv【Sievert】=Constant of organism effect by kind of radiation(※) × Gy【gray】

※ It is 1 in case of X ray and γ ray.

MEXT makes this, based on "Nuclear power 2002" made by Agency of Natural Resources and Energy.

Nuclear Power Stations
Nuclear Reactors near Epicenter of the Earthquake

Fukushima Dai-ichi NPP

Fukushima Dai-ni NPP

- **Occurred 14:46 March 11, 2011**
- **Magnitude:9.0 Mw**
- **Epicenter location: 38° 6”N and 142° 51”E, and 24km in depth**
- **It is said that the height of tsunami which attacked Fukushima NPP was higher than 14 m（Max. 39 m at Taro town）**

Damage Caused by Earthquake and Tsunami

KYODO NEWS

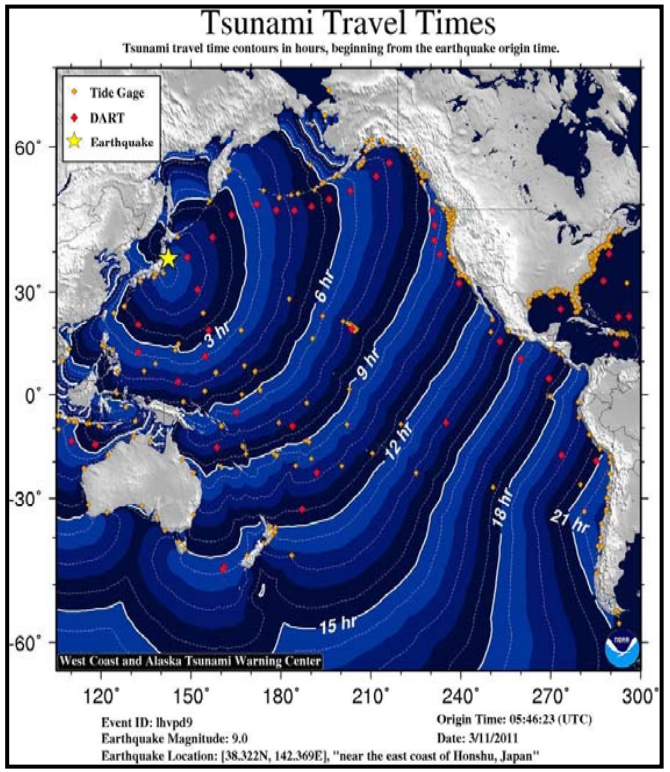
KYODO NEWS

Casualties : over 24,524

- Dead : 15, 037
- Missing : 9,487

Evacuees : 116,591

(As of May 14h, National Police Agency)



NOAA/US Dept of Commerce, http://wcatwc.arh.noaa.gov/

Japan Faces an Unprecedented Challenge
(Enormous Earthquake, Tsunamis and Nuclear Accident)

Earthquakes:
- **M - 9.0 quake (March 11)**
- **M - 7 class 5 times**
- **M - 6 class 71 times**
- **M - 5 class 380 times**

(As of May 16th)

Great Support of the International Community

Japan deeply appreciates for the assistance offered from 156 countries and regions and 41 international organizations

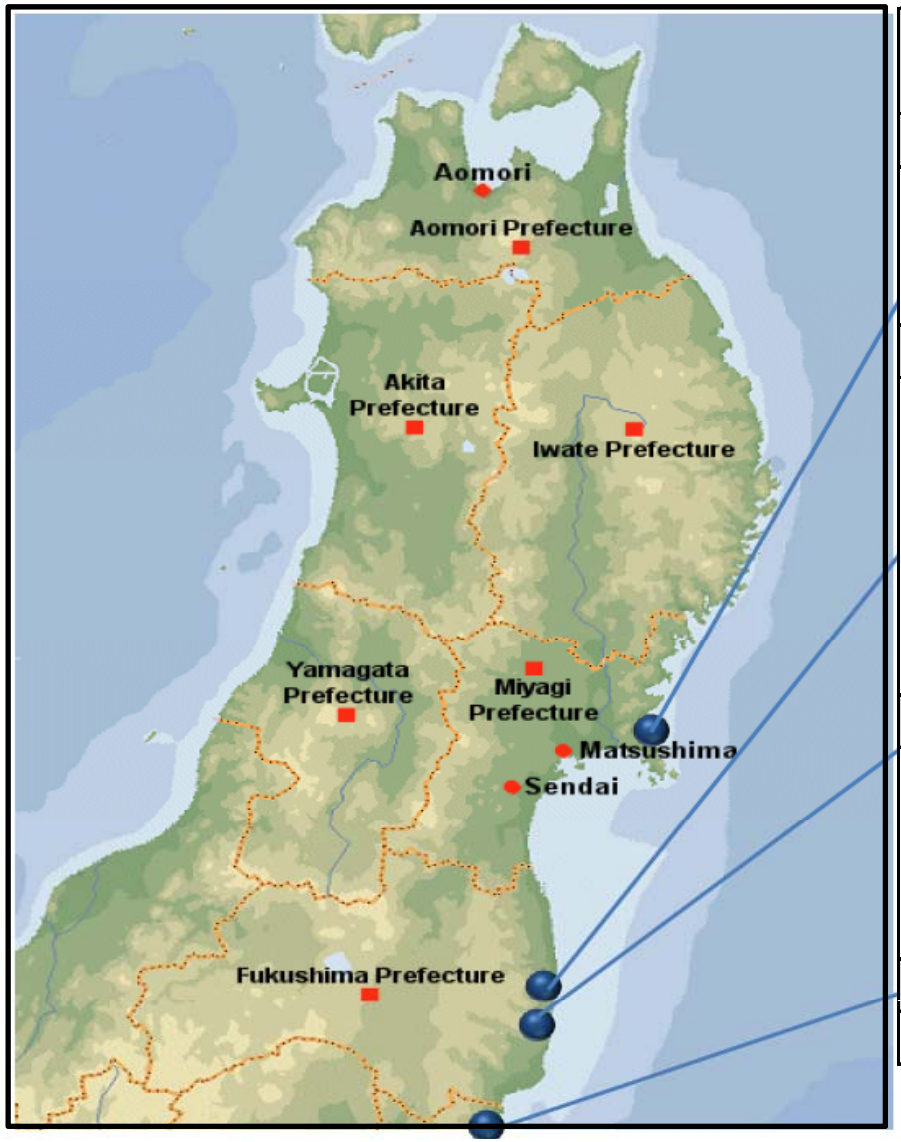
Rescue teams were sent from 28 countries, regions and international organizations

US Navy/US Pacific Command
(Operation Tomodachi)

(As of May 9th)

Nuclear Power Stations
Nuclear Reactors near Epicenter of the Earthquake

4 Nuclear Power Stations with 14 Units



		automatic shut down	cold shut down
Onagawa			
Unit 1	524 MW, 1984-	✓	✓
Unit 2	825 MW, 1995-	✓	✓
Unit 3	825 MW, 2002-	✓	✓
Fukushima Dai-ichi			
Unit 1	460 MW, 1971-	✓	
Unit 2	784 MW, 1974-	✓	
Unit 3	784 MW, 1976-	✓	
Unit 4	784 MW, 1978-	Periodical inspection	
Unit 5	784 MW, 1978-		✓
Unit 6	1,100 MW, 1979-		✓
Fukushima Dai-ni			
Unit 1	1,100 MW, 1982-	✓	✓
Unit 2	1,100 MW, 1984-	✓	✓
Unit 3	1,100 MW, 1985-	✓	✓
Unit 4	1,100 MW, 1987-	✓	✓
Tokai Dai-ni			
Unit 1	1,100 MW, 1978-	✓	✓

Radiation Accident Causes

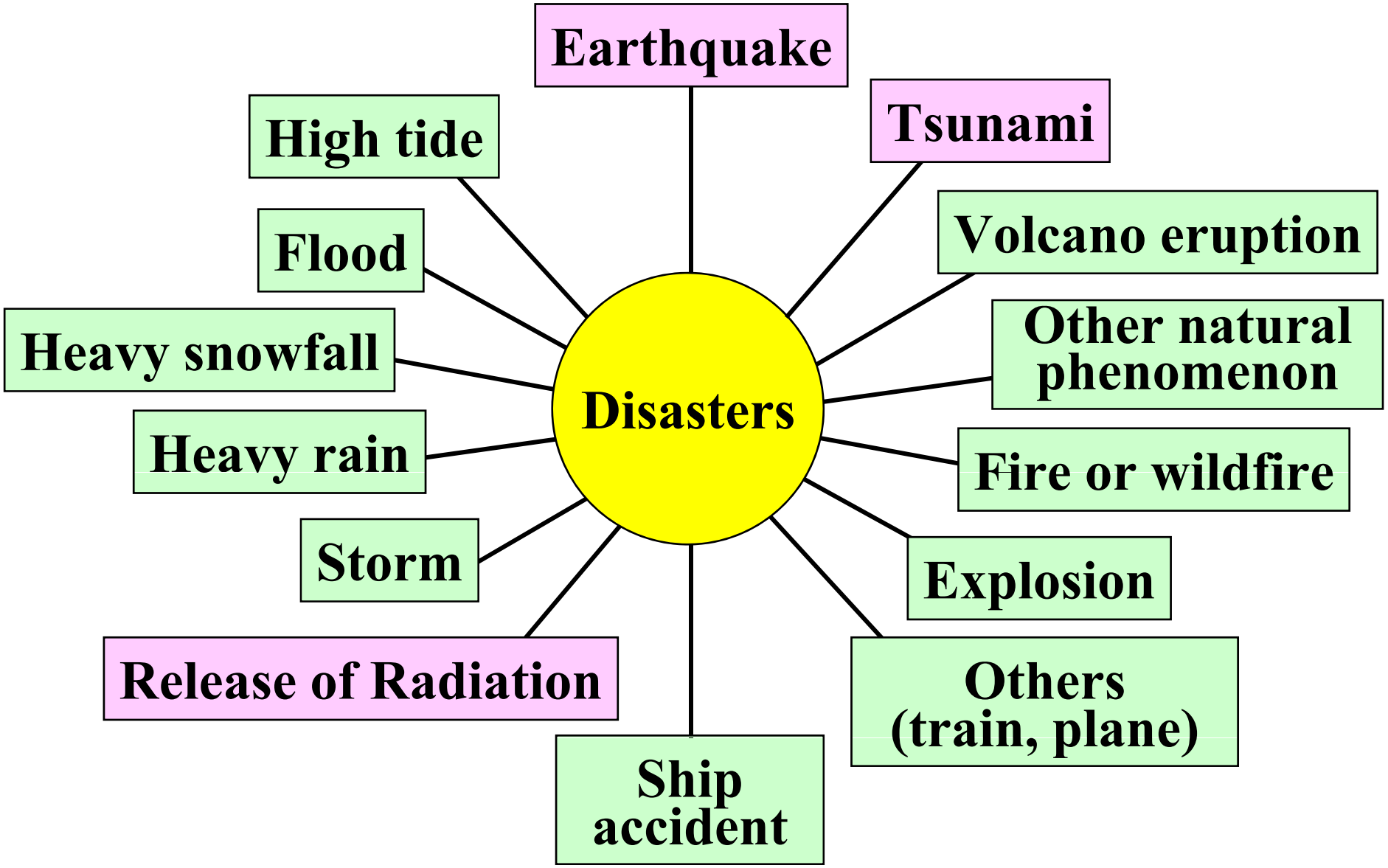
- **Biological effects**

  acute or chronic

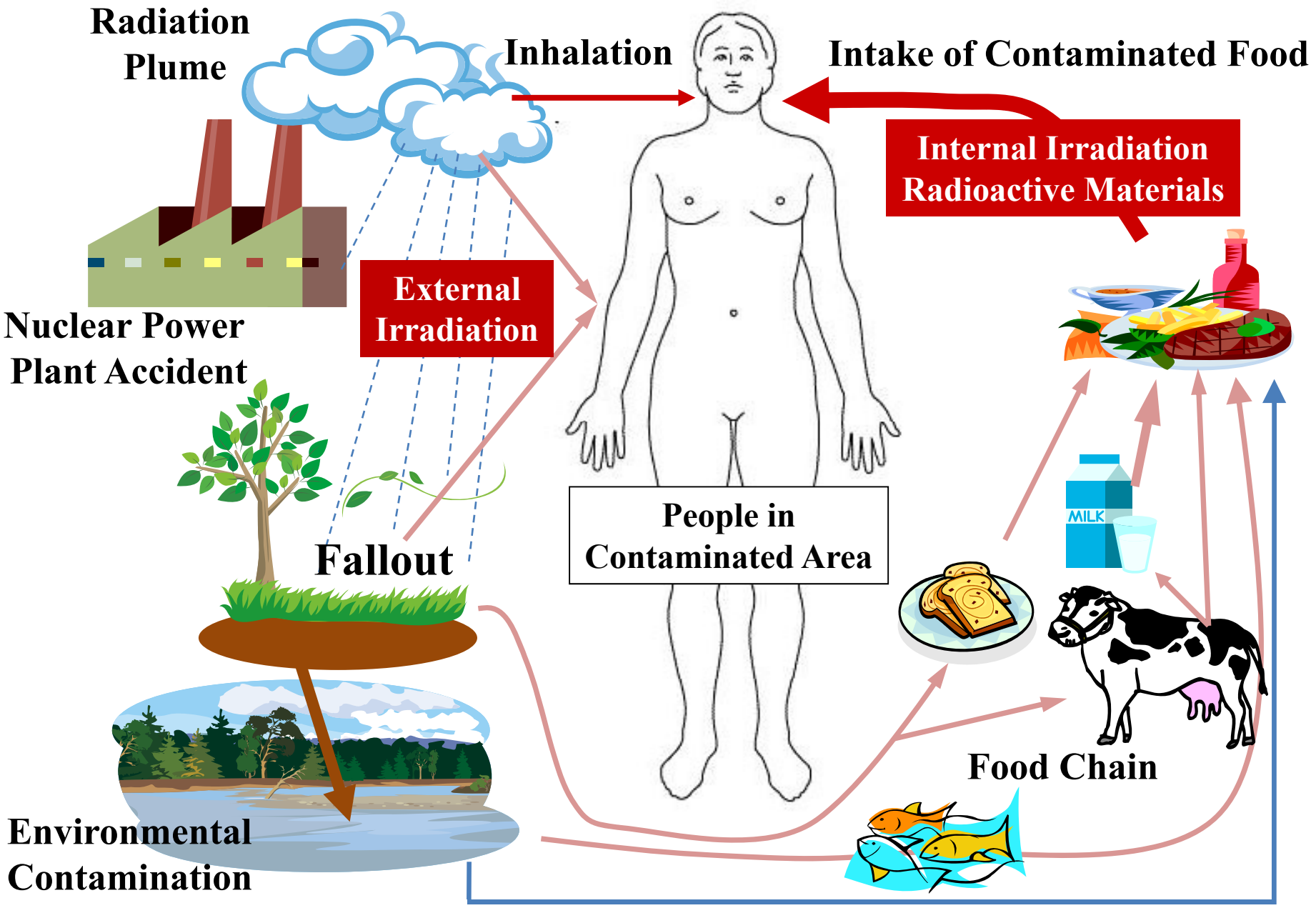
- **Environmental effects**
- **Psychological effects**
- **Social problems**

  economical

Combined Disaster



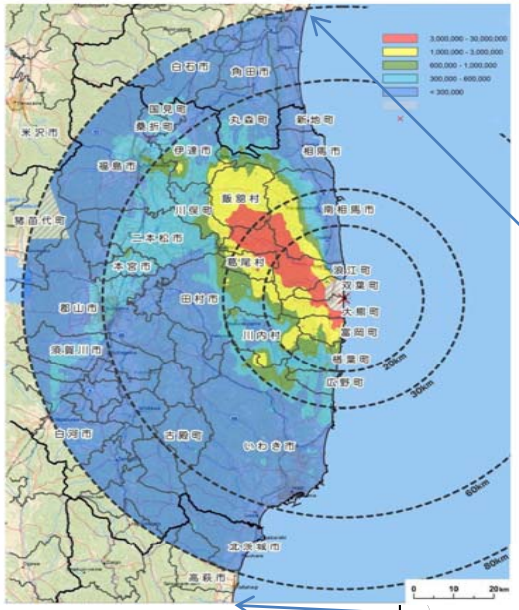
Biological Reaction & Cancer Risk After Nuclear Disaster

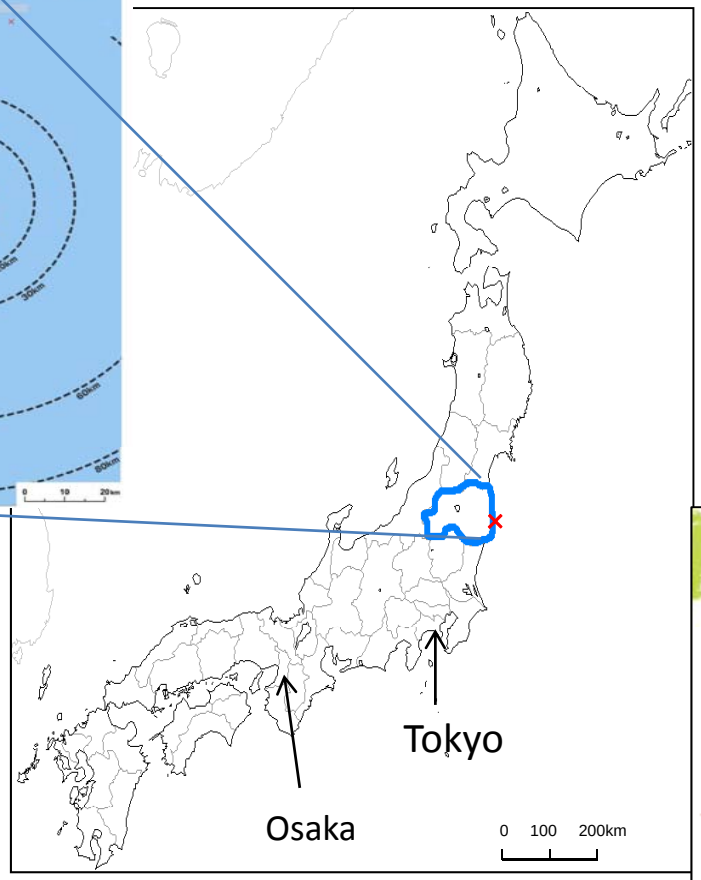


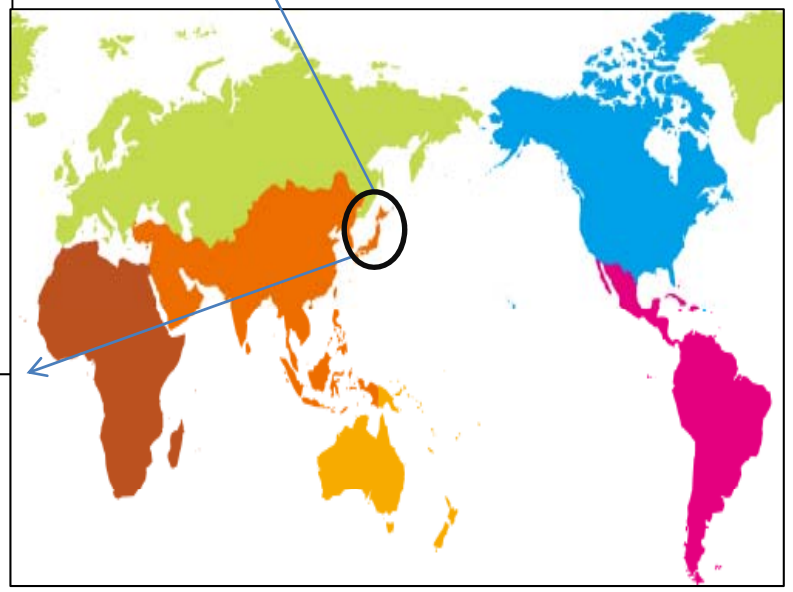
Current Situation on Resident Evacuation

March 12	
5:44	**Residents within 10km radius from Unit1 of Fukushima Dai-ichi NPS evacuated by the Prime Minister Directive**
18:25	**Prime Minister directed evacuation of the residents within the 20km radius from Fukushima Dai-ichi NPS**
March 15	
	The Local Emergency Response Headquarter issued "the direction to administer the stable iodine (KI) during evacuation from the evacuation area (20km radius)" to the prefecture Governor and the heads of cities, towns and villages.
	Regarding the evacuation as far as 20km from Fukushima Dai-ichi NPS and 10km from Fukushima Dai-ichi NPS, necessary measures have already been taken. • **The stay indoors in the area from 20km to 30km from Fukushima Dai-ichi NPS was made for the residents concerned.** • **Cooperating with Fukushima Prefecture, livelihood support to the residents in the sheltering area were implemented.**
March 25	
	Chief Cabinet Secretary, Edano recommended voluntary evacuations for the residents within the area from 20km to 30km from Fukushima Dai-ichi NPS in a press conference.

Contamination Levels with ^{134}Cs / ^{137}Cs





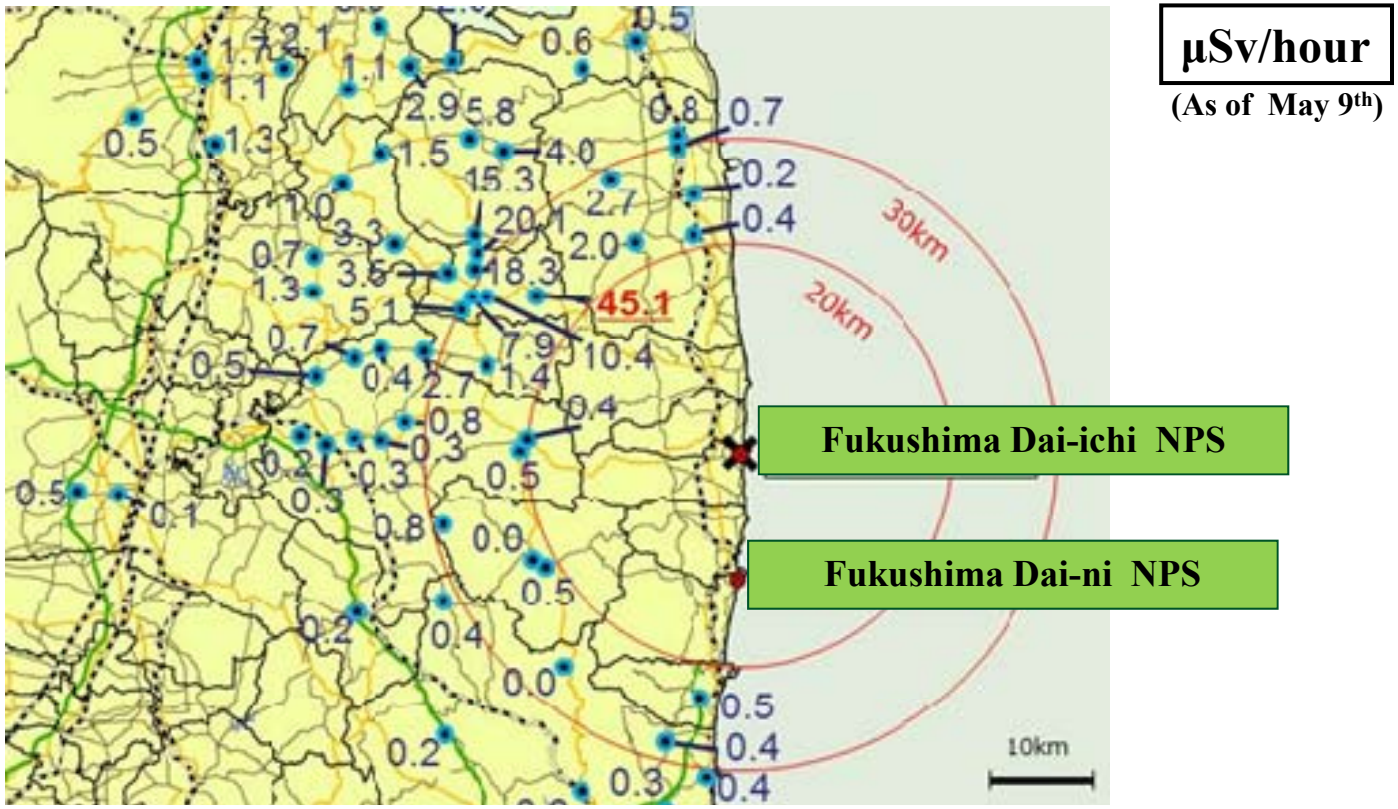


^{134}Cs / ^{137}Cs (Bq/m^2)
(April 29, 2011)

- 3,000,000-30,000,000
- 1,000,000-30,000,000
- 600,000-1,000,000
- 300,000-600,000
- <300,000
- Not determined

Fukushima Dai-ichi (I) locates approximately
- **230 km from Tokyo**
- **580 km from Osaka**
- **600 km from Sapporo**

Dose-Rates at the Site of Fukushima Dai-ichi NPPs

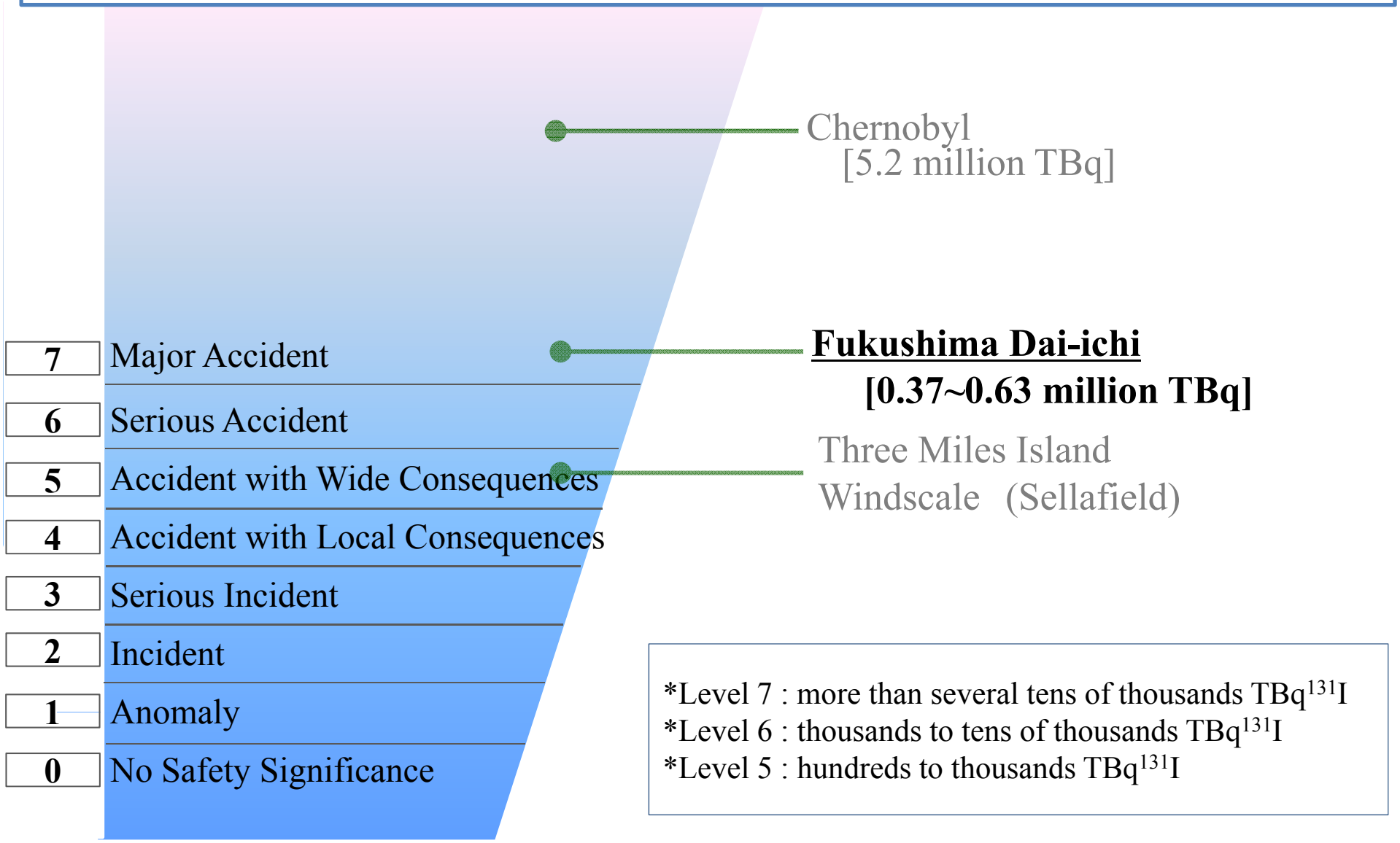


20 km radius of the plant and other designated areas
→ no-entry zone, planned evacuation zone

Some areas between 20 and 30 km radius of the plant (as a general rule)
→ emergency evacuation preparation area

INES Rating on the Events at Fukushima Dai-ichi NPS

The Rating of the International Nuclear and Radiological Event Scale (INES) on Fukushima Dai-ichi Nuclear Power Station (NPS), in temporary assessed as Level 7.



*Level 7 : more than several tens of thousands TBq^{131}I
*Level 6 : thousands to tens of thousands TBq^{131}I
*Level 5 : hundreds to thousands TBq^{131}I

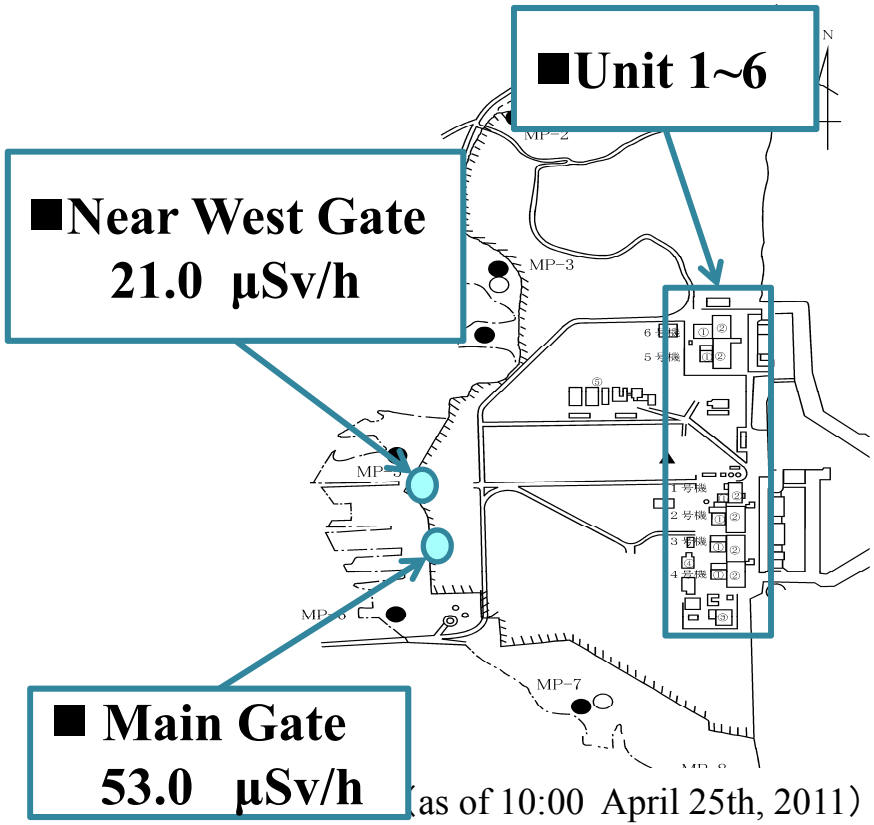
Radiation Survey for the Public

- Screening was started at the local headquarters on March 12.
- 162 people were checked as of March 15. The initial screening level was 6,000cpm; levels of 110 people registered were below the levels and those of 41 were above it. Five of those received decontamination measures and were transferred to hospital.
- Fukushima prefecture conducted radiation monitoring for the public at 4 locations. 30 people showed contamination with over than 13,000cpm. After decontamination, they showed much lower values; therefore they returned to evacuation areas without medical examination.
- 187,179 people were monitored for contamination with radioactive materials（as of 14 May）.

Radiation Monitoring

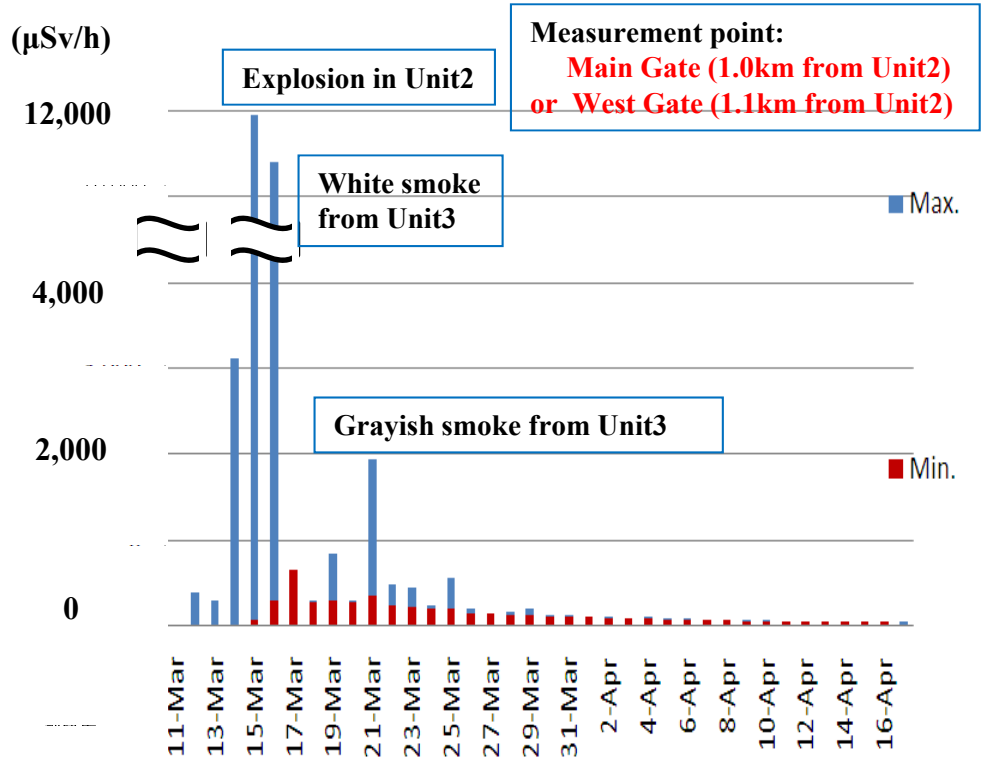
TEPCO monitors radiation levels every 10 minutes and releases the results soon y. Radiation levels increased on March 15th and then started to decrease. Levels now remain lower.

Monitoring posts and the readings at the Fukushima Dai-ichi NPS



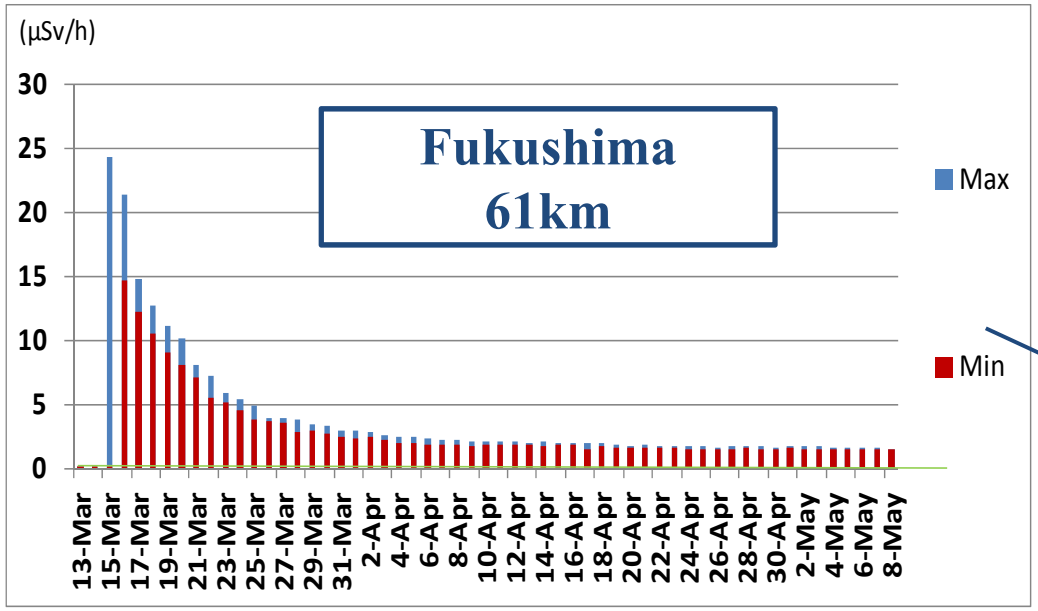
（as of 10:00 April 25th, 2011）

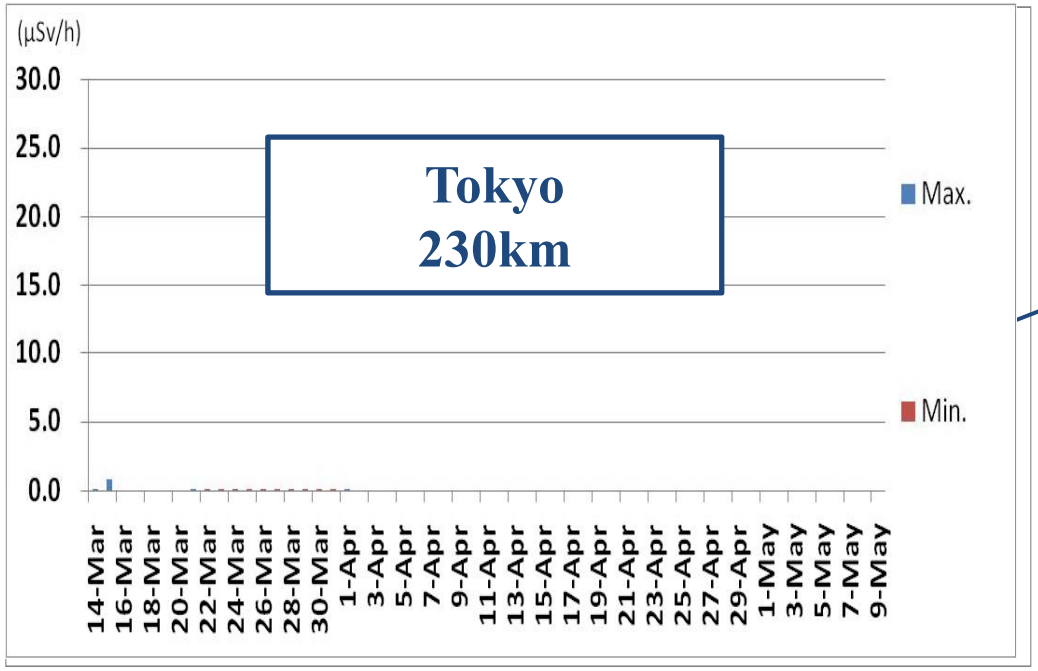
Environmental radiation levels at the Fukushima Dai-ichi NPS



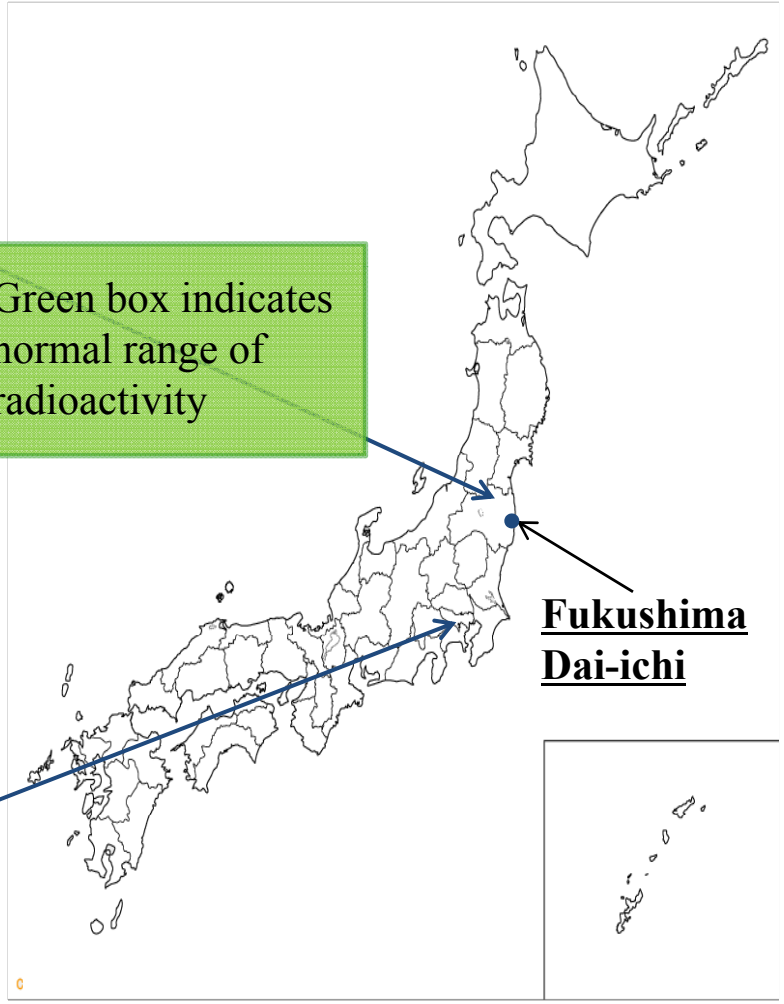
TEPCO

Atmospheric Readings



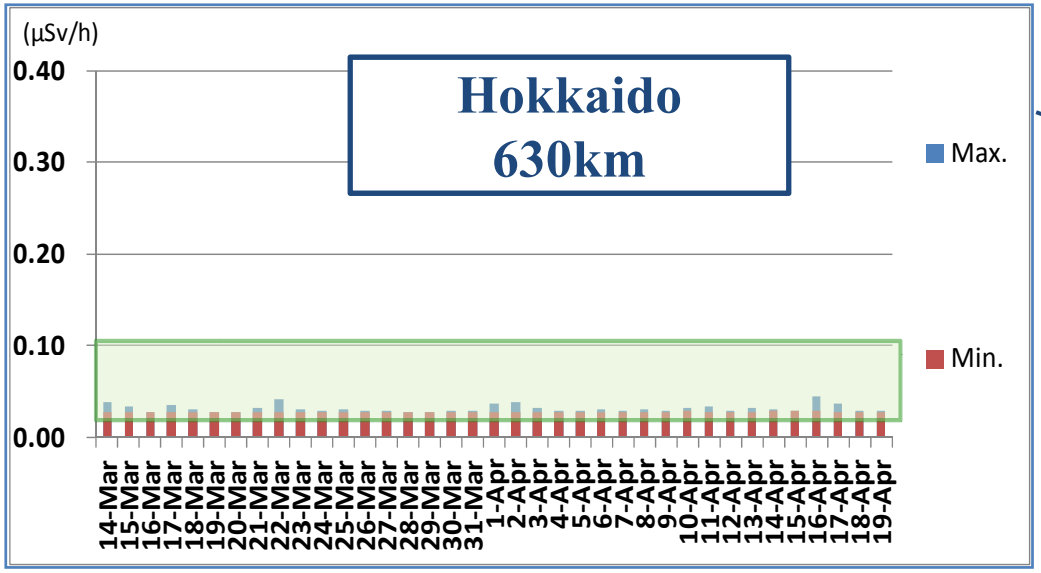


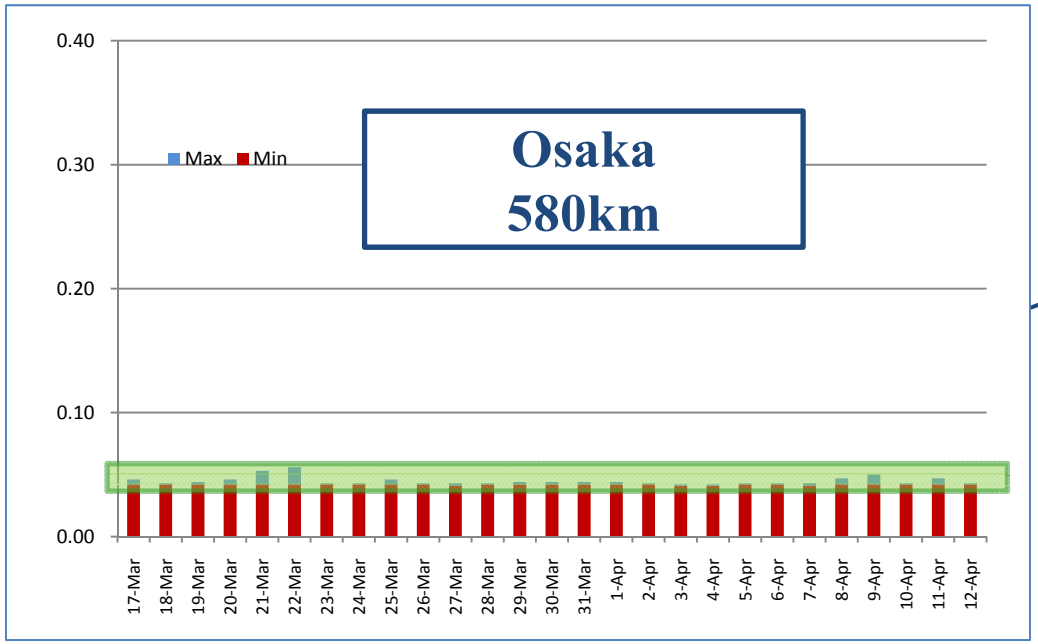
Green box indicates normal range of radioactivity

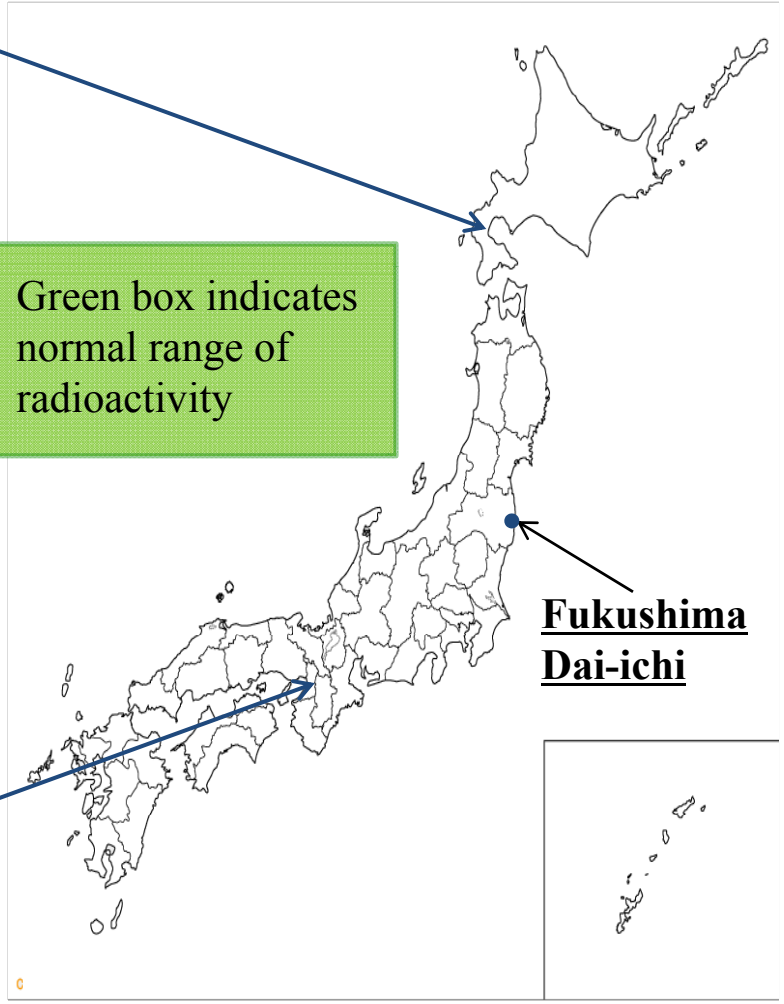


MEXT, Fukushima Prefectural Government

Atmospheric Readings







MEXT, Fukushima Prefectural Government

Safety of Food in Japan

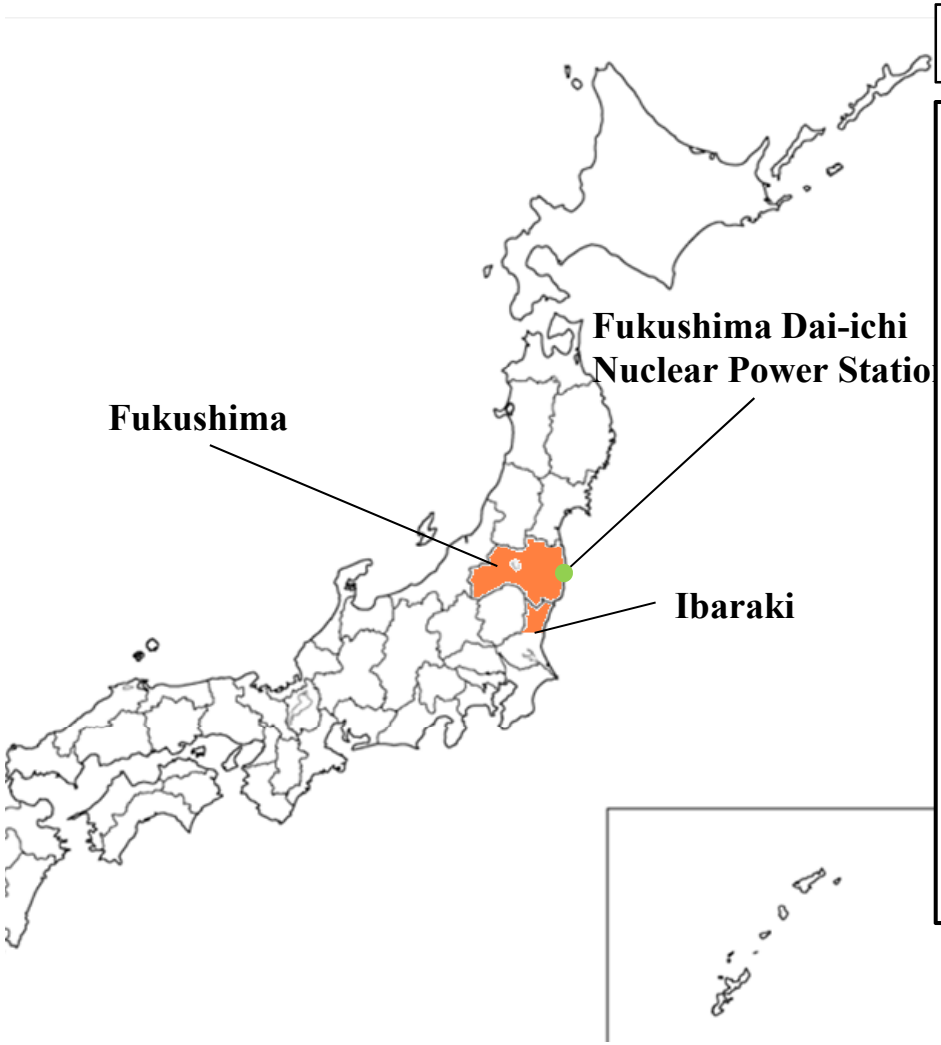
Japan set provisional regulation values of radioactive materials in food in accordance with the Food Sanitation Act and notified local government.

	Provisional regulation values of radioactive materials in food in accordance with the Food Sanitation Act（Bq/kg）	
Radioactive iodine （^{131}I）	Drinking water Milk, dairy products*	300
	Vegetables（Except root vegetables and tubers), Fish	2,000
Radioactive cesium(sum of ^{134}Cs and ^{137}Cs)	Drinking water Milk, dairy products	200
	Vegetables, Grains, Meat, eggs, fish, etc.	500
Uranium	Infant foods, Drinking water, Milk, dairy products	20
	Vegetables, Grains, Meat, eggs, fish, etc.	100
Alpha-emitting nuclides of plutonium and transuranic elements（Total radioactivity of ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{242}Pu, ^{241}Am, ^{242}Cm, ^{243}Cm, ^{244}Cm）	Infant foods, Drinking water , Milk, dairy products	1
	Vegetables, Grains, Meat, eggs, fish, etc.	10

*）Provide guidance so that materials exceeding 100 Bq/kg are not used in milk supplied for use in powdered baby formula or for direct drinking.

Safety of Food in Japan

Japan inspects radioactivity in food every day, and restricts distribution of food that fails to meet provisional regulation values taking into consideration the spread of contamination.



Source: Ministry of Health, Labour and Welfare

Instructions (as of 16 May 2011)

… Not to Distribute

* **Fukushima Prefecture**
  - Raw milk
  - Non-head type leafy vegetables (e.g. spinach)
  - Head type leafy vegetables (e.g. cabbage)
  - Flowerhead brassicas (e.g. broccoli, cauliflower)
  - Turnip
  - Log grown shiitake (grown outdoor)
  - Bamboo shoot
  - Ostrich fern
  - Juvenile (baby) fish of Japanese sand lance
* **Ibaraki Prefecture**
  - Spinach

Please refer to the following URL for the details of the Instructions.
http://www.mhlw.go.jp/english/topics/2011eq/index.html

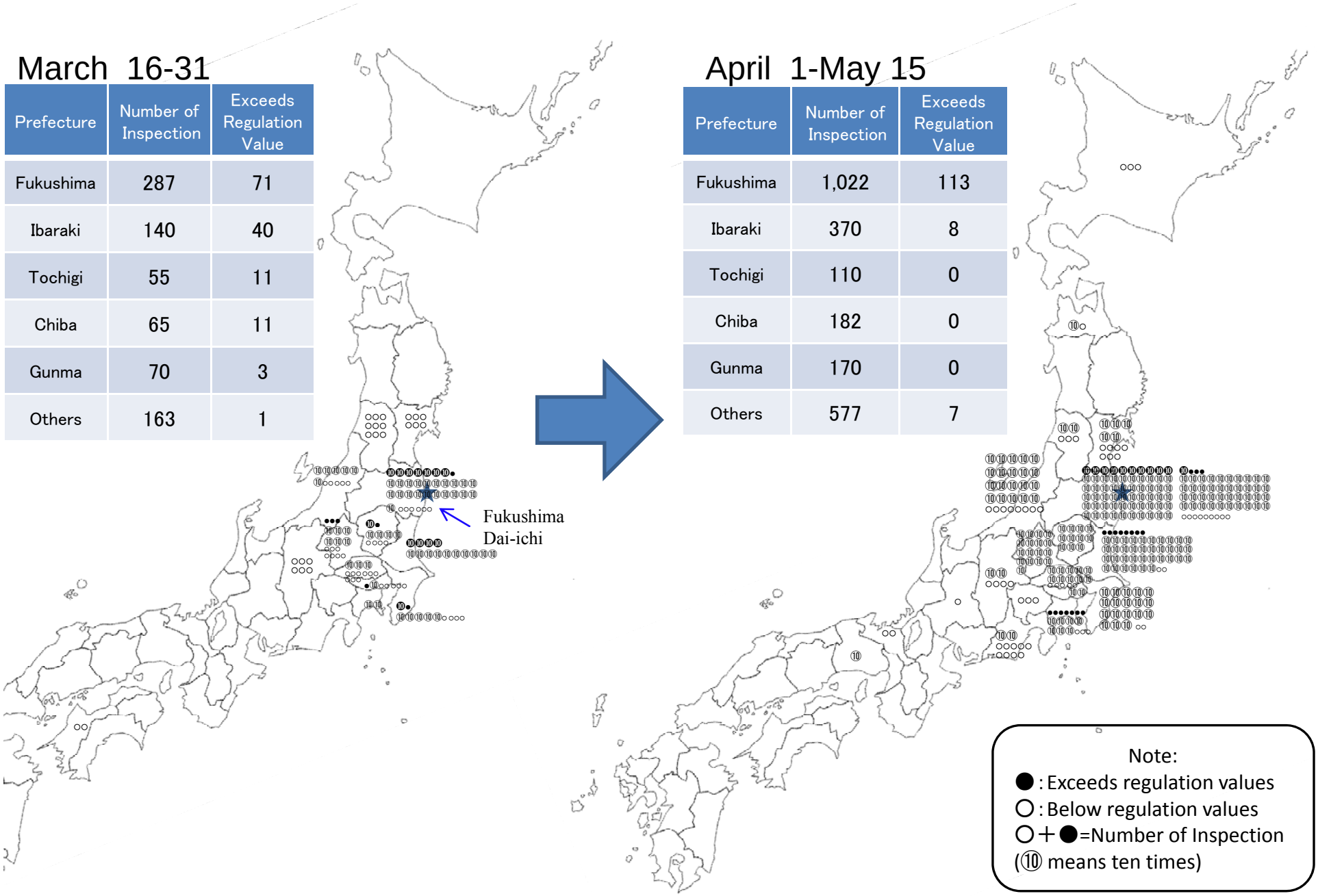
Radionuclide Levels in Fresh Products

March 16-31

Prefecture	Number of Inspection	Exceeds Regulation Value
Fukushima	287	71
Ibaraki	140	40
Tochigi	55	11
Chiba	65	11
Gunma	70	3
Others	163	1

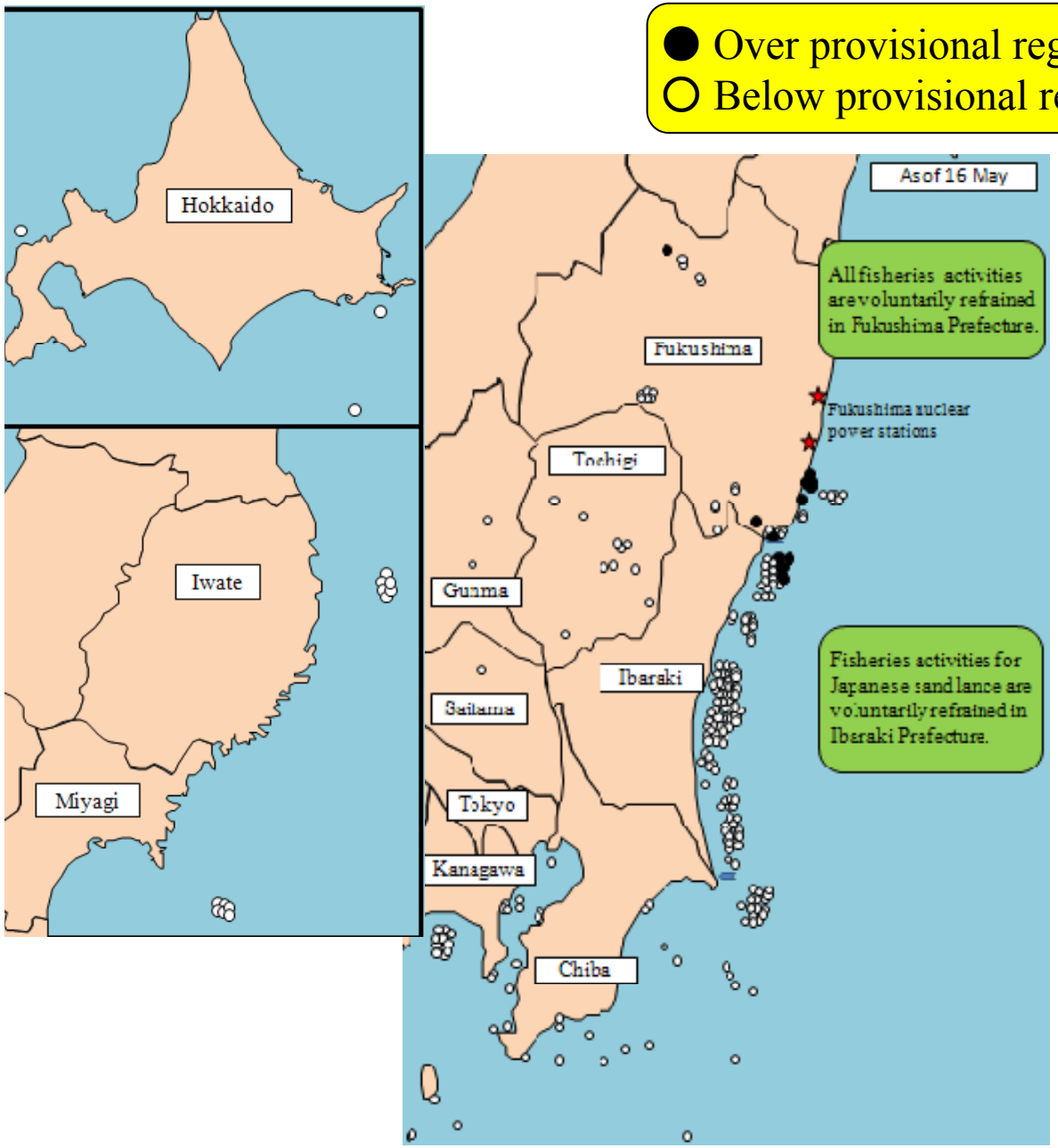
April 1-May 15

Prefecture	Number of Inspection	Exceeds Regulation Value
Fukushima	1,022	113
Ibaraki	370	8
Tochigi	110	0
Chiba	182	0
Gunma	170	0
Others	577	7



Safety of Marine Products

● Over provisional regulation values: 16 samples
○ Below provisional regulation values: 253 samples



Samples over provisional regulation values are Juvenile (baby) fish of "Japanese sand lance", whitebait, ayu sweetfish and Japanese smelt.

Fisheries of these fish species are not conducted in Fukushima and Ibaraki prefectures

No fisheries are conducted in Fukushima prefecture

Strategy for Restriction on Tap Water

1. Concept of the radioactive level for restrictions on the intake for the general public

■Set not to exceed the effective dose of 5mSv/y

○Consider the balance between "health risk" and "the cost of taking countermeasures"

■Set not to exceed the thyroid gland equivalent dose of 50mSv/y

- The weighting factor for thyroid is 0.04, which is equivalent to 2mSv/y of effective dose.

2. Concept of the index for restrictions on the intake

● Radioactive iodine

- ***50mSv/y of thyroid gland equivalent dose*** is allocated to three groups (drinking water, milk and dairy products, and vegetables), leaving 1/3 for others.

➢ Index for tap water **300Bq/kg**

- The restriction value for infants is set with reference to the values set by CODEX (Safe values acceptable for international trades)

➢ Index for tap water (infants) **100Bq/kg**

● Radioactive cesium

-5mSv/y of effective dose is allocated to five groups (drinking water, milk and dairy products, vegetables, etc.)

➢ Index for tap water **200Bq/kg**

3. Requests for intake restrictions and public announcement

■MHLW requests water supply utilities for restriction on intake and public announcement, when the level of radioactive materials in tap water exceeds the indexes.

■***Only one water supply utility*** in Fukushima Pref. was requested the restriction by MHLW, because the level of radioactive iodine with over than 300Bq/kg in tap water.

➢ The water supply cancelled

■20 water supply utilities in Fukushima, Ibaraki, Tochigi, Tokyo, and Chiba Pref. were requested for the restriction on infants' intake of tap water and public announcement by MHLW, because of radioactive iodine over than100 Bq/kg in tap water.

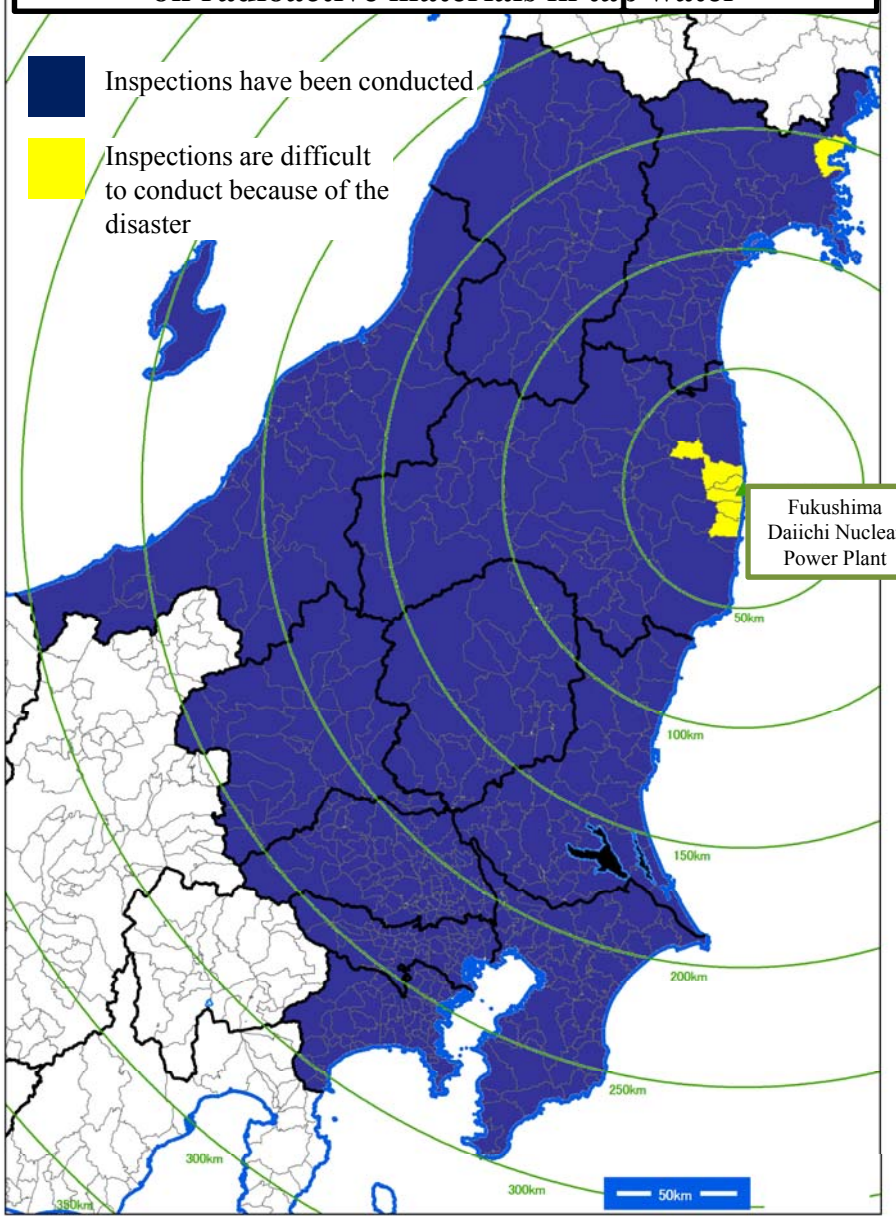
➢ All water supply canceled the restriction on the infants' intake

■***There is no case in which radioactive cesium in tap water exceeded the index.***

Monitoring Policy on Radioactive Materials in Tap Water

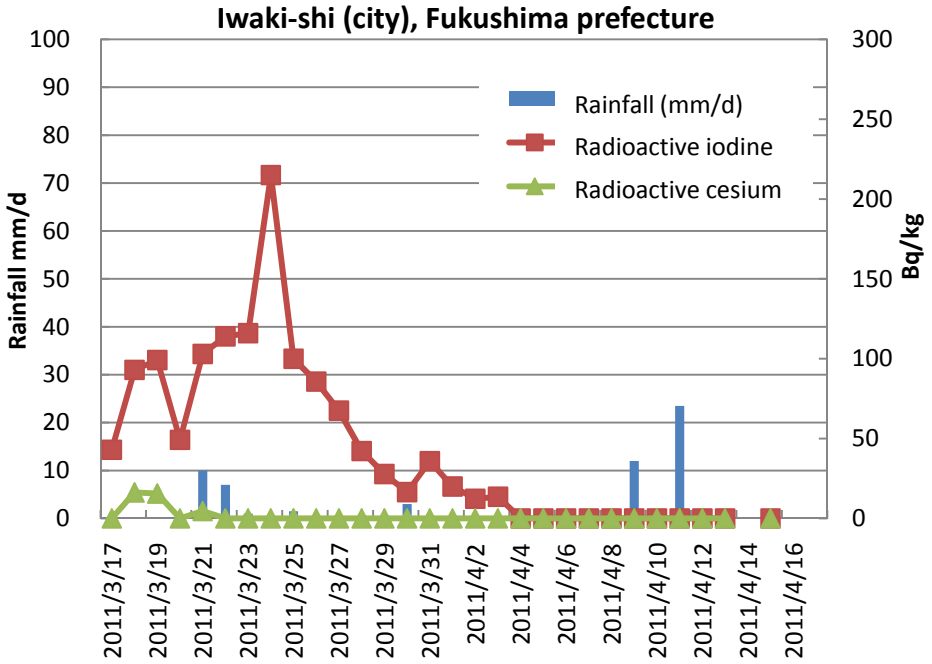
- **Conduct continuous and regular inspections on tap water, taking into account that the nuclear emergency situation has not been restored to normal state.**
- **Resolve the situation of non-inspected areas in which tap water is considered to be affected by the diffusion of radioactive material**
- **Make speedy public announcements of the inspection results to dispel the concerns of water users**
- **Conduct annual intensive monitoring in Fukushima prefecture and the neighboring regions (including Tokyo)**
  - Conduct inspections in all municipalities, excluding six affected/evacuated municipalities
  - Results in all municipalities were below the indexes (ND in most cases)

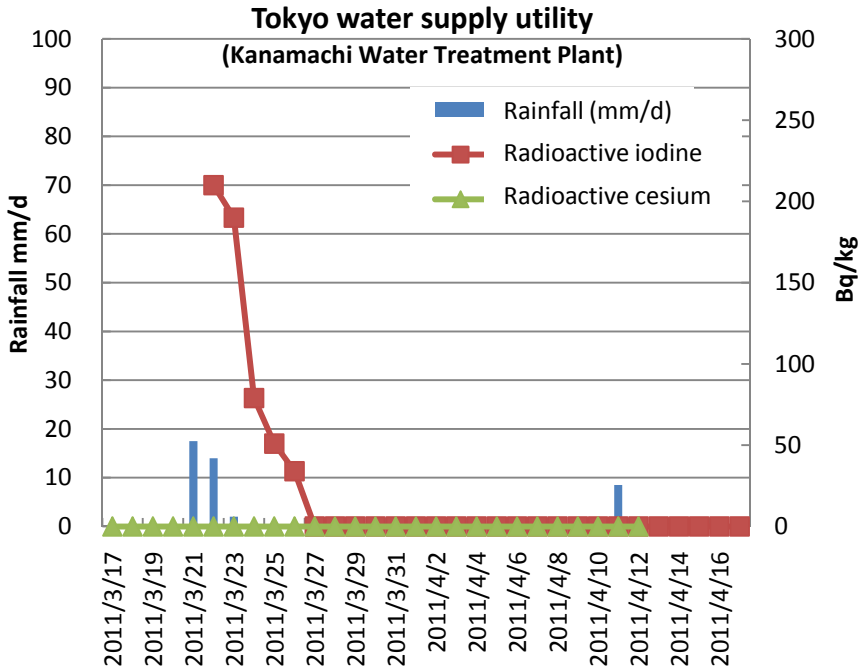
Implementation status of monitoring inspection plans on radioactive materials in tap water



Map of Geospatial Information Authority of Japan is used.

Levels of Radioactive Iodine and Cesium in Tap Water





Trend of radioactive materials in tap water

■Radioactive iodine

- The peak concentration of radioactive iodine was observed at each measuring point from 17 to 24 March. From around the end of March, the concentration decreased. Especially in regions outside of Fukushima prefecture, the peak concentration of radioactive iodine was observed on the first day (March 21) it rained after the accidents, or the next day. However, during the subsequent rains (March 30, April 9, April 11, etc.), the clear increase of radioactive iodine concentration was not observed. **At present, no radioactive iodine is detected in tap water at most measuring points.**

■Radioactive cesium

- The concentration of radioactive cesium, compared with radioactive iodine, was generally low, although it was temporarily detected in parts of municipalities in Fukushima prefecture. **At present, no radioactive cesium is detected at most measuring points.**

At present, there is no concern to drink tap water in Japan. Tap water is safe.

Provision of Relevant Information Overseas

Communication to WHO, IAEA and its Member States etc

(1) IHR (International Health Rule)

(2) ENAC Website

(3) IEC (IAEA)

(4)Foreign Media Briefing

(5) Briefings for Diplomatic Representatives in Tokyo

(6) English information on the Web

- **Nuclear and Industrial Safety Agency:**
  http://www.nisa.meti.go.jp/english/index.html
- **Office of Prime Minister:**
  http://www.kantei.go.jp/foreign/index-e.html

Speedy Dissemination of Accurate Information

- **Japan is committed to the speedy dissemination of accurate information.**
- **All necessary information can be found at the following websites.**

Japan's Countermeasures

- 1.http://www.kantei.go.jp/foreign/incident/index.html
- 2.http://www.meti.go.jp/english/index.html
- 3.http://www.nisa.meti.go.jp/english/

Measurement of Radioactivity Level

- 1.http://www.mext.go.jp/english/radioactivity_level/detail/1303962.htm
- 2.http://www.nisa.meti.go.jp/english/
- 3.http://www.worldvillage.org/fia/kinkyu_english.php
- 4. http://www.tepco.co.jp/en/press/corp-com/release/index-e.html
- 5. http://www.nsc.go.jp/NSCenglish/geje/index.htm

Drinking Water Safety

- 1.http://www.mhlw.go.jp/english/topics/2011eq/index.html
- 2.http://www.waterworks.metro.tokyo.jp/press/shinsai22/press110324-02-1e.pdf

Food Safety

- 1.http://www.maff.go.jp/e/index.html
- 2.http://www.mhlw.go.jp/english/topics/2011eq/index.html

Ports and Airports Safety

- 1.http://www.mlit.go.jp/page/kanbo01_hy_001428.html
- 2.http://www.mlit.go.jp/koku/flyjapan_en/index.html
- 3.http://www.mlit.go.jp/page/kanbo01_hy_001411.html

Tourism

- 1. http://www.mlit.go.jp/kankocho/en/index.html

Summary

- An earthquake measuring 9.0 struck the northeast coast of the main island "Honshu" in Japan at 14:46 on 11 March 2011, triggering a tsunami hitting this area.
- The earthquake left more than 15,000 people dead and almost 10,000 missing.
- The earthquake and tsunami caused serious damages to NPPs, resulting in release of a large amount of radioactive materials into the atmosphere (combined disaster).
- There are no workers or public people requiring treatment for radiation exposure or contamination with radioactive materials.
- Monitoring system has been established for food and tap water.