# Nuclear Accident at the Fukushima Dai-ichi Nuclear Power Station

April 9, 2011

Ministry of Foreign Affairs of Japan

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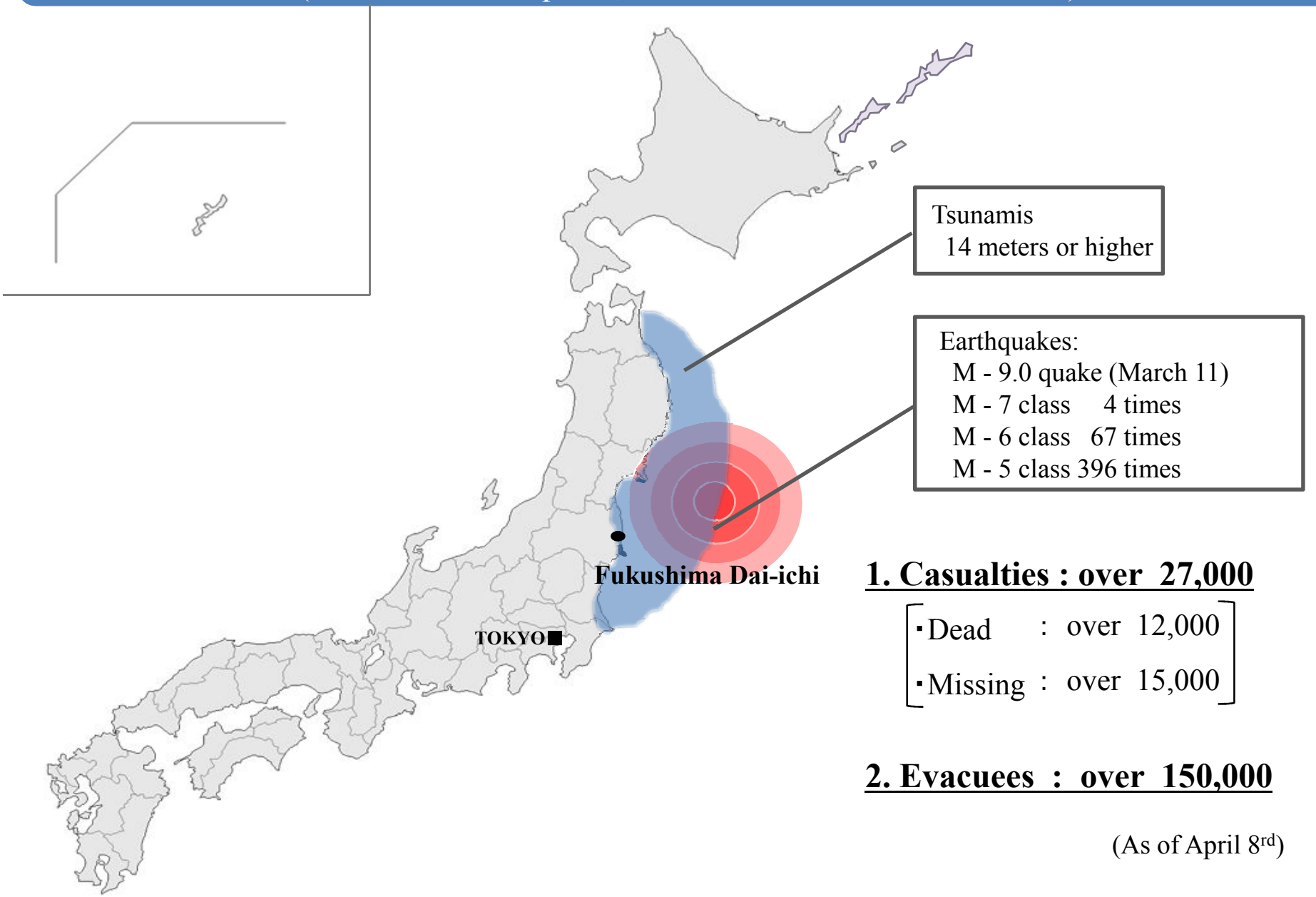
# A. Japan Faces an Unprecedented Challenge

(Enormous Earthquake, Tsunamis and Nuclear Accident)




**1. Casualties : over 27,000**

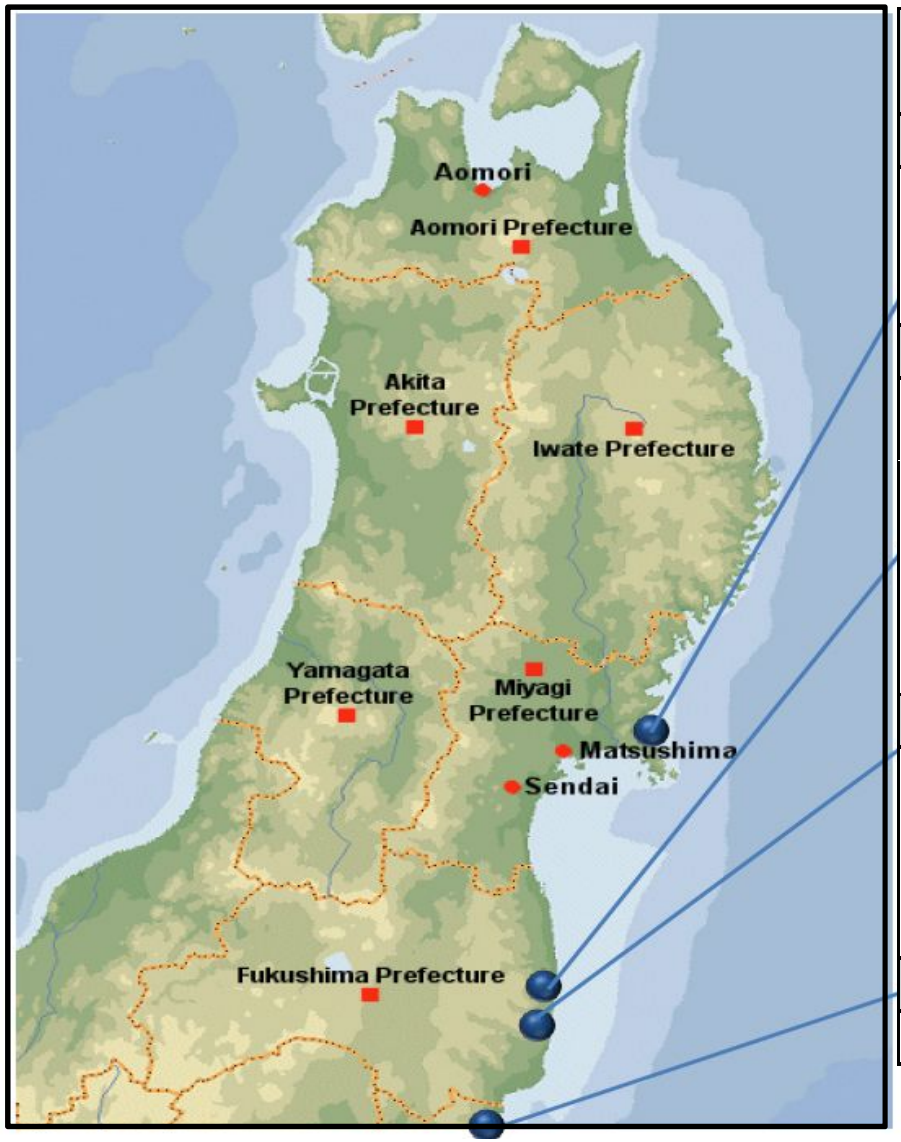
- Dead : over 12,000
- Missing : over 15,000

**2. Evacuees : over 150,000**

(As of April 8rd)

# 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- | ✓ | ✓ |

# 1. Rescuing Efforts and Foreign Assistance

Japan deeply appreciates the assistance offered from

134 countries and regions and
39 international organizations

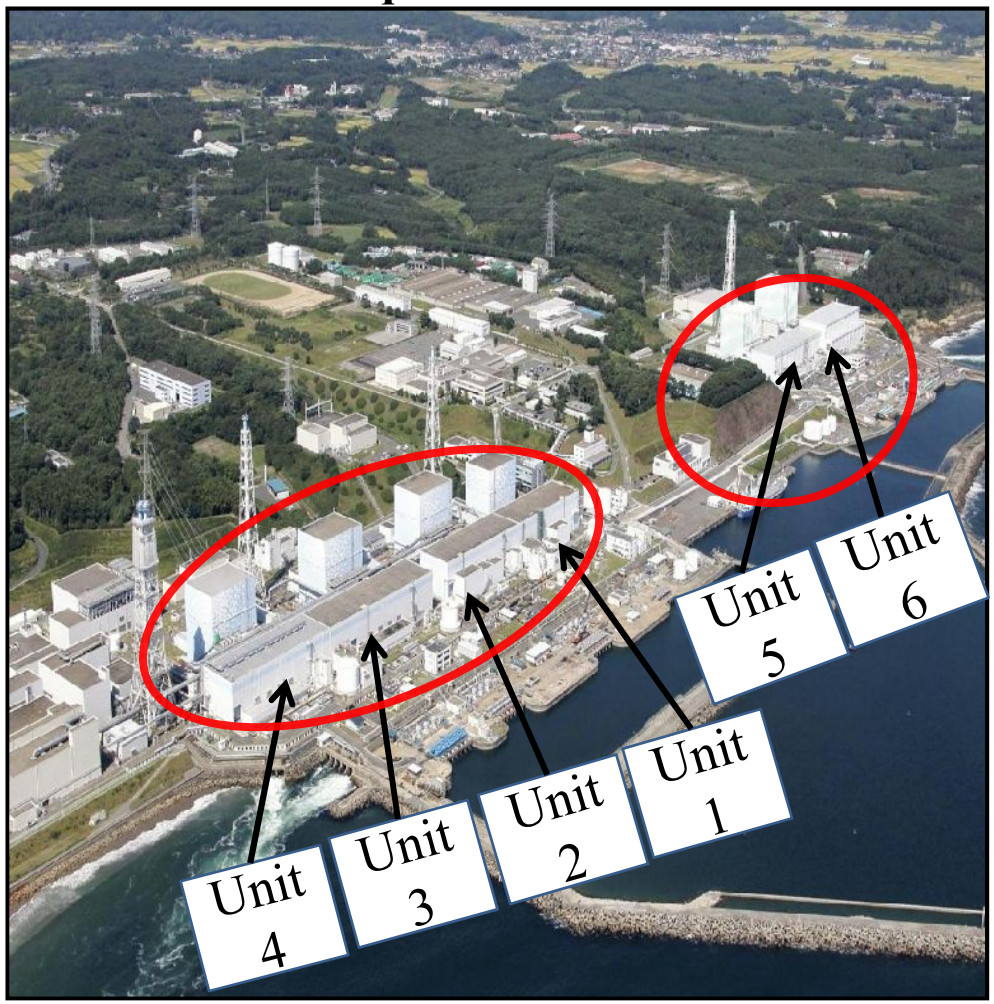
(Rescue teams were sent from 24 countries and region)

Ministry of Defense

US Navy/US Pacific Command
(Operation Tomodachi)

# 2. Fukushima Dai-ichi Nuclear Power Station

**Before the Earthquakes and Tsunamis**



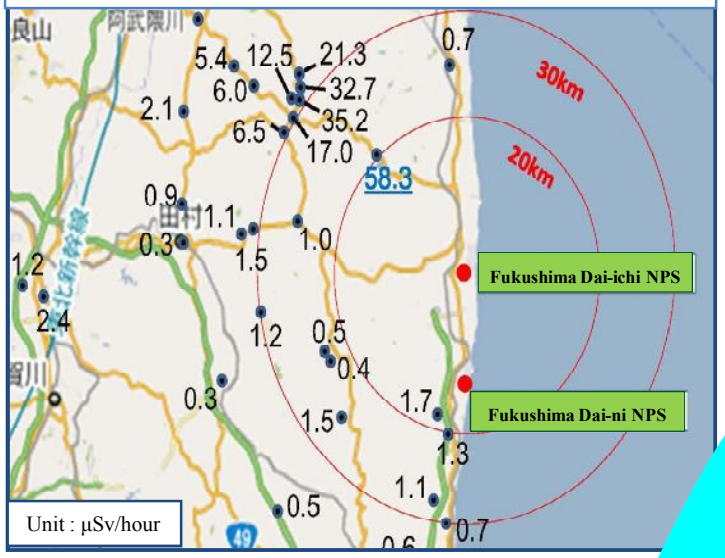

TEPCO

**After the Earthquakes and Tsunamis**

Air Photo Service Inc (Myoko, Niigata Japan)

# 2. Fukushima Dai-ichi Nuclear Power Station

## Evacuation




## Cause of the Damage

Grid Line

① Loss of External Power Supply due to the Earthquake

Reactor Building

Turbine Building

About 20M

About 40M

Tsunami (estimated 14m)

Diesel Generator

Elevation: about 10m

② Diesel Generator Inoperable due to the Tsunami

Seawater level

Seawater Pump

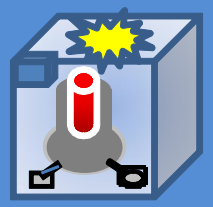
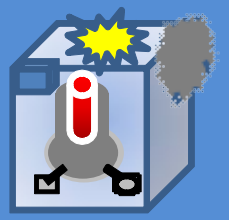
All Motor Operated Pumps including Emergency Core Cooling Pumps became Inoperable

## B. Key Challenges

1. Cool Down the Reactors
2. Contain Spread of Radioactive Substances (sea, soil and atmosphere)
3. Rigorous and Intensive Monitoring
4. Ensure the Safety of Food, Drinking Water and On-site Workers

# 1. Cool Down the Reactors

(As of April 8)

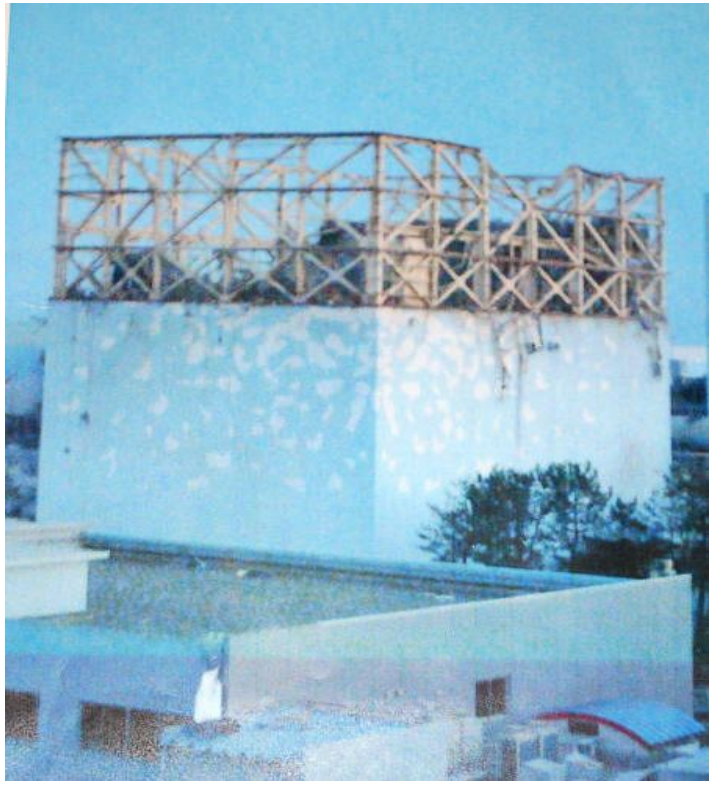
| | | Unit 1 | Unit 2 | Unit 3 | Unit 4 |
|---|---|---|---|---|---|
| | |  |  |  |  |
| Type / MW / Commercial Operation | | BWR / 460 / Mar 71- | BWR / 784 / Jul 74- | BWR / 784 / Mar 76- | BWR / 784 / Oct 78- |
| Status at time of Earthquake | | In Service | In Service | In Service | Periodical Inspection Outage |
| | Automatic Shutdown | ✔ | ✔ | ✔ | – |
| | Fresh Water Injection | ✔ | ✔ | ✔ | – |
| RPV | Water Level [mm] (distance from the top of fuel) | -1,650 (A)<br>-1,650 (B) | -1,500 (A)<br>N/A (B) | -1,850 (A)<br>-2,250 (B) | – |
| RPV | Reactor Pressure [Mpa g] | 0.395 (A)<br>0.793 (B) | -0.020 (A)<br>-0.020 (D) | -0.004 (A)<br>-0.079 (C) | – |
| RPV | Temperature<br>－Feedwater Nozzle<br>－Bottom Head of RPV | 246.6℃<br>119.4℃ | 141.2℃<br>N/A | N/A<br>110.7℃ | – |
| SFP | Fresh Water Injection | ✔ | ✔ | ✔ | ✔ |
| SFP | Temperature | 24℃* | 53℃ | 60℃* | 57℃* |
| Building | | Damage | Slight Damage | Damage | Damage |
| AC Power (Lighting of Central Operation Room**) | | ✔ | ✔ | ✔ | ✔ |

*Temperature based on reading of the thermograph from air by Ministry of Defense. (the indicators attached to the SFPs are broken)

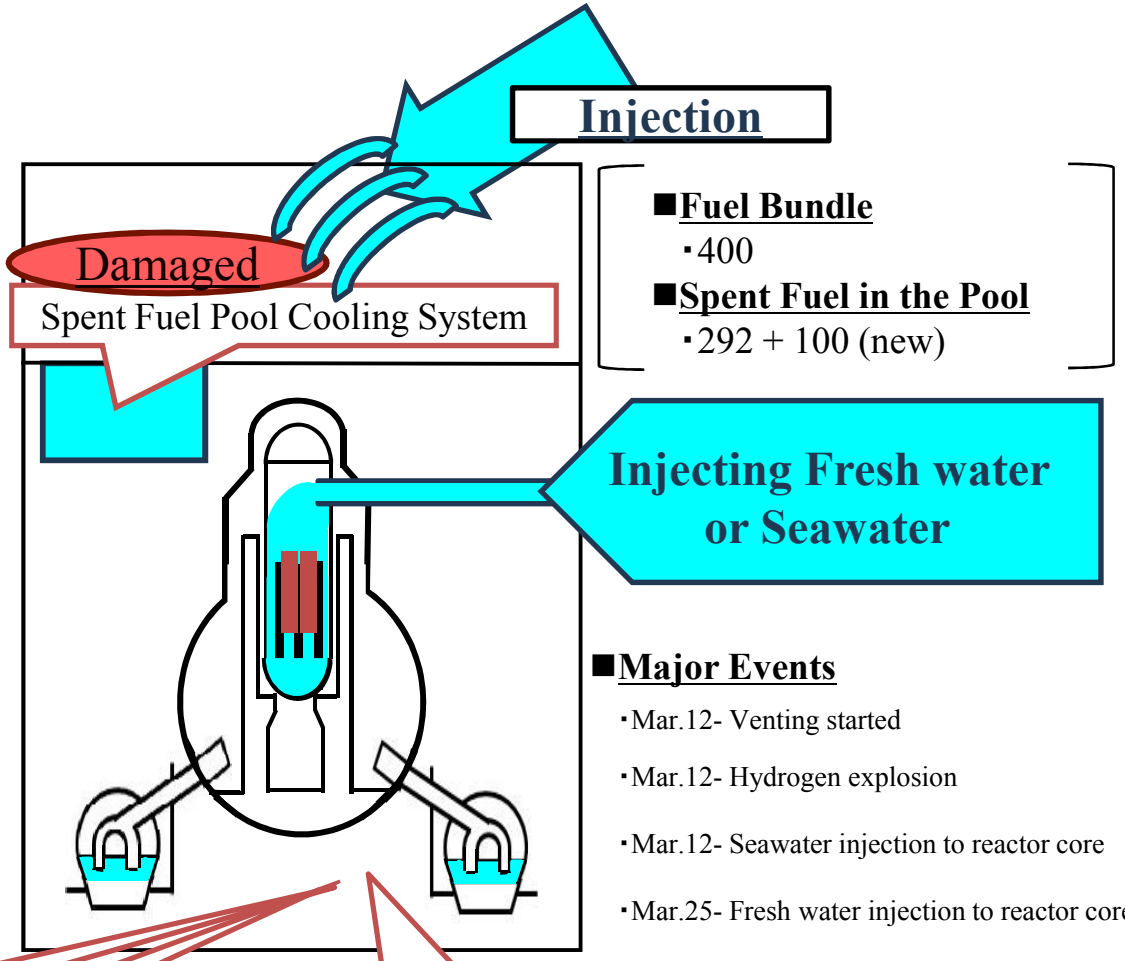
**Facilities are under-checking.

# 1. Cool Down the Reactors (Unit 1)

(As of April 8, 2011)



TEPCO




■**Major Events**

- Mar.12- Venting started
- Mar.12- Hydrogen explosion
- Mar.12- Seawater injection to reactor core
- Mar.25- Fresh water injection to reactor core
- Mar.31- Fresh water spray by concrete pump trucks
- Apr. 7- Injection of nitrogen to the reactor

Damaged

Emergency Diesel Generator

Residual Heat Removal System

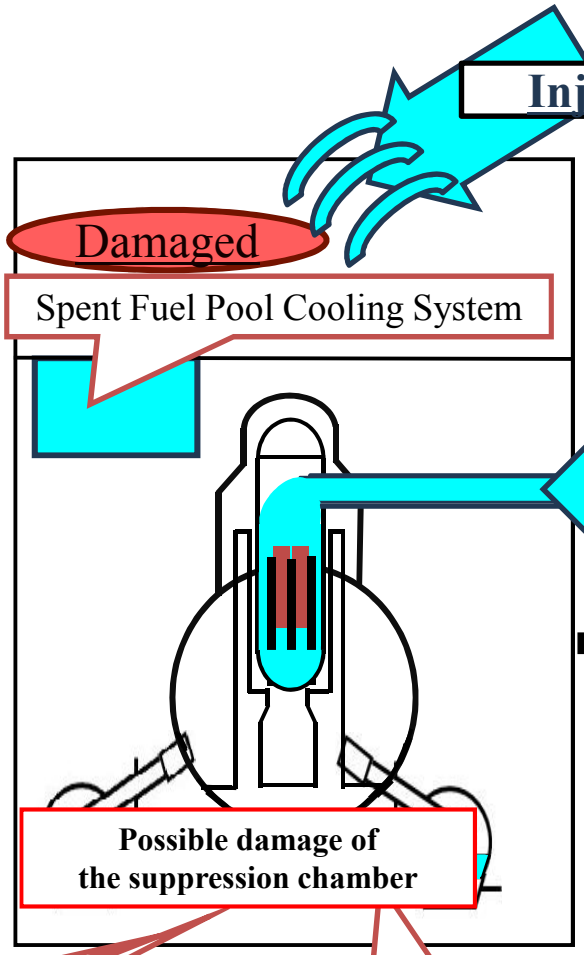
Recovered

External Power
(Mar.24- connected to the central control room)

# 1. Cool Down the Reactors (Unit 2)

(As of April 8, 2011)


Ministry of Defense




■**Fuel Bundle**
- 548

■**Spent Fuel in the Pool**
- 587 + 28 (new)

**Injecting Fresh water or Seawater**

■**Major Events**

- Mar.13- Venting started
- Mar.14- Seawater injection to reactor core
- Mar.15- Sound of explosion
- Mar.20- Seawater injection to spent fuel pool (SFP)
- Mar.26- Fresh water injection to reactor core
- Apr. 1- Fresh water injection to SFP

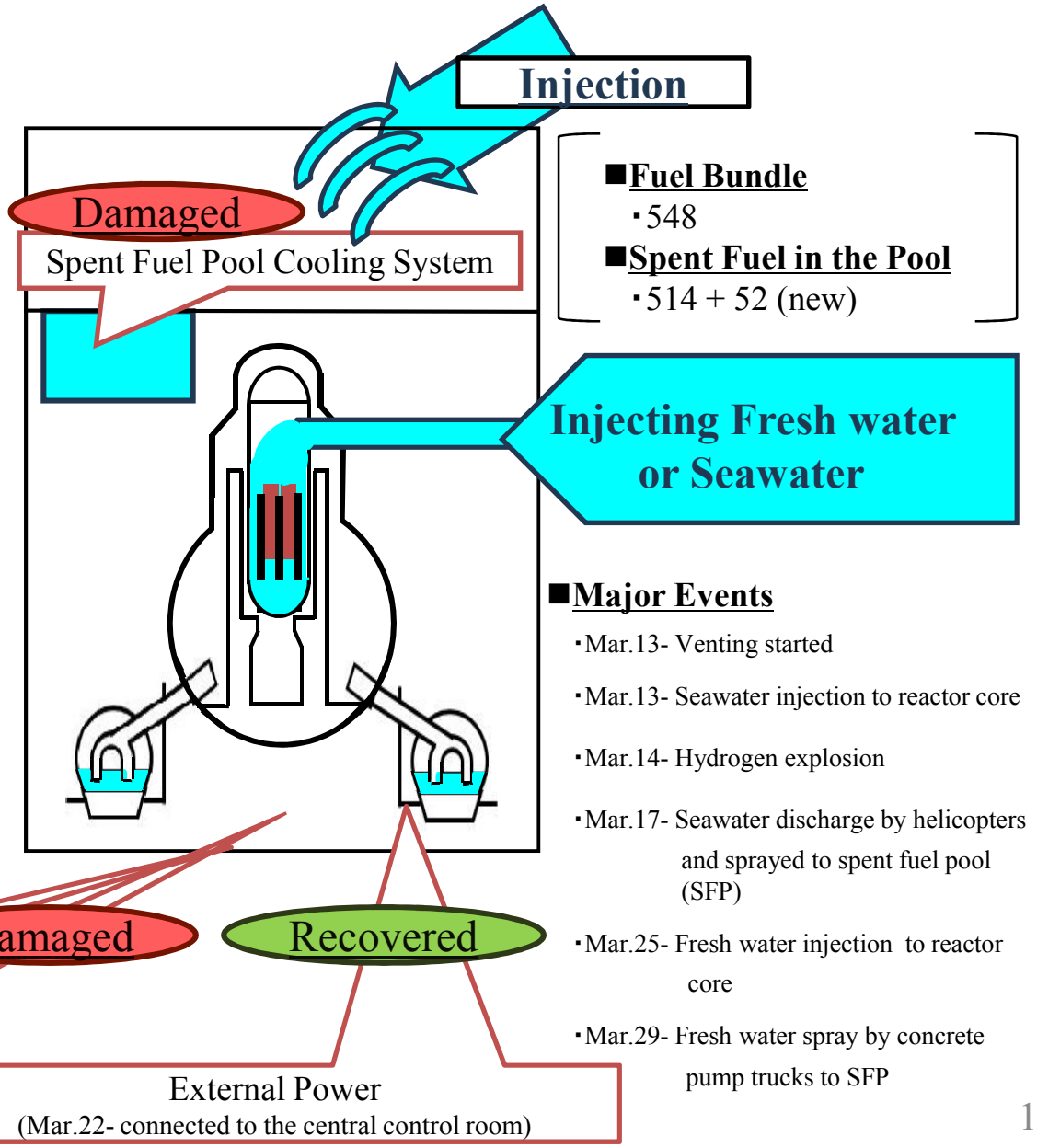
Damaged
- Emergency Diesel Generator
- Residual Heat Removal System

Recovered
- External Power (Mar.26- connected to the central control room)

# 1. Cool Down the Reactors (Unit 3)

(As of April 8, 2011)

Air Photo Service Inc (Myoko, Niigata Japan)

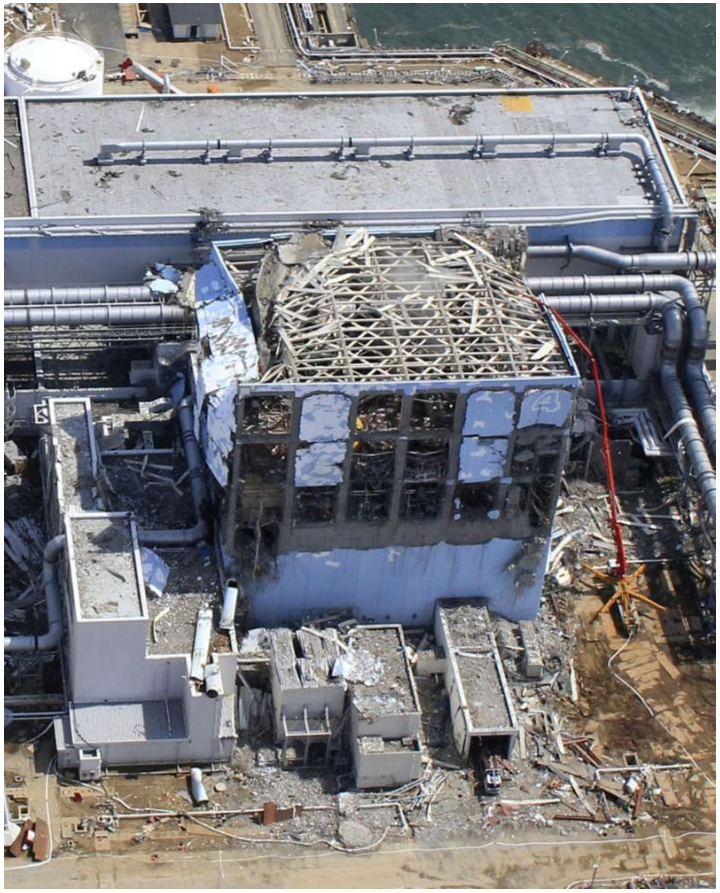



■**Major Events**

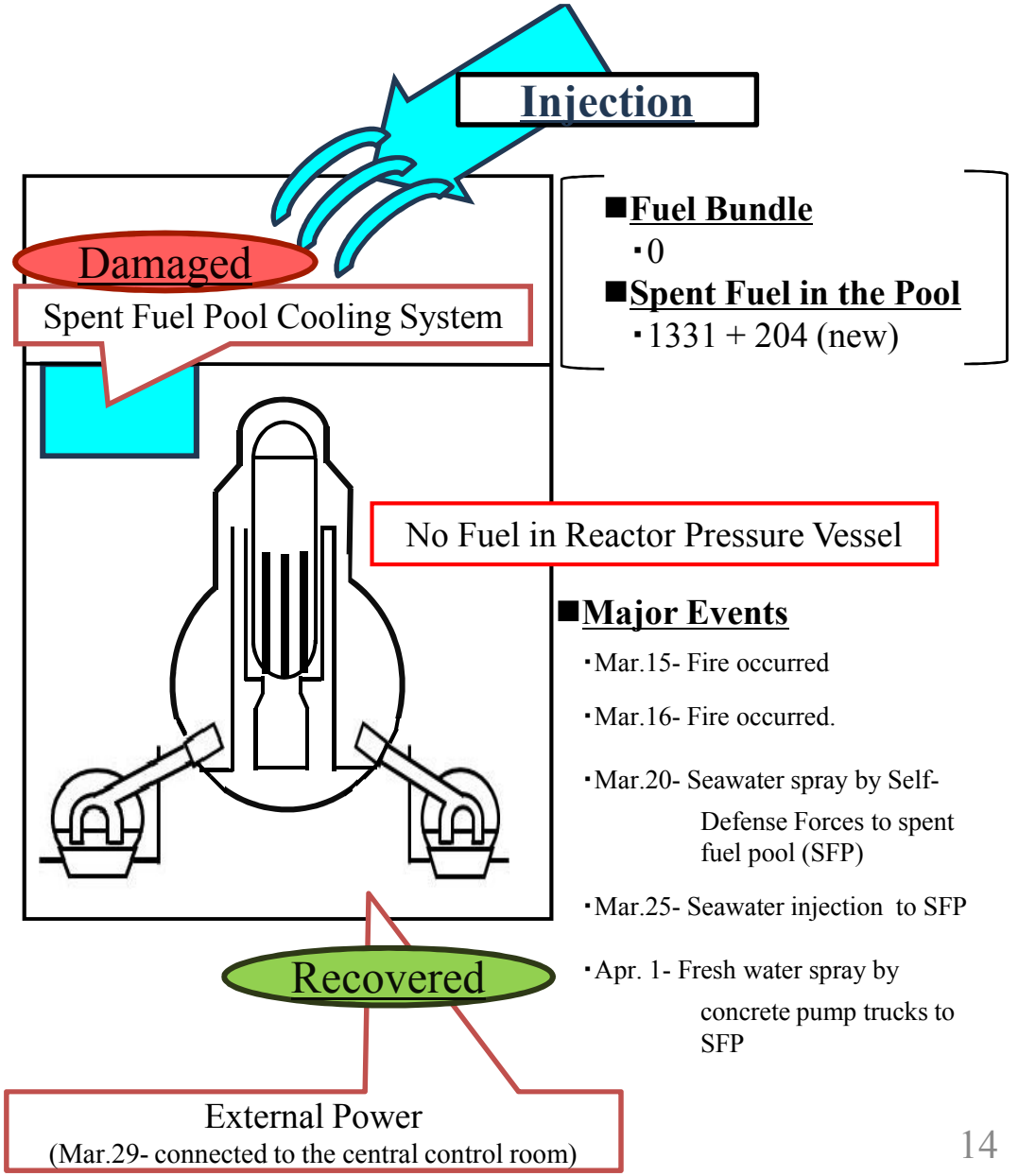
- Mar.13- Venting started
- Mar.13- Seawater injection to reactor core
- Mar.14- Hydrogen explosion
- Mar.17- Seawater discharge by helicopters and sprayed to spent fuel pool (SFP)
- Mar.25- Fresh water injection to reactor core
- Mar.29- Fresh water spray by concrete pump trucks to SFP

# 1. Cool Down the Reactors (Unit 4)

(As of April 8, 2011)



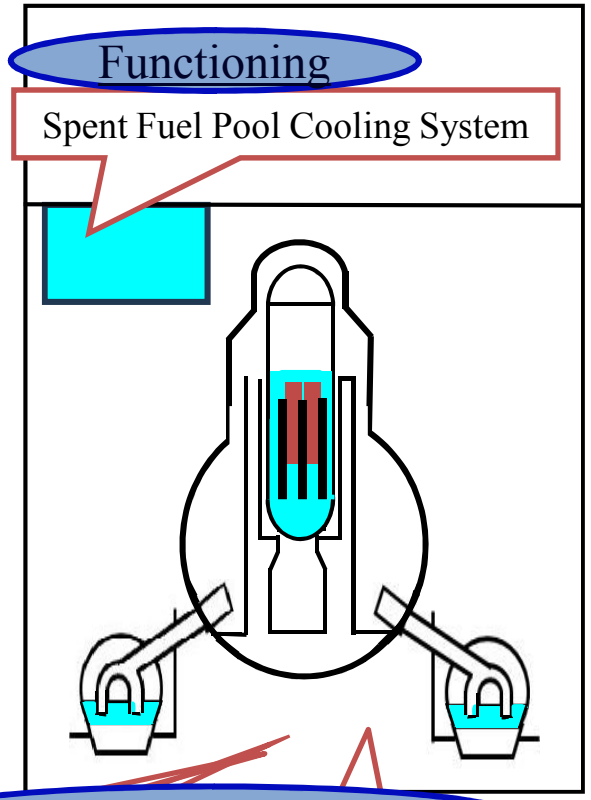
Air Photo Service Inc (Myoko, Niigata Japan)



# 1. Cool Down the Reactors (Unit 5&6)

(As of April 8, 2011)

TEPCO




■**Fuel Bundle**
- Unit5 : 548
- Unit6 : 764

■**Spent Fuel in the Pool**
- Unit 5 : 946 + 48 (new)
- Unit 6: 876 + 64 (new)

# Other Nuclear Power Stations in the Tohoku Area

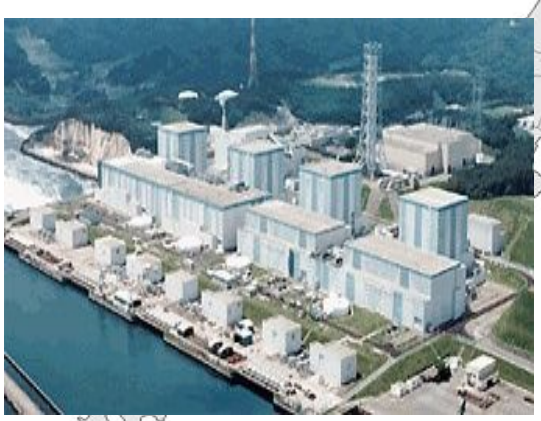
## Onagawa (3 Units)

Tohoku Electric Power Co., Inc

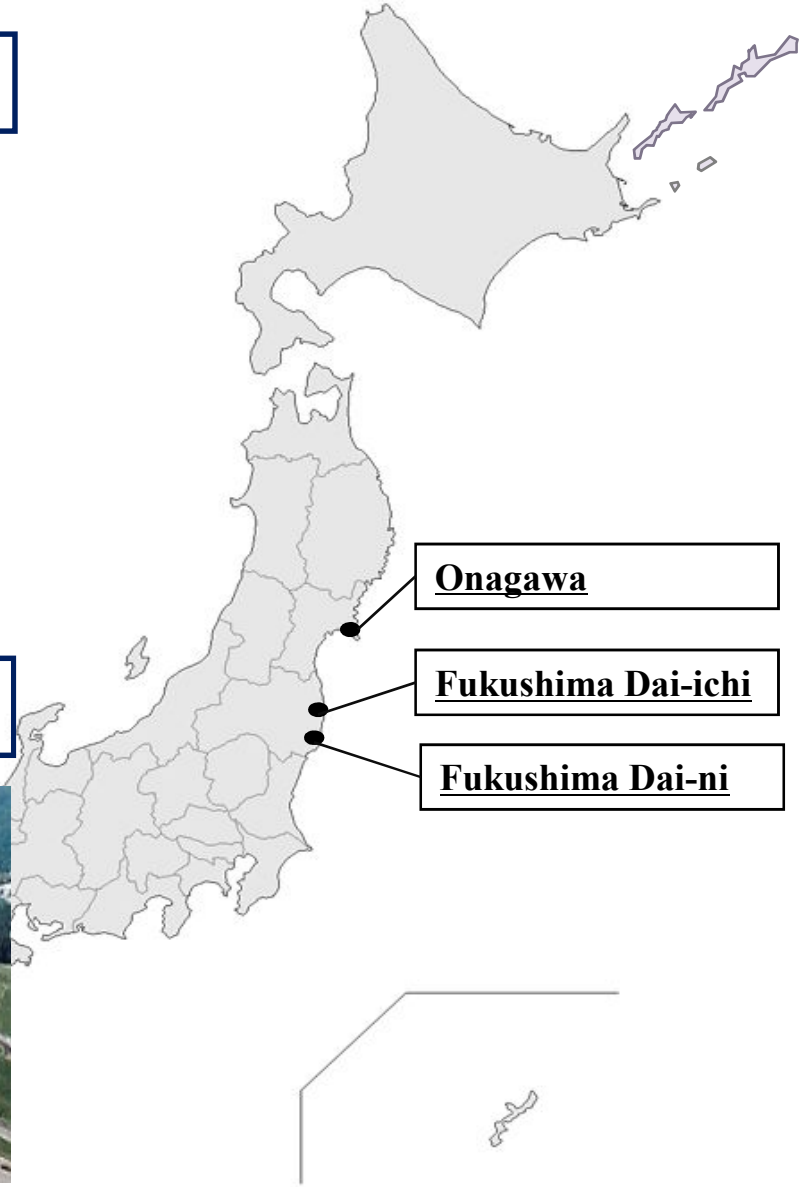
All units (Units 1-3) were immediately shut down automatically, then safely cold shut down.

## Fukushima Dai-ni (4 Units)

All units (Units 1-4) were immediately shut down automatically, then safely cold shut down.

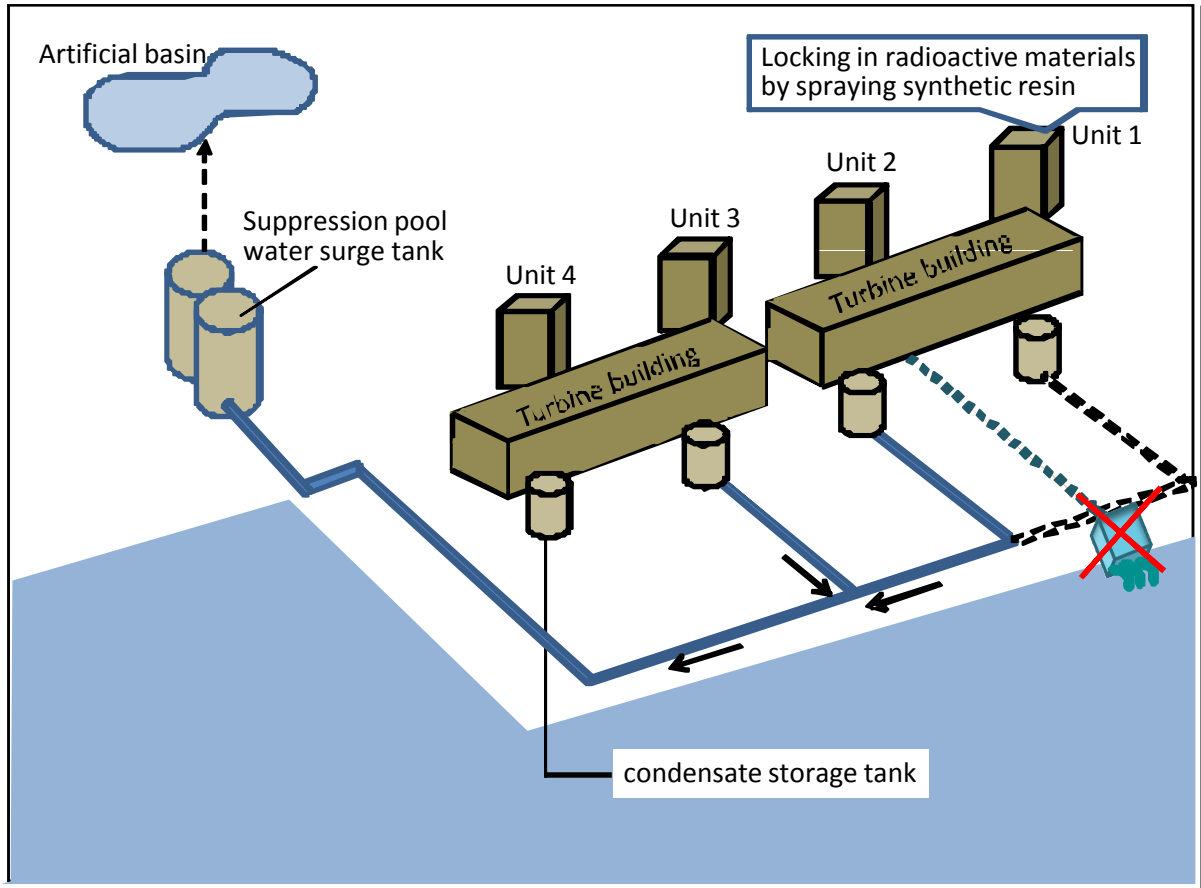


TEPCO



# 2. Contain Spreads of Radioactive Substances
(sea, soil and atmosphere)

The Japanese Government and TEPCO are making the utmost effort to prevent the dispersion of flow-out radioactive contaminated water.




## ■Major Events

- Mar. 27
  Stagnant water on the basement floor of the turbine of Unit2 and in the trenches found to be highly contaminated.
- Mar. 29
  Stagnant water in the trenches and the turbine building transferred to the storage tank, then to the surge tank.
- Apr. 1
  Highly contaminated water discovered leaking into the sea.
- Apr. 6
  Leak of contaminated water into the sea was stopped.

# 2. Contain Spread of Radioactive Substances
(sea, soil and atmosphere)

Experts are making the utmost effort to prevent radioactive substances contained in dust, debris and vapor from spreading.

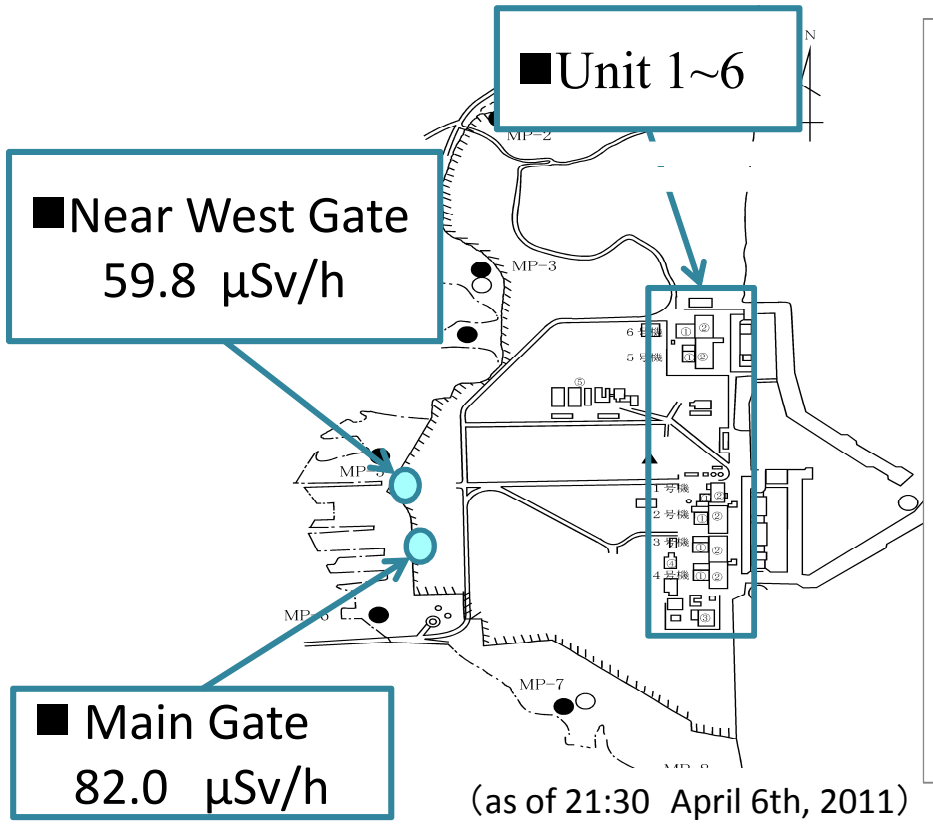
**Spraying synthetic materials on the surface of the ground to prevent the spread of radioactive substances**

TEPCO

# 3. Rigorous and Intensive Monitoring

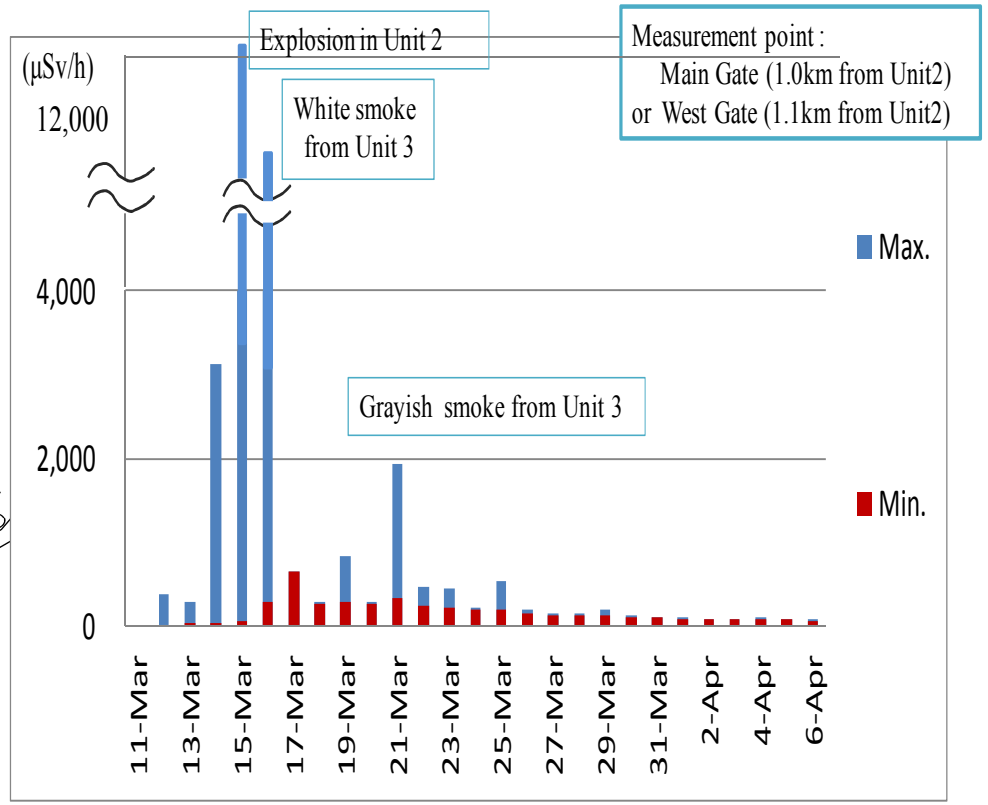
TEPCO monitors radioactivity levels every ten minutes and releases the results immediately. Radioactivity levels rose on March 15th, but have since fallen and remain low.

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



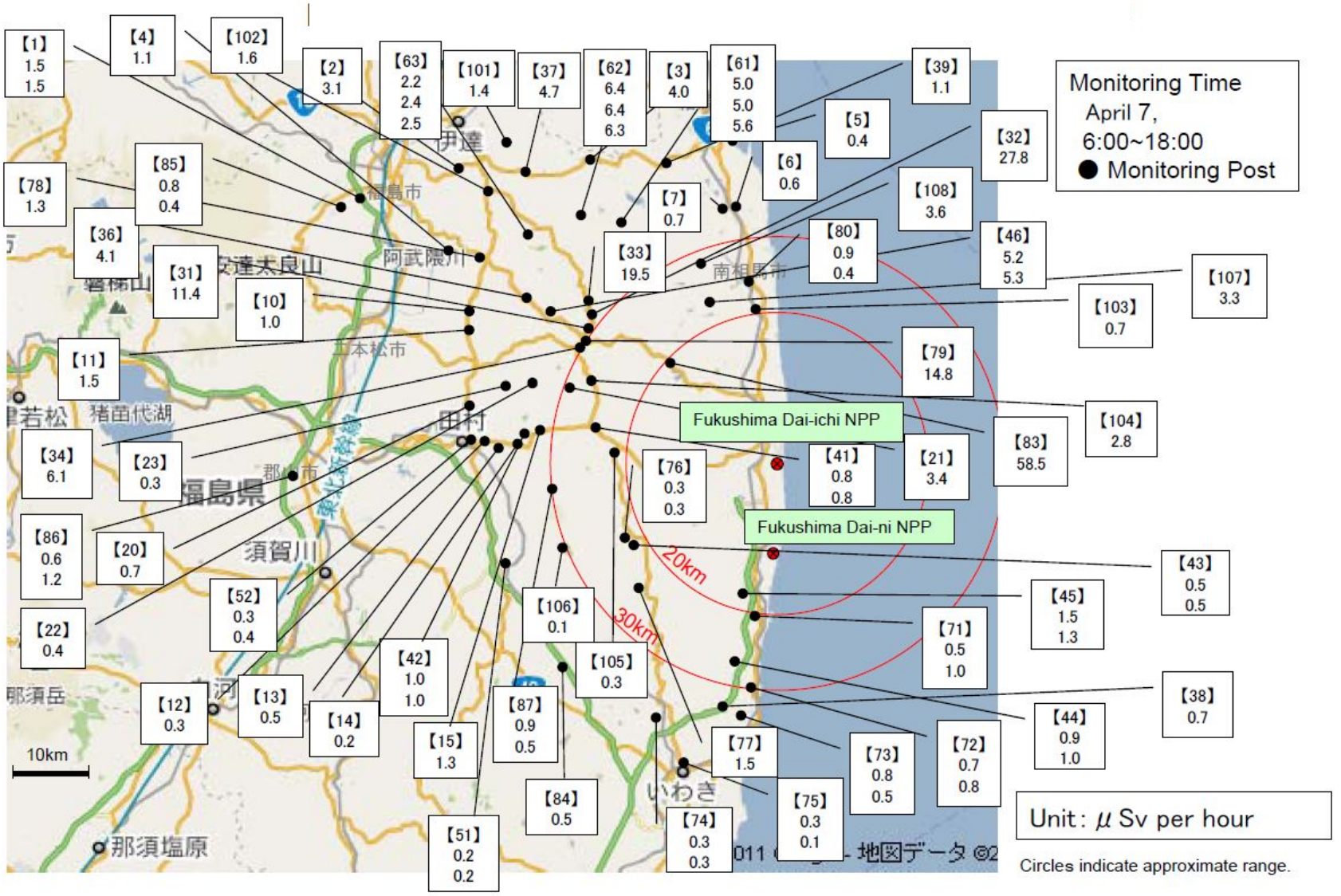

（as of 21:30 April 6th, 2011）

Environmental Radioactivity Level at the Fukushima Dai-ichi NPS

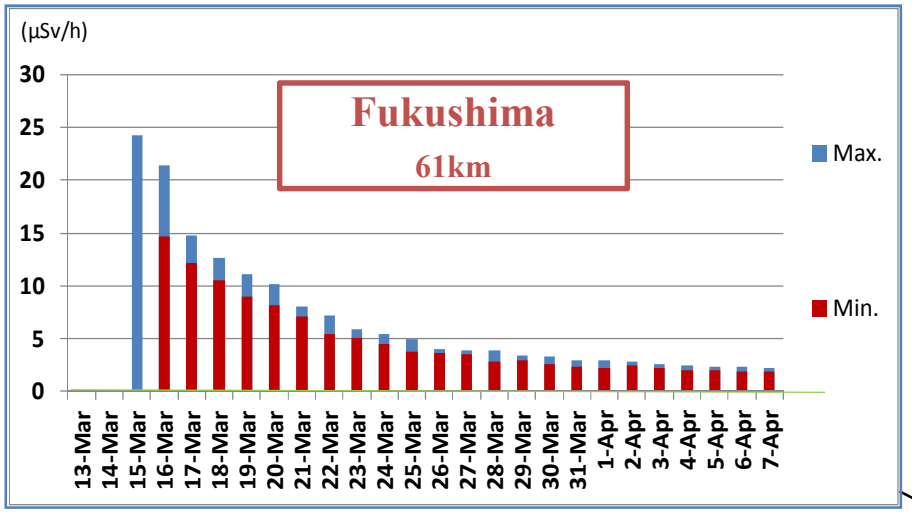


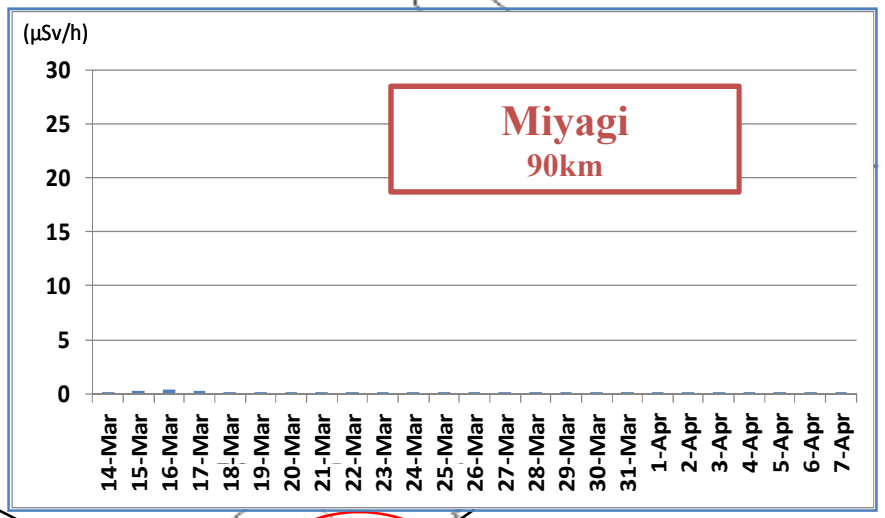

TEPCO

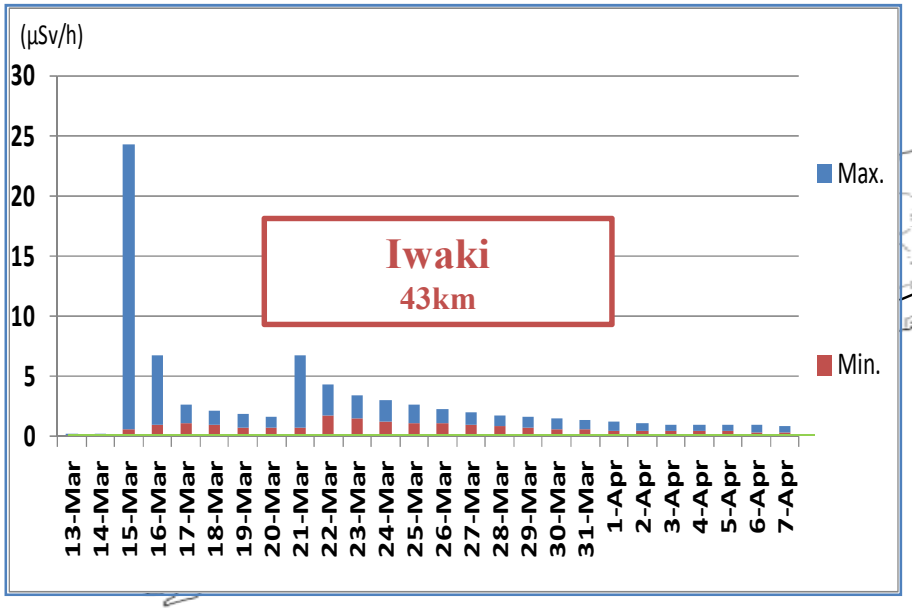
# Readings at Monitoring Posts out of Fukushima Dai-ichi NPS

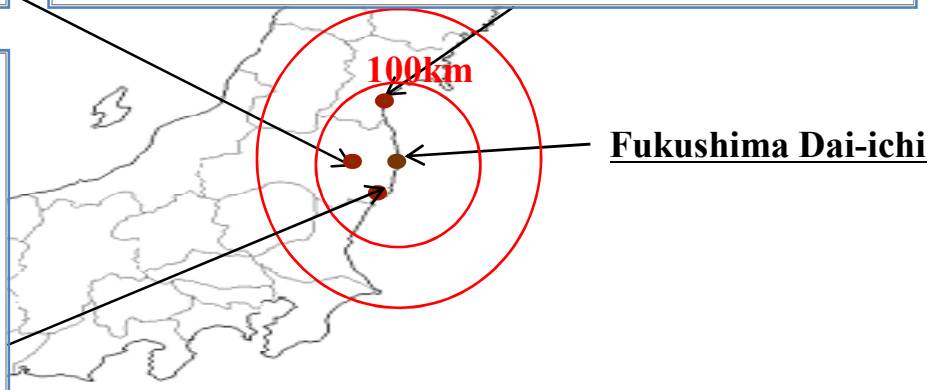


# Atmospheric Readings within 100km



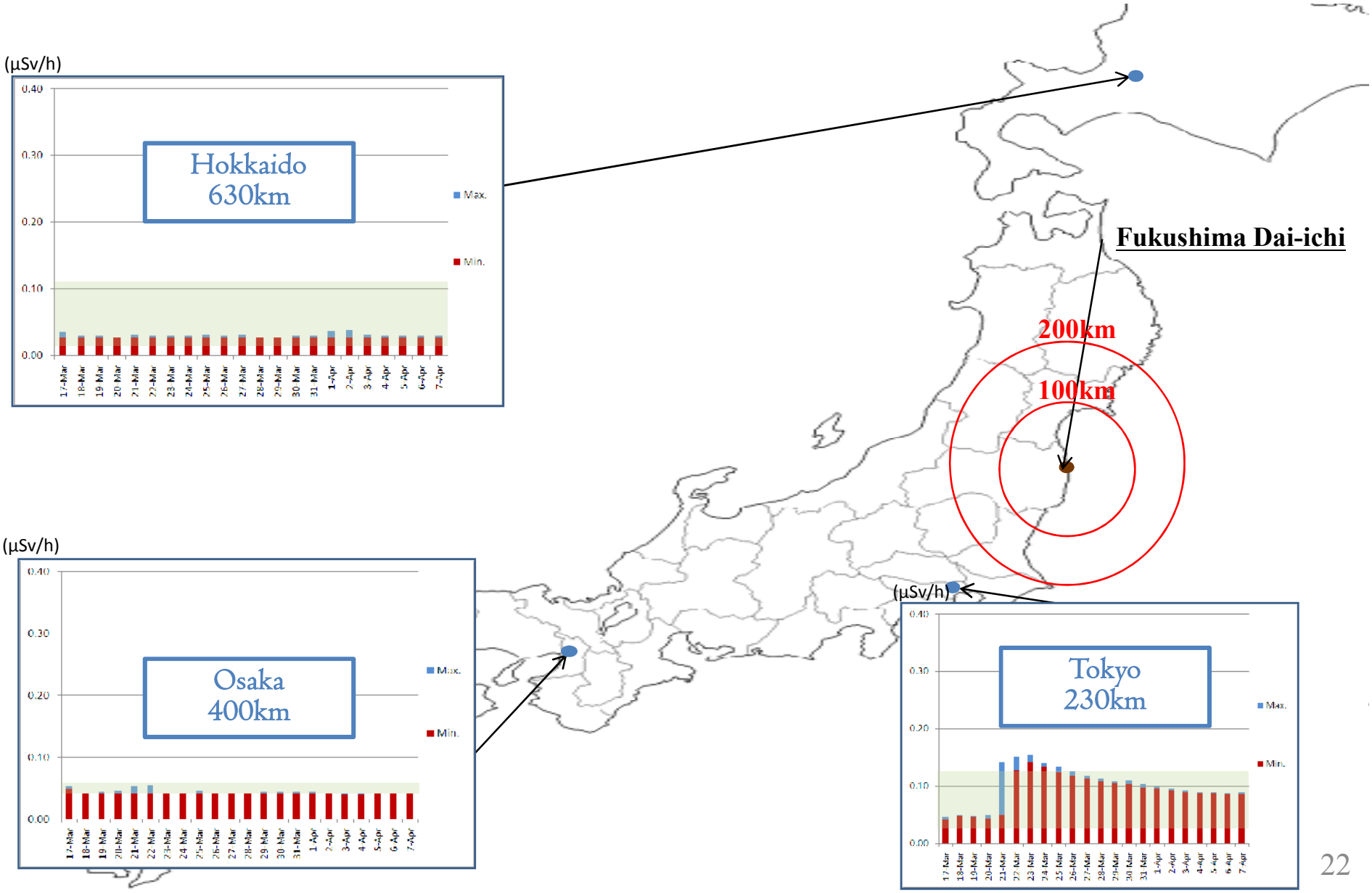




MEXT, Fukushima Prefectural Government

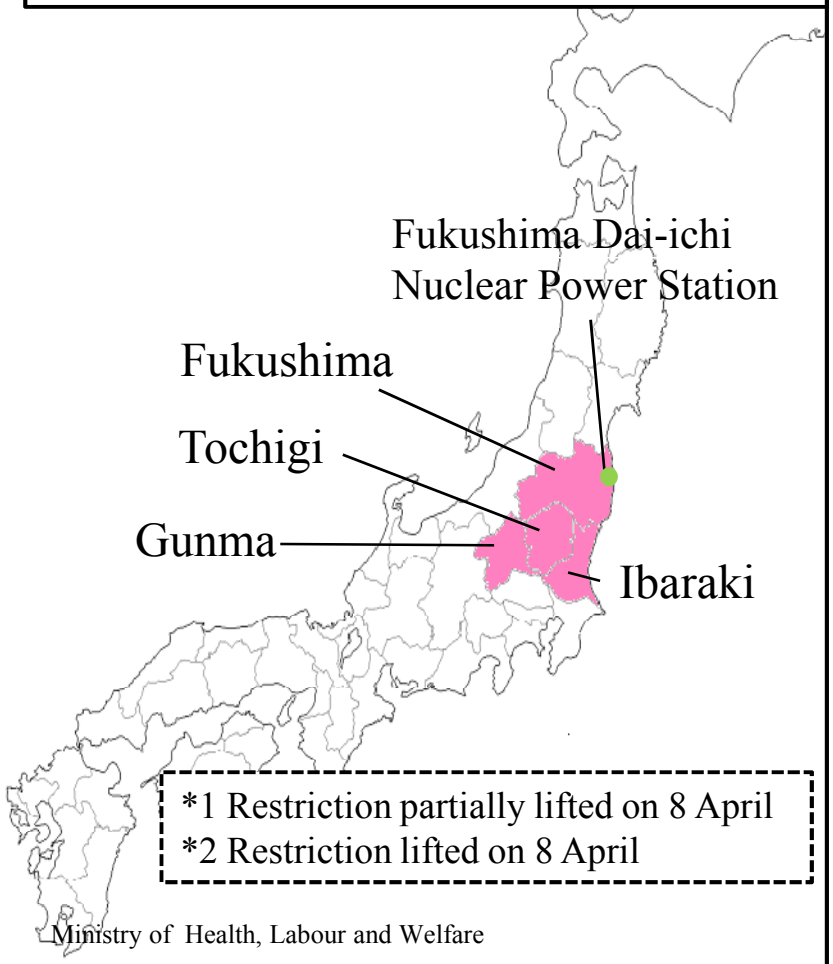
# Atmospheric Readings in Tokyo, Osaka and Sapporo



# 4. Ensure the Safety of Food and Water

The Japanese government inspects radiation dosages every day, and prohibits distribution and consumption of food that fails to meet stringent criteria.

**Instructions**
**(issued by Prime Minister on 21, 23 March and 4 April 2011)**




*1 Restriction partially lifted on 8 April
*2 Restriction lifted on 8 April

**… Not to Distribute**

**＊ Fukushima Prefecture**
- Fresh raw milk*1
- Non-head type leafy vegetables and head type leafy vegetables (e.g. spinach)
- Flowerhead brassicas including turnip (e.g. broccoli, cauliflower)

**＊ Ibaraki Prefecture**
- Fresh raw milk
- Spinach
- Parsley

**＊ Tochigi and Gunma*2 Prefectures**
- Spinach

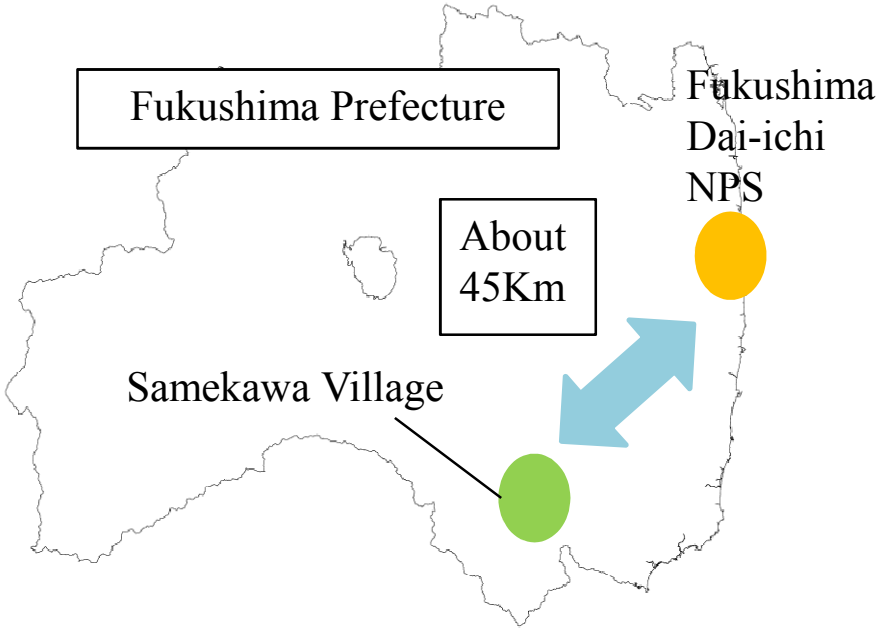
**＊ Chiba Prefecture**
- Spinach (Asahi-shi, Katori-shi, Tako-machi)
- Shungiku, Qing-geng-cai, Sanchu, Parsley, Celery (Asahi-shi)

**… Not to Consume**

**＊ Fukushima Prefecture**
- Non-head type leafy vegetables and head type leafy vegetables
- Flowerhead brassicas

Ministry of Health, Labour and Welfare

# Safety of Farm Products




**Radioactive Contamination in Leafy Vegetables in Samekawa-village (Fukushima Prefecture)**

| (bq/kg) | Samekawa-village | | |
|---|---|---|---|
| | 21-Mar | | 24-Mar |
| radioactive iodine | 5,900 | → | 1,200 |
| radioactive cesium | 1,700 | | 68 |

**Guidance Levels for Radionuclides in Vegetables**

| Japan | EU | IAEA * | |
|---|---|---|---|
| 2,000 | 2,000 | 3,000 | |
| 500 | 1,250 | 1,000 | (Cs134) |

Source: Ministry of Health, Labour and Welfare, EURATOM, IAEA

*OIL(Operational Intervention Levels )6 : Locally produced food, milk and water have been screened, and all members of the public, including infants, children and pregnant women can safely drink the milk and water and eat the food during the emergency phase.

# Safety of Drinking Water

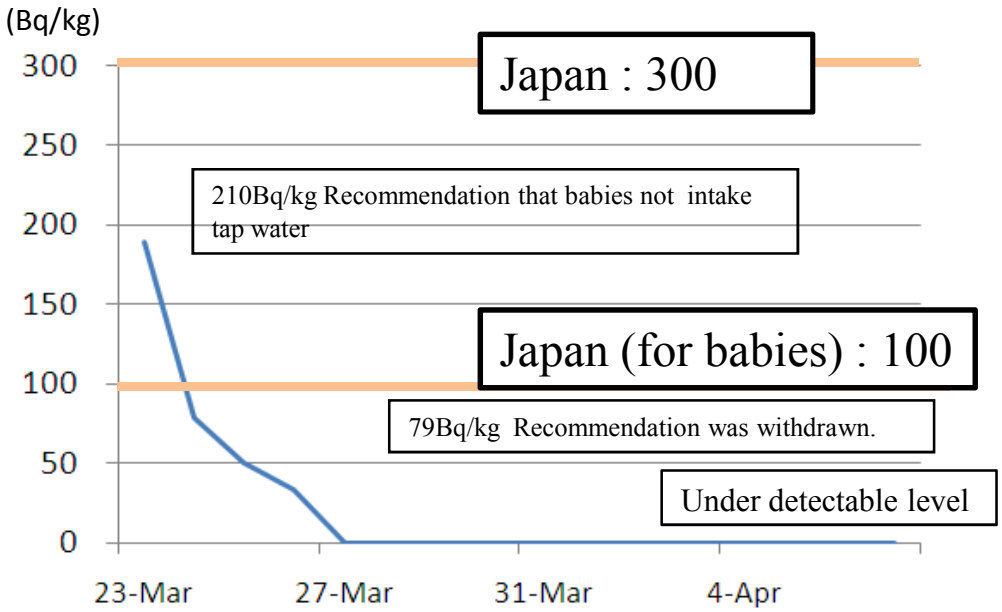
The Japanese Government has been implementing necessary measures based on its stringent criteria for radionuclides in drinking water, and monitoring radionuclide levels every day.

**Guidance Levels for Radionuclides in Drinking Water**

| (Bq/kg) | Japan | EU |
|---|---|---|
| radioactive iodine(I131) | 300<br>(for babies) 100 | 500 |
| radioactive cesium | 200 | 1,000 |

Ministry of Health, Labour and Welfare, EURATOM

**Radioactive Iodine(I131) in Drinking-Water in Tokyo**
(Kanamachi filter plant)




Bureau of Waterworks Metropolitan Tokyo Government

*On March 23, the Japanese Government recommended that the residents in Tokyo area refrain from having their babies intake tap water, but it withdraw the recommendation in two days.

# Safety of On-site Workers

The Japanese Government closely supervises on-site workers' health conditions, limiting the level of their maximum exposure to radiation to 250mSv.

No workers in Fukushima NPS have been exposed to 250mSv or more.

On March 24, three workers exposed to more than 170mSv were hospitalized, but were released four days later as no health problems were found.

**Emergency Dose Limit**

| mSv | JAPAN |
|---|---|
| emergency dose limit | 100<br>↓<br>250<br><br>(limit raised for Fukushima emergency workers) |

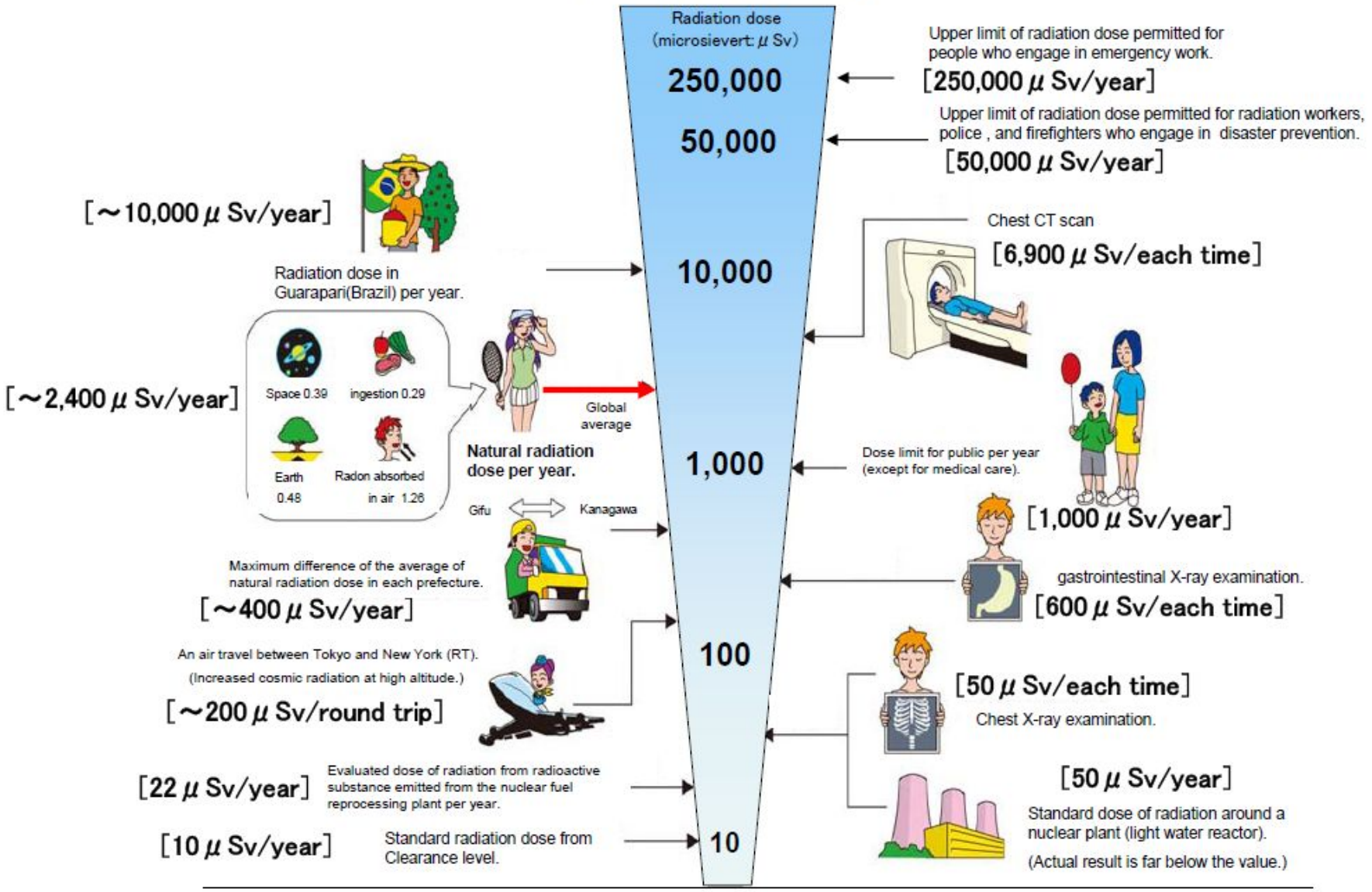
Ministry of Health, Labour and Welfare, Nuclear and Industrial Safety Agency, ICRP,

**Workers Exposed to Radiation in Fukushima Dai-ichi NPS, as of April 5**

| level of exposure | number of workers |
|---|---|
| more than 100mSv | 21 |
| more than 250mSv | 0 |

Nuclear and Industrial Safety Agency

# Radiation in Daily-life




Ministry of Education, Culture, Sports, Science and Technology (MEXT)

# C. Information Sharing and Cooperation with the International Community

1. Cooperation with the IAEA
2. Press Releases by International Organizations
3. Speedy Dissemination of Accurate Information

# 1. Cooperation with the IAEA

**1. Information Sharing**

(1) Japan has been providing facility-related and other relevant information to the IAEA.

(2) Nuclear Industry Safety Agency (NISA) provided updates on situations of the Fukushima Dai-ichi Nuclear Power Station at the IAEA Technical Briefing (21st March) and at the side event of the Fifth Review Meeting of the Contract Parties to the Convention on Nuclear Safety (4th April).

**2. IAEA Expert Missions**

(1) The IAEA has extended to Japan upon the request of the Government of Japan, in connection with the incidents involving the nuclear power plants in Japan by dispatching a series of the IAEA experts to Japan mainly in the field of radiation monitoring. Such dispatch of experts includes :

(i) Radiation Monitoring Teams, totaling up to 16 members who have been taking measurements mainly in Fukushima since 19 March;

(ii) one marine expert from the IAEA's laboratory in Monaco, who boarded Research Vessel "MIRAI" during 2 -4 April to observe and provide advice for Japanese experts on their method of collection and analysis of seawater samples; and

(iii) A Joint FAO/IAEA Food Safety Assessment Team, who met with local government officials, farmers etc. in Fukushima, Ibaraki, Tochigi and Gunma prefecture.

(2) In addition, IAEA experts in BWR technology met with Japanese officials and operators including NISA and the Tokyo Electric Power Company (TEPCO) and visited the Fukushima Dai-ichi Nuclear Power Plant on 6 April.

# 2. Press Releases by International Organizations

International Civil Aviation Organization (ICAO)

International Maritime Organization (IMO)

## ICAO and IMO released the same press releases twice

-'No Restrictions on Travel to Japan' on 18th March (ICAO) and 21th March (IMO)

- International flight and maritime operations can continue normally into and out of Japan's major airports and sea ports, excluding those damaged by the tsunami; according to the latest information available from WHO, IAEA, WMO, IMO and ICAO

- 'Current Radiation Levels In Japan And Travel Advice' on 1st April

- Radioactive material from the damaged Fukushima Daiichi Plant is gradually spreading outside of Japan into global atmosphere but at extremely low concentrations that do not present health or transportation safety hazards, according to the United Nations organizations closely monitoring the situation.
- Screening for radiation of passengers arriving from Japan is currently considered unnecessary at airports or seaports around the world.

World Health Organization (WHO)

-FAQs 'Japan Nuclear Concerns' on 5th April

- At this time, WHO is not advising general restrictions on travel to Japan.

# 3. 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

## 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

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