# **Great East Japan Earthquake**

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## Japan Water Works Association

## 12.05.2011

## **Great East Japan earthquake** 1 earthquake 2 Tsunamis **3Floods 4fires 5Nuclear disasters** BREAKING NEWS **TSUNAMI HITS** NHK WORLD C PWR BAP

The dairy Yomiuri Mar. 12

## Plates are around the outer layer of the earth







- 1 the Pacific plate sliders under the North American plate
- 2 The edge of the continental plate is pulled in, causing distortion, which builds up.
- 3 When the distortion reaches its limit, the land plate rebounds<sub>5</sub> and an earthquake occurs

## Mechanism of tsunami generation

The causes of Tsunamis : earthquakes, landslides and undersea volcanic activity

### **③Create waves**

②Seawater is lifted up the seabed. The sea bed experiences sudden movement up or down.

① Earthquake occurs when Pacific Plate slides under North American Plate

## ③Tsunami propagates

sunami

waves spread

### 4 Sea rises over a wide area

## Length of wave

(Several kilometers to several hundred kilometers)



The earthquake March 11 2:46 Scale: M=9.0

Disaster toll Killed 14,063 Missing 13,691 Injured 5,302 (20.04.2011)

Ekiren.co.jp on web



## The intensity on Japanese seismic scale



## Tsunami

Damage of Tsunami in the past 1. 1896:Meiji Sanriku Tsunami death toll 22,000 (include unidentified bodies)

2. 1933:Showa Sanriku Tsunami death toll 3,000

3. 1960: Chile Tsunami

death toll 14



http://dil.bosai.go.jp/library/risk/s01hajimeni/introduction<sup>1</sup>.



# Seawall





## Seawall



# Seawall





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The daily Yomiuri Mar 12,2011



3:08 coastal area in **Iwate Pre.** 



読売新聞10.4.2011



the waves receded and the marine level became low







## 中国・タイなどきょう救助隊を派遣







## 米海軍10隻以上の艦船が救助活動へ The ship was pulled and sank



## Cars were swallowed by the waves and went under.

From the Daily Yomiuri Mar 12,2011

# Sewage treatment plant



#### 日本下水道新聞16.3.2011



The piles of wrecked cars and debris in a major road

From the daily yomiuri Mar 13,2011



From the daily yomiuri Mar 13,2011



1.Hundreds cars lay in ruin after being washed away by the tsunami..

Nandrali of can lie is rule langraday moving alter being westerd away by a turnersi and bornet in Tokainara. Oarabi Prefecture.



2.Ships lay aground after being washed away by the tsunami

From the Daily Yomiuri Mar 13,2011

High is appoint laberlay marking after being washed away by a transmille Kansonawa, Myagi Profection,

## **Tsunami destroyed an apartment building**



# **Tsunami destroyed Schools**





A resident is finished to a reason followerse in Watchsylold Word, Sensish, on Sense Any converge.

# A resident was hoisted to a rescue helicopter



Braildoors and he hadp cells as "205" sign on a confect is Biomenance. Bigagi Professors, an Interday manage. Some residents called for help with an "SOS" sigh on a rooftop

From the Daily Yomiuri Mar 13,2011

# Liquefaction occurred



From the Daily Yomiuri Mar 26,2011

# Utility poles tilted



# Manholes were pushed out of the ground by liquefaction



From the Daily Yomiuri Mar 26,2011

# Nuclear power plant the incident



The daily Yomiuri Mar. 17.2011

# Seawater flooded the area N-power plant



読売新聞10.04.2011



The daily Yomiuri Mar. 16.2011



From the Daily Yomiuri Mar 16,2011

# Helicopter dumped seawater



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From the Daily Yomiuri Mar 18,2011



Areas where people are urged to stay indoors

## Radiation exposure, health hazards



# Nuclear Problems

- High levels of radioactive substances have been detected in seawater collected near the troubled nuclear power plant
- Safety standards of water were exceeded for infants to drink.
- Radioactive iodine was many times over limit.
- Atmospheric radioactivity was increased etc.

# Timetable for ending the ongoing emergency

- Power utility defined the next three months as "Step1" and the three to six months following that as "Step2".
- The biggest target for Step1 will be to ensure the reactors at the facility can be stably cooled.
- The second step will seek to step leakage of radioactive materials into the air.

# International aid



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# International aid



### From the Daily Yomiuri April 4,2011

# **Remain alert**

- Everyone should remain vigilant, paying attention to information about disasters such as earthquakes or tsunamis on television and radio.
- 2. Lifelines such as electricity, gas and water have been suspended many areas.
- 3. Telephones, the Internet and other forms of communication have connection difficulties.

# Don't panic

- 1. We must act in a level-headed manner and not panic.
- 2. People in the same companies, schools and communities should help each other.
- 3. Local residents' rescue and relief activities helped minimize the damage.

# Crisis management



**Publicly Available Specification 22399** 

## Bringing together the wisdom of international community A primary school graduation ceremony

#### **Disaster relief**





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Evacuation center

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the Daily Yomiuri Mar

**Questions & Answers** 

What number of population was affected by interruption or reduction of water supply ?

It would came up to around 1.6 million households.

What consequences on extra water consumption needs in neighboring cities hosting refugees ?

Water utilities across the nation and SDF joined in relief activities to provide suffered people with safety water through trucks with water tank. And costs of them should be paid by the government due to the law.

Local government also required to shoulder a part of the costs.

## Questions & Answers

Were there special measures taken concerning the quality of the water distributed ?

There were a few water utilities to add activated carbon treatment to cope with radioactive detected in water, which happened in relation with nuclear power plant accidents damaged by the earthquake and tsunami.

Has there been distribution of bottled water or any other alternate water supply ? if so how ?

Local bodies have provided relief goods and foods including bottled water so that JWWA has not been informed that any water utilities provided bottled water to people at evacuation sites.

## **Questions & Answers**

Are there any assumptions concerning the consequences of the tsunami on underground water quality (salinity) ?

Three water utilities damaged by tsunami have suspended intake water from shallow wells, due to the value of their chloride ion beyond standard value of 200mg/l.

Is there already any estimation of infrastructure destruction costs ?

Some financial institutions released the information about it on their webs but yet not by the government. So that JWWA is afraid that it would be too early to share about it.