The Great East Japan Earthquake Information from Official Websites

Preface

We, Department of International Affairs of JST, originally made this English version of reference booklet on the “Great East Japan Earthquake” so that it can help ourselves both understand a series of disasters, which have occurred since March 11, 2011, namely the gigantic earthquake and tsunami that struck the north east region of Japan and the subsequent accidents related to Fukushima Daiichi Nuclear Plant, and explain as correctly and adequately as possible based on official information when we are requested from foreign society such as the diplomatic circle in Tokyo or our foreign counterpart organizations.

The contents in this reference booklet are as follows;

1. Earthquake and Tsunami
   - Data of the earthquake and tsunami
   - Damage of the earthquake and tsunami
2. Nuclear Power Plant Accident
   - Fukushima Daiichi Nuclear Plant
   - Water, Food, Atmosphere, etc.
   - Evacuation
   - Restoration Plan, etc.

These pieces of information are basically from the official announcements of the government of Japan or authorized scientific organizations because we think whose responsibilities are legally stipulated and therefore their information is comparatively reliable. All the information shows its reference such as URL of the websites so that readers can trace and update the information by themselves in accordance with their own interest. The responsibility on cited data in this reference booklet is attributed to organizations who released the data.

Recently, we have heard that many foreign researchers tend to be cautious and hesitant and sometimes give up trying to come to Japan because they are not informed of reliable data to make sure of the real radioactivity risks caused by the Fukushima accident.
We suppose this case happens partly because official information released from the government of Japan or authorized scientific organizations have not reached to them either in a timely manner or adequate translation for foreign people and they do not know how to do.

Hoping it could be a small help to ease and improve the above mentioned situation, we would like to post our reference booklet on website for public use. We would be more than happy if various kinds of information this booklet offers could help as many hesitating foreign researchers as possible to evaluate the situation correctly and decide to come to Japan.

As of July 20, 2011

～Contents～

As of July 20, 2011

(注意)

・*青字イタリック*: 原文(日本語)を JST にて英訳。

・項目番号は引用時の構成にあわせて、原文から適宜変更している。

(Notice)

・***Blue Italic Font***: JST translated original Japanese text to English.

・Itemized numbers may be changed from the original for editing

As of July 20, 2011

1. 地震・津波について ~ Earthquake and Tsunami ~

1-1. (地震・津波情報)

Data of the earthquake and tsunami

1-1-(1). 地震の規模 Scale of Earthquake

<本震>

Date and Time: 11 March 2011 14:46

Magnitude: 9.0 (interim value; the largest earthquake recorded in Japan)

Epicenter: N38.1, E142.9 (130km ESE off Oshika Peninsula) Depth 24km (interim value)

(Attachment <1-1> :Map of location of the Main Shock and Aftershocks)

Japan Meteorological Agency (JMA) Seismic Intensity:

7 (Max)	Kurihara City of Miyagi Prefecture
6+	28 cities and towns (including Wakuya Town, Tome City, Osaki City, Natori City) in Miyagi, Fukushima, Ibaraki, and Tochigi Prefectures
6- or weaker	Observed nationwide from Hokkaido to Kyushu

(Attachment <1-2>: Distribution of JMA Seismic Intensity)

<余震> Aftershock

Number:

2	Seismic Intensity 6+	25	Seismic Intensity 5-
2	Seismic Intensity 6-	140	Seismic Intensity 4
6	Seismic Intensity 5+		

Main aftershocks:

On April 7, an earthquake of magnitude 7.4 (preliminary estimate) occurred, with its epicenter off the coast of Miyagi Prefecture.

On April 11, a 6.3-magnitude earthquake (preliminary estimate) struck, with its epicenter in the Hamadori area, Fukushima Prefecture.

引用：気象庁"The 2011 off the Pacific coast of Tohoku Earthquake -Portal-"
http://www.jma.go.jp/jma/en/2011_Earthquake.html
緊急災害対策本部(May 13, 2011)
http://www.kantei.go.jp/saigai/pdf/201105131700jisin.pdf

（参考情報）

(1) Comparison to Great Hanshin-Awaji Earthquake

Date and Time: 17 January 1995 5:46

Magnitude: 7.3

Epicenter: N34.36 E135.02 (the northern part of Awaji Island) Depth 16km
JMA Seismic Intensity: The maximum Seismic Intensity Scale was 7 in part of Kobe City of Hyogo Prefecture.

引用：神戸市“The Great Hanshin-Awaji Earthquake Statistics and Restoration Progress”
http://www.city.kobe.lg.jp/safety/hanshinawaji/revival/promote/january.2011.pdf

(2)Tables explaining the JMA Seismic Intensity Scale
(Attachment <1-3>: illustration of Seismic Intensity Scale)

(3)Explanation of earthquake magnitude

Magnitude refers the size of an earthquake. It's obtained by calculating the maximum amplitude of waves measured by a seismograph. If the energy of the earthquake is large, the magnitude increases. Thus, a difference in magnitude of 1.0 is equivalent to a factor of about 30 in the energy released; a difference in magnitude of 2.0 is equivalent to a factor of 1000 in the energy released.

Earthquakes are classified into several levels by magnitude; great (more than M7), moderate (more than M5 and less than M7), light (more than M3 and less than M5), minor (more than M1 and less than M3) and micro(less than M1).

引用：地震調査研究推進本部"地震の発生メカニズムを探る"
http://www.jishin.go.jp/main/pamphlet/eq_mech/index.htm
防災科学技術研究所 Hi-net"地震の基礎知識"
http://www.hinet.bosai.go.jp/about_earthquake/part1.html

1-1-(2). 津波の規模

Observed Tsunami:

	First tsunami	Maximum height of tsunami
Miyako(Iwate)	+0.2m (March 11, 14:48)	+8.5m<= (March 11, 15:26)
Ofunato(Iwate)	-0.2m (March 11, 14:46)	+8.0m<= (March 11, 15:18)
Soma(Fukushima)	+0.3m (March 11, 14:55)	+9.3m<= (March 11, 15:51)
Ishinomaki(Miyagi)	+0.1m (March 11, 14:46)	+7.6m<= (March 11, 15:25)

※Maximum height of tsunami cannot be retrieved so far due to the troubles. Actual maximum height might be higher.
(Attachment <1-4>: Information of observed Tsunami)

引用：気象庁“The 2011 off the Pacific coast of Tohoku Earthquake -Portal-“
http://www.jma.go.jp/jma/en/2011_Earthquake.html

Tsunami Warnings and Advisories: Japan Meteorological Agency issued Tsunami Warning (Major Tsunami) at 14:49, i.e. 3 minutes later of the earthquake. Tsunami Warning and Tsunami Advisory were completely cleared on 17:58, March 13.

引用:防災科学技術研究所” Preliminary report of the 2011 off the Pacific coast of Tohoku Earthquake”(March 25, 2011)
http://www.bosai.go.jp/e/international/Preliminary_report110328.pdf

Column 津波の海外への影響

Observed Tsunami in foreign countries: The tsunami propagated to the coast of Hawaii, northern and southern America countries, and the Pacific countries.

引用:防災科学技術研究所” Preliminary report of the 2011 off the Pacific coast of Tohoku Earthquake”(March 25, 2011)
http://www.bosai.go.jp/e/international/Preliminary_report110328.pdf

The tsunami rolled across the Pacific at 800km/h (500mph) - as fast as a jetliner - before hitting Hawaii and the US West Coast, but there were no reports of major damage from those regions.

Thousands of people were ordered to evacuate coastal areas in the states of California, Oregon and Washington.

The biggest waves of more than 6-7ft (about 2m) were recorded near California's Crescent City, said the Pacific Tsunami Warning Centre.

A tsunami warning extended across the Pacific to North and South America, where many other coastal regions were evacuated, but the alert was later lifted in most parts, including the Philippines, Australia and China.

引用:BBC News
http://www.bbc.co.uk/news/mobile/world-asia-pacific-12709598

As of July 20, 2011

Attachment<1-1>

Map of location of the Main Shock and Aftershocks

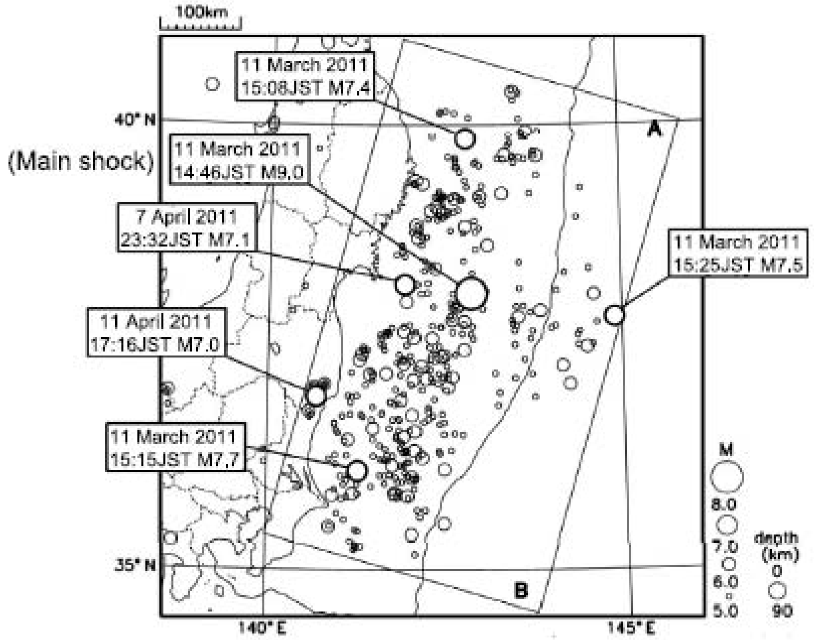
http://www.jma.go.jp/jma/en/2011_Earthquake/2011_Earthquake_Aftershocks.pdf

The 2011 off the Pacific coast of Tohoku Earthquake

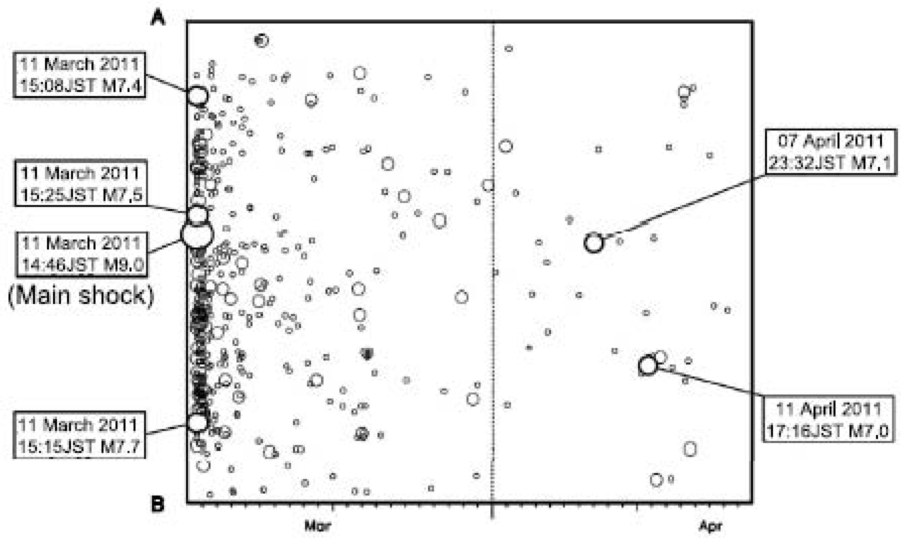
Location of the Main Shock and Aftershocks

Period 12:00 JST, 11 March - 12:00 JST, 18 April, 2011

Depth <= 90km, Magnitude >= 5.0



Time-Space Distribution of aftershocks in the above rectangular area (Projected A-B line)



Circles indicates the main shock and aftershocks

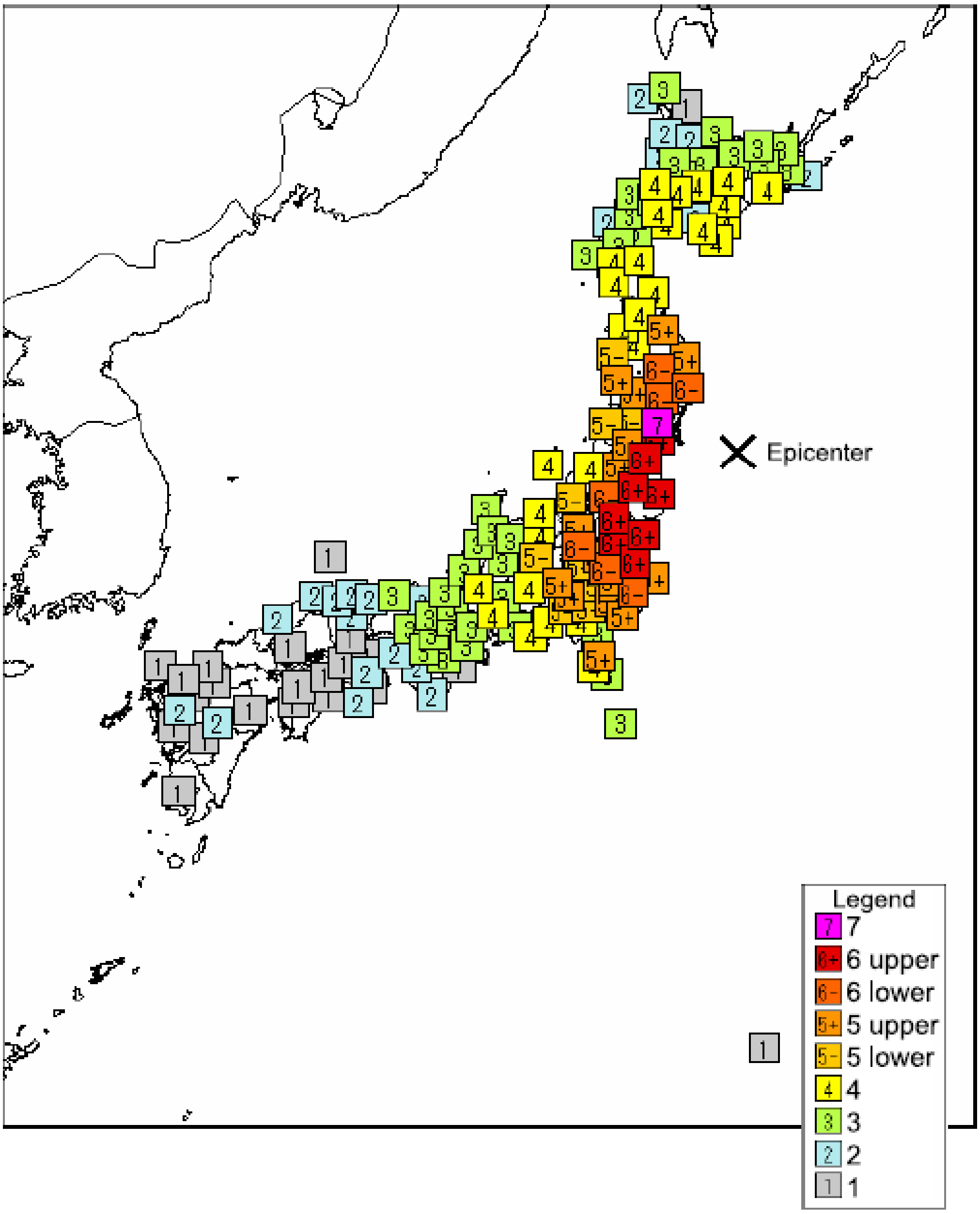
Size of circles corresponds with their magnitude

Distribution of JMA Seismic Intensity

http://www.jma.go.jp/jma/en/2011_Earthquake/2011_Earthquake_Intensity.pdf

The 2011 off the Pacific coast of Tohoku Earthquake

Distribution of JMA Seismic Intensity



As of July 20, 2011

Attachment<1-3>

Illustration of Seismic Intensity Scale

http://www.jma.go.jp/jma/en/Activities/intsummary.pdf

As of July 20, 2011

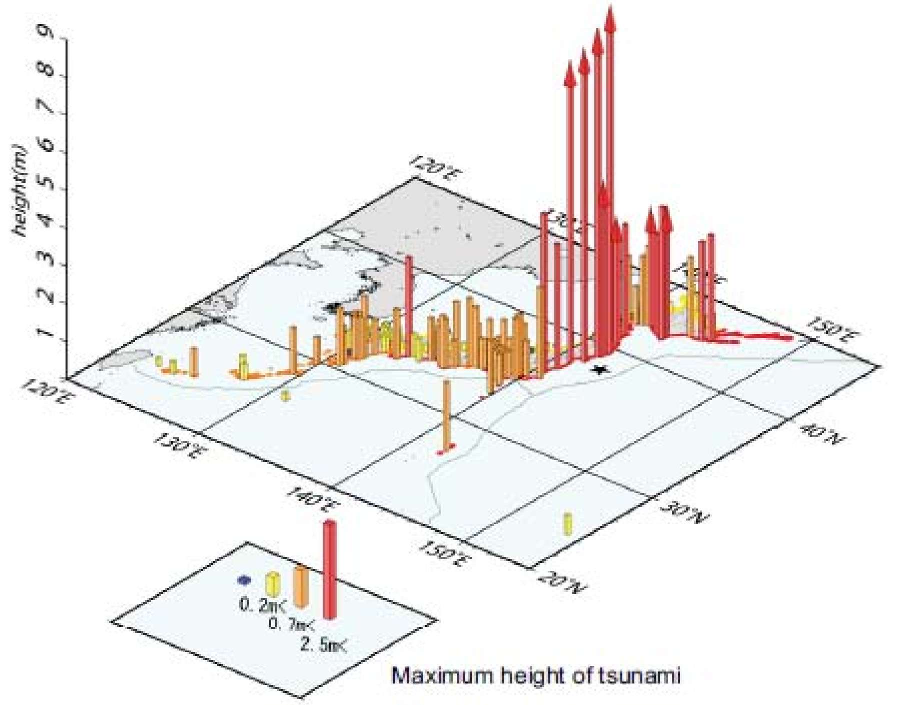
Attachment<1-4>

Information of observed Tsunami

http://www.jma.go.jp/jma/en/2011_Earthquake/2011_Earthquake_Tsunami.pdf

The 2011 off the Pacific coast of Tohoku Earthquake

Observed Tsunami



Observed Tsunami (time and height)

	First tsunami	Maximum height of tsunami
Miyako (Iwate)*	March 11, 14:48 JST +0.2m	March 11, 15:26 JST +8.5m<=
Ofunato (Iwate)*	March 11, 14:46 JST -0.2m	March 11, 15:18 JST +8.0m<=
Ishinomaki (Miyagi)*	March 11, 14:46 JST +0.1m	March 11, 15:25 JST +7.6m<=
Soma (Fukushima)*	March 11, 14:55 JST +0.3m	March 11, 15:51 JST +9.3m<=
Oarai (Ibaraki)	March 11, 15:15 JST +1.8m	March 11, 16:52 JST +4.2m
Kamaishi (Iwate)*	March 11, 14:45 JST -0.1m	March 11, 15:21 JST +4.1m<=
Mutsu (Aomori)	March 11, 15:20 JST -0.1m	March 11, 18:16 JST +2.9m
Nemuro (Hokkaido)	March 11, 15:34 JST slight	March 11, 15:57 JST +2.8m
Tokachi (Hokkaido)*	March 11, 15:26 JST -0.2m	March 11, 15:57 JST +2.8m<=
Urakawa (Hokkaido)	March 11, 15:19 JST -0.2m	March 11, 16:42 JST +2.7m

* Maximum height of tsunami cannot be retrieved so far due to the troubles.
Actual maximum height might be higher.

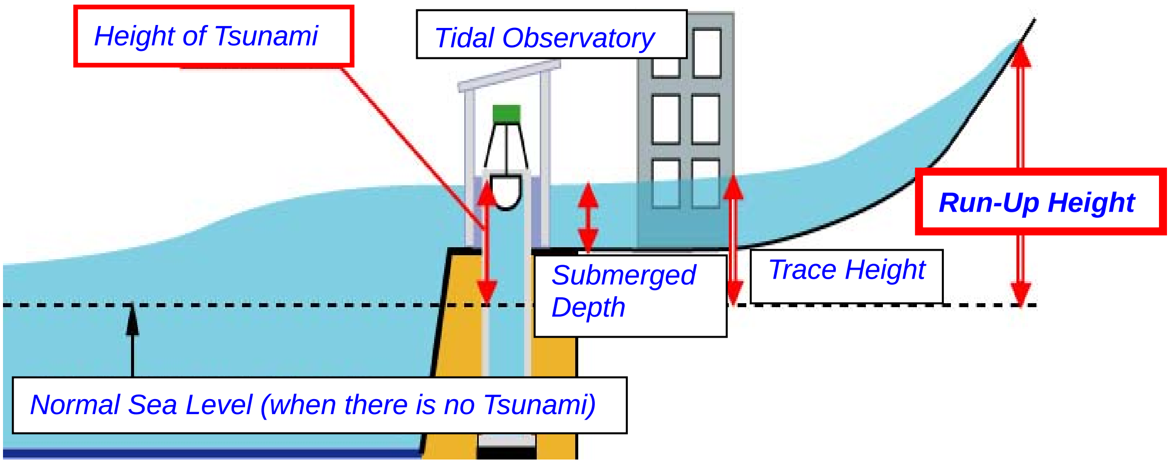
Column 津波の高さと遡上高（Run-Up Height）についての現地調査（東京大学地震研究所、暫定）

On 3rd and 4th of April, tsunami investigation was held from Miyako city to Kuji city. At Aonotaki, a Tsunami run-up height of 34.8 *m* was measured, comparable to 37.9 *m* at Koboriuchi Fisheries Cooperative Association. The black dots on the map below indicate for surveying points and the white dots are for inspection points. The numbers on bracket by the inspection points are an approximate height, so the result of further investigation is effective.

(in meter)

Earthquake Research Institute, The University of Tokyo（東京大学地震研究所）
http://outreach.eri.u-tokyo.ac.jp/eqvolc/201103_tohoku/eng/tsunamiinvestigation/

遡上高 (Run-Up Height)について



"Height of Tsunami" refers to the gap in sea level raised by Tsunami from normal sea level when no Tsunami is taking place. Whereas the height (elevation) which Tsunami runs up from waterfront toward inland is called "Run-Up Height", and this is well known to have a height ranging from the comparable one as the "Expected Tsunami Height" released by Meteorological Agency, to even around quadruple height at a maximum.

参考:日本語原文

なお、「津波の高さ」とは、津波がない場合の潮位（平常潮位）から、津波によって海面が上昇したその高さの差を言います。 さらに、海岸から内陸へ津波がかけ上がる高さ（標高）を「遡上高（そじょうこう）」と呼んでいますが、「遡上高」は気象庁から発表される「予想される津波の高さ」と同程度から、高い場合には4倍程度までになることが知られています。

Japan Meteorological Agency (気象庁)
http://www.jma.go.jp/jma/kishou/know/faq/faq26.html

1-2. 地震・津波による被害について (Damage of the earthquake and tsunami)

1-2-(1). 被災者数(死亡者、行方不明者、避難者)について

Q1. *How bad was human suffering due to the earthquake and tsunami?*

A2. The earthquake and tsunami devastated the Tohoku district and other regions. Damages were inflicted in Kanto district, too. The number of deaths is 15,560, the number of injured is 5,689, and the number of missing is 5,329 (as of July 13 according to the National Police Agency). The number of those evacuated is approximately 111,532 (as of July 7 at 15:00 according to the Fire and Disaster Management Agency).

Latest information available

(as of July 13, 2011, according to the National Police Agency)

Dead	15,560
Injured	5,689
Missing	5,329

引用：外務省、警察庁

http://www.mofa.go.jp/j_info/visit/incidents/index.html

http://www.mofa.go.jp/j_info/visit/incidents/index2.html#damages

http://www.npa.go.jp/archive/keibi/biki/higaijokyo.pdf

1-2-(2). 建物被害について

Q2. How was the damage regarding the infrastructure and the building in the Tohoku district?

A2. In the Tohoku district and other regions, electricity, gas and water were disconnected in many areas. Roads, railways, airports, and other infrastructure were also severely damaged. Currently, the whole nation is working for the post-disaster rehabilitation, and lifelines and infrastructures are gradually recovering, including a partial resumption of operation, from April 13, of Sendai Airport, which had been closed due to the earthquake and tsunami damages.

The actual numbers of the building damage were as follows:
(July 19, 2011, National Police Agency)
- Fully-destroyed: 109,741
- Half-destroyed: 125,373
- Partial damage: 457,967

引用：外務省

http://www.mofa.go.jp/j_info/visit/incidents/index.html

参照:警察庁緊急災害警備本部

http://www.npa.go.jp/archive/keibi/biki/higaijokyo.pdf

1-2-(3). 火災発生件数について

Q3. *How many fires were caused by the earthquake?*

A3. *345 fires were reported although all the fires were put out by now. (as of April 20, 2011, 11:00)*

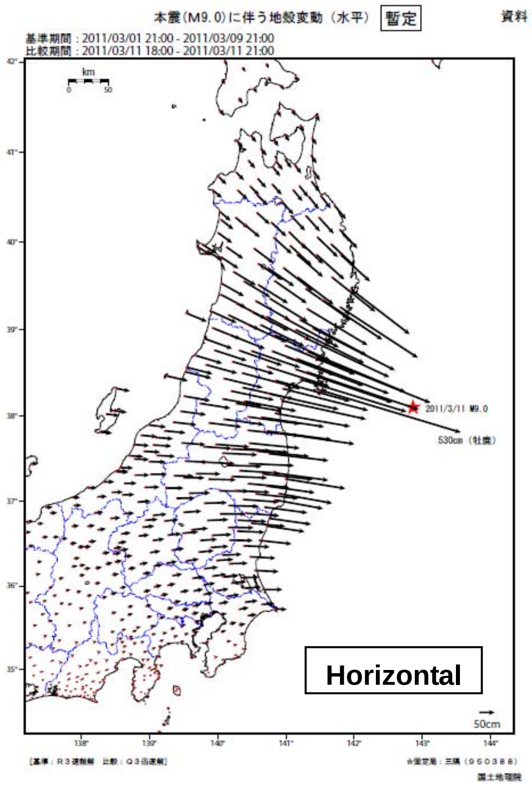
参照:消防庁災害対策本部

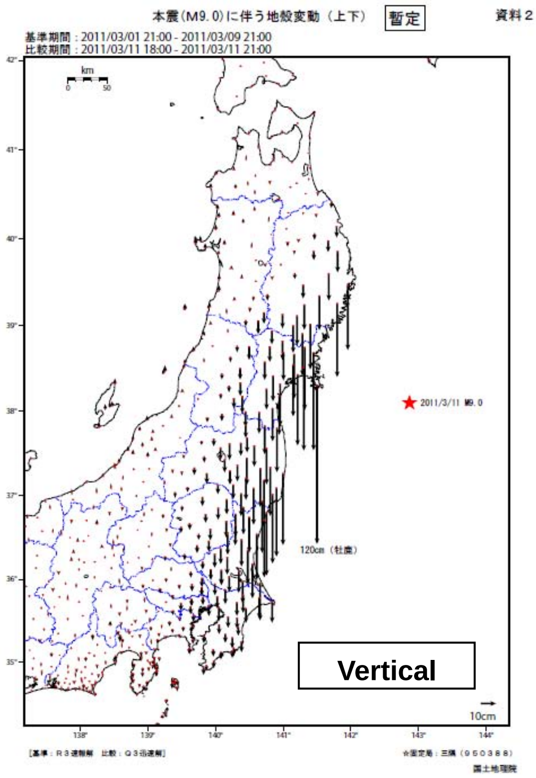
http://www.fdma.go.jp/bn/data/%E5%B9%B3%E6%88%9023%E5%B9%B4%EF%BC%882011%E5%B9%B4%EF%BC%89%E6%9D%B1%E5%8C%97%E5%9C%B0%E6%96%B9%E5%A4%AA%E5%B9%B3%E6%B4%8B%E6%B2%96%E5%9C%B0%E9%9C%87%EF%BC%88%E7%AC%AC109%E5%A0%B1%EF%BC%89.pdf

1-2-(4). 地殻変動・地盤沈下・浸水地域の状況

Q4. *Did the earthquake cause earthquake deformation?*

A4. *Yes, we observed 1.2 m of vertical (downward) crustal movement and 5.3 m of horizontal (to the east) crustal movement at a maximum.*
[Observation point: Ojika, Ishinomaki City, Miyagi Prefecture]





引用・参照:国土地理院

http://www.gsi.go.jp/chibankansi/chikakukansi40005.html

（原文）

3 月 11 日に発生した東北地方太平洋沖地震（M9.0）では、最大で水平方向に約 5.3m、上下方向に約 1.2m という極めて大きな地殻変動が観測されました。本震発生時に、電子基準点「牡鹿」（宮城県石巻市）が、東南東方向へ約 5.3m動き、約 1.2m 沈下するなど、北海道から近畿地方にかけて広い範囲で地殻変動が観測されました。

Q5. *How large area was submerged under water due to tsunamis?*

A5. *Total flooded area in 6 prefectures (Aomori, Iwate, Miyagi, Fukushima, Ibaraki, and Chiba) is estimated to be 561 km^2 based on the data collected from satellite images. It is as large as 90 % of Tokyo's 23 wards.*

参照：国土地理院

http://www.gsi.go.jp/common/000059939.pdf

青森、岩手、宮城、福島、茨城、千葉の6 県62 市町村の空中写真・衛星画像判読による浸水範囲面積の合計は561km2（山手線の内側の面積63km2 の約9 倍）でした。

Column Liquefaction (液状化)

Liquefaction took place a various place, sand boils and ground subsidence were also observed as a consequence of liquefaction. The manholes floated due to the loss of effective stress, in fact the shaking was not too strong but the frequency was high. *According to the Japanese Geotechnical Society, the liquefaction damage by this earthquake was at least 42 km^2 only in the Tokyo Bay area, which might be the worst in the world's history.*

写真引用：地盤工学会「東北地方太平洋沖地震の災害調査情報　一時調査（東畑郁生委員他からの調査報告）

http://www.jiban.or.jp/file/towhata.pdf

参照：毎日新聞デジタル運営サイト

http://mainichi.jp/select/weathernews/news/20110417ddm001040086000c.html

1-2-(5). 経済的な被害総額

Q6. *How much was the financial damage due to the earthquake and tsunami?*

A6. *According to the information from relevant prefectures and ministries, the Cabinet Office estimates that the direct financial damage is approximately 16.9 trillion yen (199 billion US dollars/ Exchange rate: 1USD = 85JPY) as follows:*

[Reference] Comparison of Financial Damage between the Great East Japan Earthquake and the Great Hanshin Awaji Earthquake

(June 24, 2011)

	The Great East Japan Earthquake	The Great Hanshin Awaji Earthquake
Buildings, etc. (housing, offices, plants, machinery, etc.)	approx.**10.4** trillion yen	approx.**6.3** trillion yen
Lifeline utilities (Water service, gas, electricity, and communication and broadcasting facilities)	approx.**1.3** trillion yen	approx.**0.6** trillion yen
Social infrastructure (River, road, harbors, drainage, and airport, etc.)	approx.**2.2** trillion yen	approx.**2.2** trillion yen
Others (including agriculture, forestry and fisheries)	approx.**3.0** trillion yen	approx.**0.5** trillion yen
Total	approx.**16.9** trillion yen	approx.**9.6** trillion yen

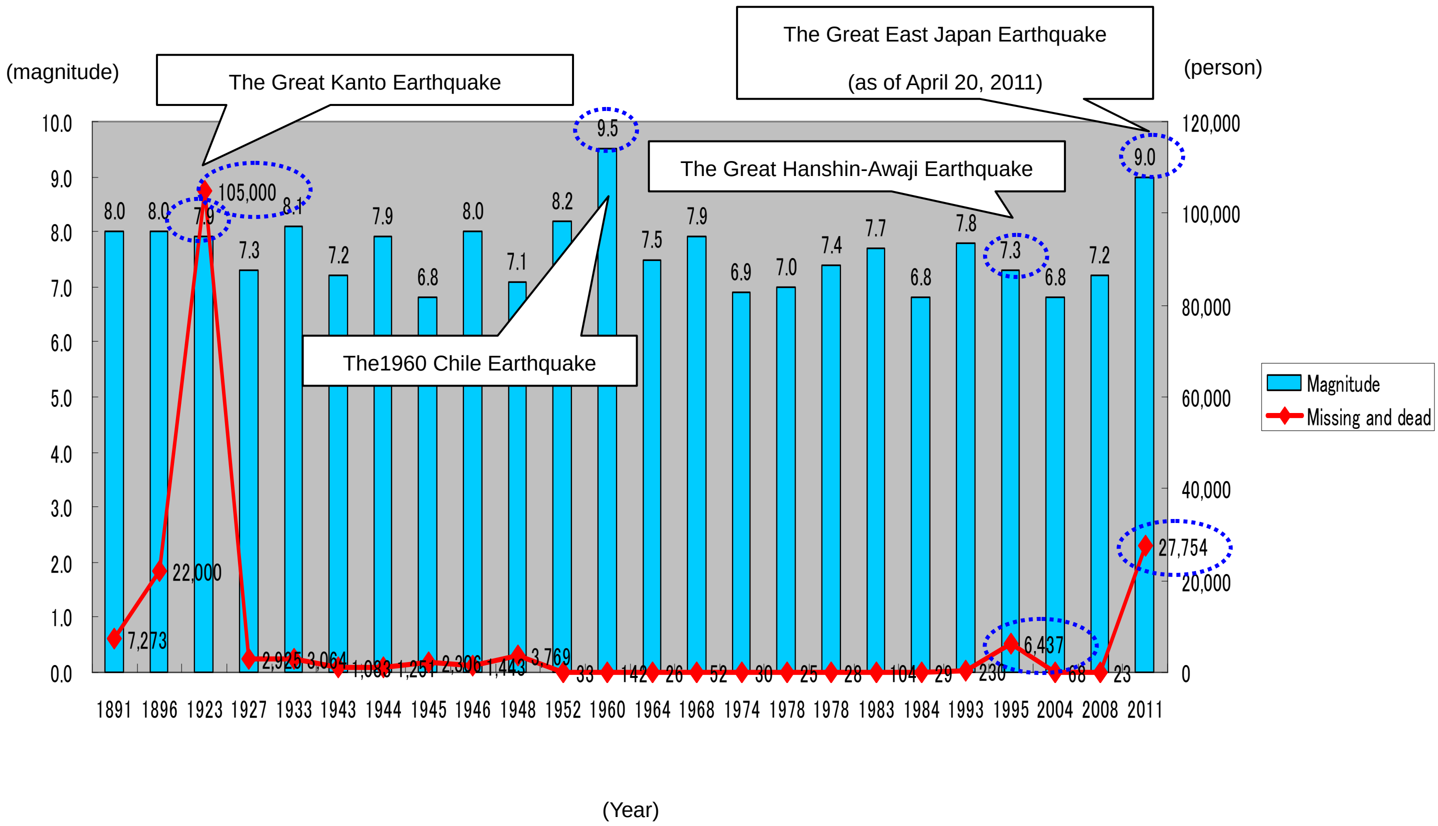
参照：内閣府「東日本大震災における被害額の推計について」
http://www.bousai.go.jp/oshirase/h23oshirase.html
http://www.bousai.go.jp/oshirase/h23/110624-1kisya.pdf

Column *Major Earthquakes in Japan (since the Meiji era, 1868~)（日本の主な被害地震（明治以降））*

Historically, Japan has been hit by many huge earthquakes which killed thousands of people. This earthquake caused the second heaviest damage next to the Great Kanto Earthquake in 1923.

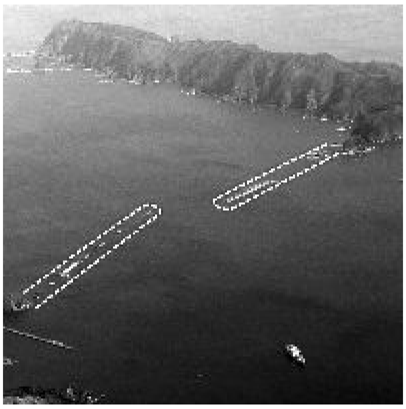
参照：内閣府「平成 22 年版防災白書」（理科年表、消防庁資料、日本被害地震総覧）
http://www.bousai.go.jp/hakusho/h22/bousai2010/html/hyo/hyo014.htm

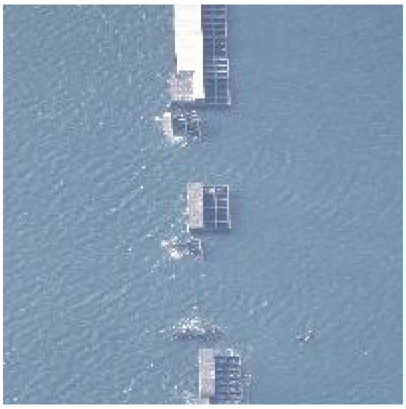
Major Earthquakes in Japan (since the Meiji era)



Column Tsunami destroyed the world's biggest waterbreak (釜石市　世界一の防波堤破壊)

One of the most severely damaged cites by the Great East Japan Earthquake, Kamaishi City, Iwate Prefecture, was internationally famous for the world's biggest breakwater, which was completed in 2009. With 20 m in thickness, its height was 8 m above the ocean surface and its depth was 63 m under sea. Although the waterbreak had durability against an earthquake of M8.5, the tsunami destroyed it into pieces with the power (momentum) equal to 250 jumbo jets at the speed of 1,000 km/hour. In Kamaishi City, 1,331 people are dead or still missing, and 5,038 people have been evacuated. More than 3,846 buildings were fully or partially destroyed. (as of April 19, 2011, 19:00)





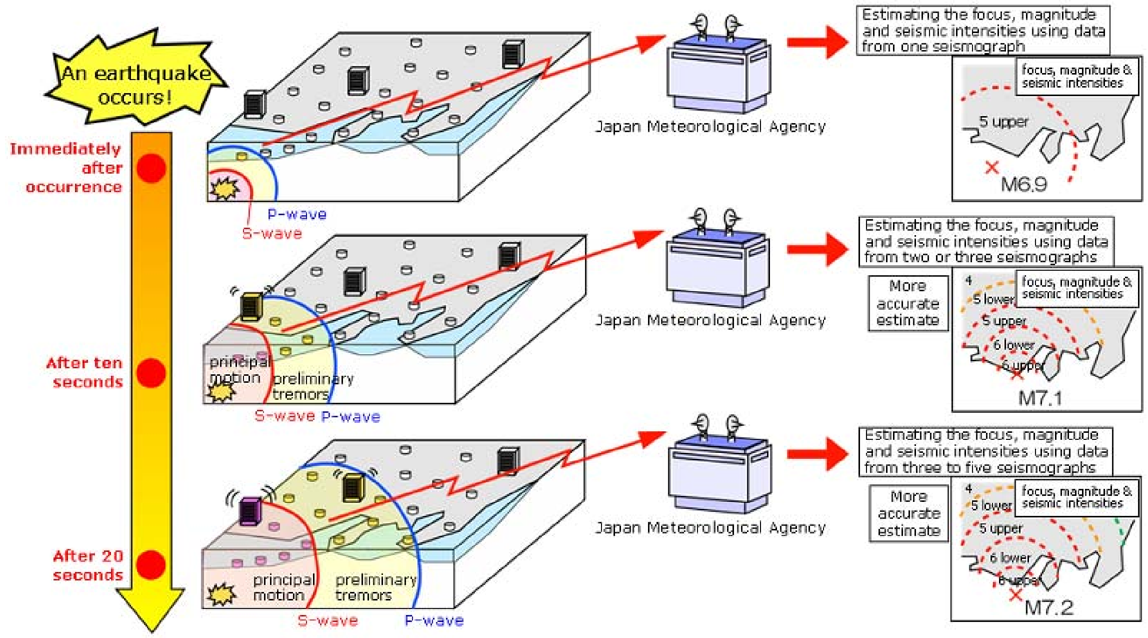
引用・参照：YOMIURI ONLINE
http://www.yomiuri.co.jp/science/news/20110320-OYT1T00777.htm
参照：岩手県災害対策本部「平成 23 年東北地方太平洋沖地震及び津波災害対応概況（平成 23 年4月 19 日 19:00 現在）」
http://sv032.office.pref.iwate.jp/~bousai/taioujoukyou/201104191700taioujyoukyou.pdf

1-2-(6). 地震に関連した日本の科学技術

Q7. What is an Earthquake Early Warning? (緊急地震速報 (Kinkyu Jishin Sokuho) in Japanese)

A7. The Earthquake Early Warning system provides advance announcement of the estimated seismic intensities and expected arrival time of principal motion. These estimations are based on prompt analysis of the focus and magnitude of the earthquake using wave form data observed by seismographs near the epicenter.

The Earthquake Early Warning is aimed at mitigating earthquake-related damage by allowing countermeasures such as promptly slowing down trains, controlling elevators to avoid danger and enabling people to quickly protect themselves in various environments such as factories, offices, houses and near cliffs.

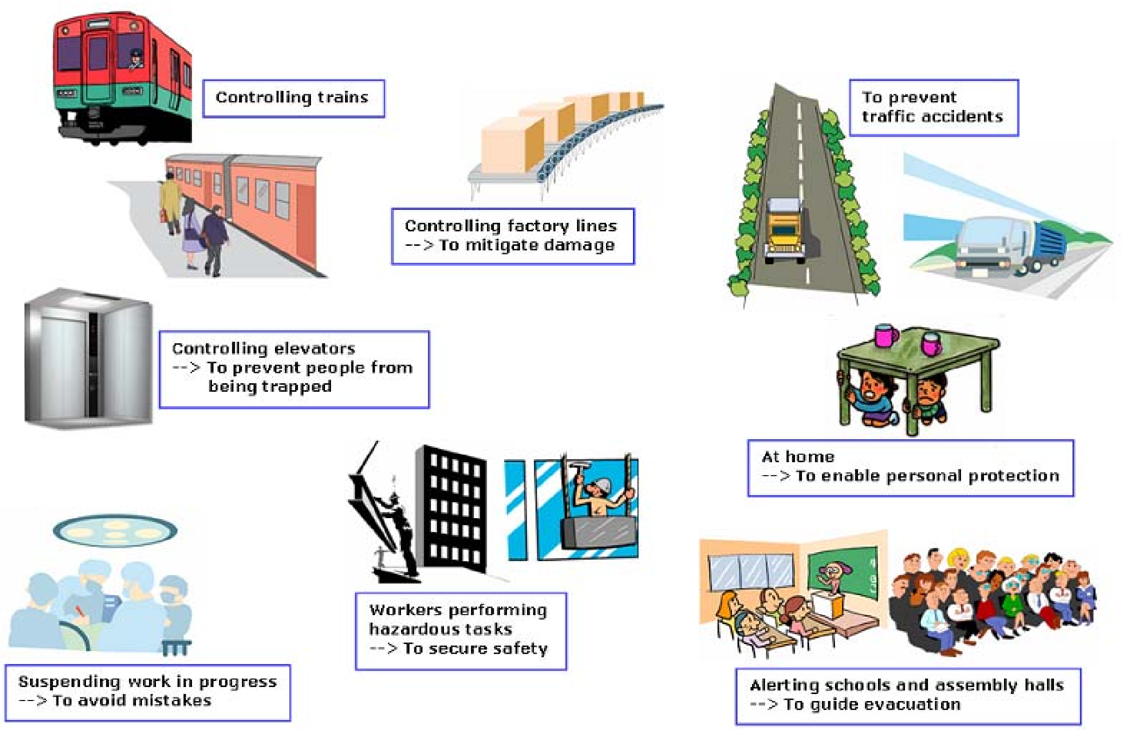


引用：気象庁
http://www.jma.go.jp/jma/en/Activities/eew1.html

As of July 20, 2011

Examples of Response to an Earthquake Early Warning

Please note that the period between the Earthquake Early Warning and the arrival of strong tremors is very short, i.e. a matter of seconds (or between several seconds and a few tens of seconds). As a result, areas that are close to the focus of the earthquake may not receive the Earthquake Early Warning transmission before strong tremors hit.　Please also note that there are limits to the accuracy of the Earthquake Early Warning, such as the estimated seismic intensity. This is because the system is necessarily dependent on very short-term data.



引用：気象庁

http://www.jma.go.jp/jma/en/Activities/eew2.html

*Column About UrEDAS (**Ur**gent **E**arthquake **D**etection and **A**larm **S**ystem)*

UrEDAS estimates earthquake parameters such as magnitude, epicentral and hypocentral distance, depth within a few seconds of initial P wave motion. Moreover, it can identify estimated hazardous area based on the M-Δ diagram(Figure 1) and issue an alarm immediately(within 4 second) after earthquake detection(Figure 2) .This is disaster-resistant network system because Its basic function is realized without composing network, and each UrEDAS can fulfill a function independently.

In principle, UrEDAS alert earthquake with a magnitude 5.5 or larger within 200km from installation position. But it can detect farther and smaller earthquake and transmit to central management center, we can find out the occurrence of an earthquake in real time.

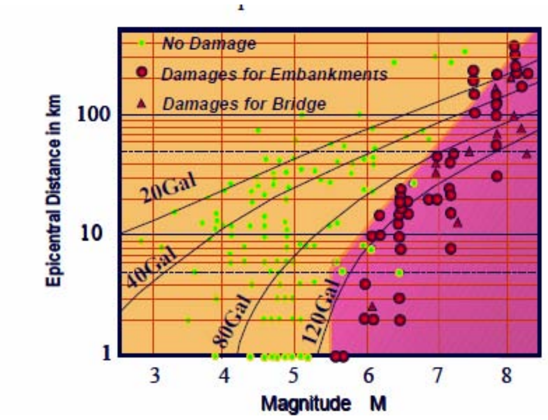


Fig.1 M-Δ Diagram

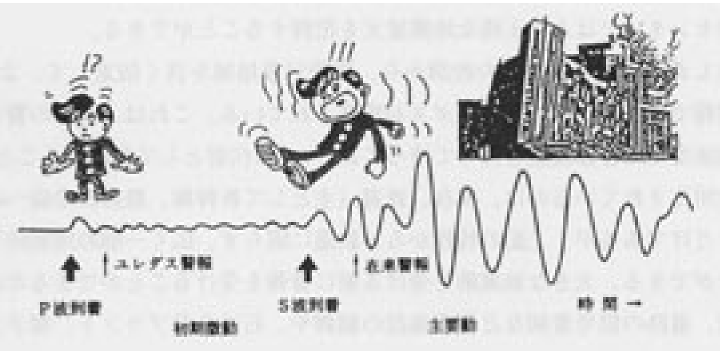


Fig.2 Typical pattern of earthquake motion

引用：消防防災博物館"地震災害の基礎知識 観測と地震予知：ユレダス-1 システム概要"

http://www.bousaihaku.com/cgi-bin/hp/index2.cgi?ac1=B101&ac2=&ac3=4524&Page=hpd2_view

※ 図1のみ、"First Actual P-Wave Alarm Systems and Examples of Disaster Prevention by Them"（The 14th World Conference on Earthquake Engineering(October 12-17, 2008, Beijing, China)発表資料）

http://www.sdr.co.jp/papers/14wcee/14wcee_p-wave_alarm_systems.pdf

Column Tohoku Shinkansen, "myth of security" is still alive-avoided the trains to derailment accident even unexpected big earthquake.
（東北新幹線｢安全神話｣は健在　想定超えた地震でも脱線防ぐ）
When the Great East Japan Earthquake occurred around 14:46 on March 11, running Tohoku Shinkansen bullet trains such as "Hayate" detected earthquakes at an early stage and immediately halted before the earthquake's first hit arrived. If Shinkansen runs at maximum speed of 275 kilometers an hour, "It needs 4 kilometers braking distance to stop" (by JR East).And if Shinkansen derailed during braking time, it could be lead to an extensive damage.
In this Tohoku Shinkansen case, all bullet trains stopped safely, it has been confirmed that all 11 trains with passengers on board weren't derailed at about 11 pm, over eight hours after earthquake.
According to JR East, since the Mid Niigata Prefecture Earthquake in 2004, technical team has been working to reduce time lag between first break detection and stop. As a result, they succeeded in developing new system which enables to reduce active breaking time 1 second, and equipped on all Tohoku Shinkansen trains by 2009.

引用：産経デジタル
http://www.sankeibiz.jp/business/news/110322/bsd1103220500001-n1.htm
http://www.sankeibiz.jp/business/news/110322/bsd1103220500001-n2.htm

2. 原子力発電所事故について ~ Nuclear Power Plant Accident ~

2-1. 福島第一原子力発電所 (Fukushima Daiichi Nuclear Plant)

2-1-(1). 事故の経緯

事故直前の福島第一原子力発電所の状況について（1 号機～6 号機）

Q2-1. What was the status of Fukushima Daiichi Nuclear Plant immediately prior to the earth quake?

A2-1. Of the six reactors at the Plant of Tokyo Electric Power Co., Ltd. (TEPCO) Fukushima Daiichi Nuclear Power Plant, Units 1, 2 and 3 were in operation at the time of the earthquake. Units 4, 5 and 6 had been shut down for regular maintenance. A certain number of spent fuel rods from each of these six reactors were being stored in spent fuel pools built in the each reactor housing. In Unit 4 only, all of the fuel in the reactor core had been transferred to the spent fuel pool in order to conduct regular maintenance. As a result, there were no fuel rods in the rector core. On the other hand, the number of fuel rods from Unit 4 that were in the spent fuel pool was greater than the number at the other reactors.

事故後の福島第一原子力発電所の状況（1 号機～6 号機）および法定上必要な手続きについて

Q2-2. What was the status of Fukushima Daiichi Nuclear Power Plant after the earthquake and what were the legally mandated steps?

A2-2. At 2:46 p. m. on March 11, 2011, a massive earthquake with a magnitude of 9.0 occurred off the coast of Miyagi Prefecture. The nuclear reactors and turbines of Units 1, 2 and 3 stopped automatically. The steel towers on the plant grounds collapsed as a result of the earthquake, preventing Units 1 through 6from receiving external power. The emergency diesel generators started up automatically. However, as a result of the major tsunami that hit the Fukushima Daiichi Nuclear Power Plant approximately an hour later, at 3:41 p. m., all of the emergency diesel generators at Units 1 through 4 failed and stopped operating, and subsequently the diesel oil tanks were washed away. As a result of this situation, all AC power was lost, and operation continued on battery power only.

As this is a situation which must be reported under Article 10 of the Nuclear Disaster Special Measures Law, TEPCO reported the situation to the ational and local governments. The tsunami had flooded not only the pumps but also the turbine building, making it impossible to use the pumps, and there was no power in the central control room as well, making all operations difficult.

When the batteries were exhausted and cooling became impossible, TEPCO judged that all cooling functions had been lost, and at 4:36 p. m. TEPCO reported the occurrence of a nuclear power emergency situation to the national and local governments in accordance with Article 15 of the Nuclear

Disaster Special Measures Law. In response, the government announced a nuclear power emergency situation at 7:03 p. m. on March 11. From that point on, the flow of information to the media came almost exclusively from only three sources: the Prime Minister's residence, TEPCO and Nuclear and Industrial Safety Agency (NISA).

With regard to cooling operations for the reactors at this point, water vapor inside the reactor at Unit 1 was cooled using the emergency condensers, and water was supplied to Unit 2 and Unit 3 using the steam-driven Reactor Core Isolation Cooling system. Meanwhile, the loss of cooling function at the spent fuel pools in Units 1 through 4 continued.

Although the site of Units 5 and 6 had also been damaged by the tsunami, one diesel generator continued to function. As a result, Units 5 and 6 achieved cold shutdown on March 20 as a result of the cooling operation.

電源喪失の影響について

Q2-3. What happened as a result of the loss of power?

A2-3. As a result of the total loss of AC power, the ordinary route of released heat to the sea water was cut off. As the batteries had also been exhausted and emergency pumping of water and cooling were unstable, adequate cooling could not be conducted and the fuel rods were exposed to air. The temperature of the fuel rods rose rapidly, and the zirconium in the zirconium alloy fuel cladding tubes reacted with the water, producing large quantities of hydrogen.

電源喪失の結果、各機はどのように対応したか

Q2-4. How did each unit (from 1 to 6) behave as a result of the loss of power?

A2-4. Unit 1

As a result, early in the morning on March12, the pressure in the containment vessel of Unit 1 began to rise due to the leakage of hydrogen, etc., and at the same time the emergency condenser stopped operating at 4:00 a. m. Accordingly, after the reactor vessel was vented at 10:17 a. m., a hydrogen explosion occurred inside the building housing the nuclear reactor at 3:36 p. m., blowing the building apart. In order to continue the cooling operation, the fire service system was used to pump in seawater at 8:20 p. m.

Unit 2

At Unit 2, the Reactor Core Isolation Cooling system was functioning, but it was not stable, and the reactor core was exposed. At 11:00 a. m. on March 13, the containment vessel was vented. At 11:30 a. m. on the following day, March 14, the Reactor Core Isolation Cooling system stopped functioning. Although workers began pumping in seawater at 4:34 p. m., the fuel was exposed to air for an extended period of time. Venting was initiated at 12:02 a.

m. on March 15, and at 6:10 a. m. an abnormal noise was heard near the pressure suppression chamber and the pressure dropped, and it is presumed that there was a full-fledged release of the radioactive materials inside the containment vessel. This was subsequently confirmed by measurements of radiation in the atmosphere that were made public.

Unit 3

At Unit 3, cooling was conducted using the Reactor Core Isolation Cooling system, and at 1:00 p. m. on March 12 cooling water was pumped in using a high-pressure coolant injection system. However, at 5:10 a. m. on the following day, March 13, the high-pressure coolant injection system stopped operating, and it became impossible to start up the Reactor Core Isolation Cooling system as well. The pressure in the reactor vessel rose sharply, and at 8:41 a. m. the reactor vessel was vented, and seawater was pumped in at 1:12 p. m. At 11:01 a. m. on March 14, a hydrogen explosion occurred inside the Unit 3 reactor building as well, destroying the building. This is presumed to have been caused by the rise in the water temperature in the spent fuel pool, causing the water level to drop and exposing the fuel rods to air, producing hydrogen.

Unit 4

At Unit 4 as well, the loss of cooling function at the spent fuel pool caused the temperature of the water in the pool to rise, causing the water level to drop and producing hydrogen, and as a result an explosion occurred at 6:14 a. m. on March 15, destroying that building as well.

Unit 5 and 6

Unit 5 and Unit 6, which had been undergoing regular inspection, had lost external power as a result of the earthquake, but a single diesel generator remained in operation and conducted emergency cooling. As a result, cold shutdown was achieved for both of these reactors on March 20. Subsequently, on March 21 and 22, external power was restored. Although cooling function at the spent fuel pools had been lost temporarily, it was subsequently restored, and at present the cooling function is operating and a sound status is being maintained.

(Science Council of Japan; May 2, 2011)
http://www.scj.go.jp/en/report/houkoku-110502-7.pdf

As of July 20, 2011

2-1-(2). 福島第一原子力発電所の現状

Q2-1 *What is the current status and are the recent major events of the Plant?*

A2-1 **All reactor in Unit 1 to 6 Plant has been shut down. (automatic shutdown at Unit 1 to 3, whereas shut down for regular examination at Unit 4 to 6.）*

*Fresh water is being injected to the Spent Fuel Pool and the Reactor Core at Unit 1 to 3, and to the Spent Fuel Pool at Unit 4.

*The situation inside the reactor building of Unit 1 was confirmed using a remote-controlled robot.(May 13)

* Removal of rubble (an amount equivalent to 8 containers) was carried out by remote-controlled heavy machinery. (May13)

(METI; May 14, 2011)
http://www.nisa.meti.go.jp/english/files/en20110514-3-2.pdf

Column **<Reference Information>**

The Reactor Core Status of Fukushima Daiichi Nuclear Power Station Unit 1 disclosed by TEPCO dated May 15, 2011

福島第一原発 1 号機の炉心状態について(2011 年 5 月 15 日株式会社東京電力が開示)

Regarding the accident of Fukushima Daiichi Nuclear Power Station caused by the Tohoku-Chihou-Taiheiyou-Oki Earthquake which occurred on March 11, 2011, we, Tokyo Electric Power Company, have been developing the immediate roadmap to restore the situation, and have taken all measures for this purpose at the moment.

Along with these efforts, we have been organizing the past work progress record as well as the plant data after the earthquake.

In this task, we have decided to conduct the analysis of the reactor core status based on the currently available records and on the hypothesis led from such records.

As a result, we estimate that "regarding the Unit 1, nuclear fuel pellets have melted, falling to the bottom of the reactor pressure vessel at a relatively early stage after the tsunami reached the station."

Meanwhile, regarding the reactor core status of Unit 1, because the fuel has been cooled stably by water injection, we believe that there would not be likely the further situation transition, e.g. to the situation where we need to release a large amount of radioactive materials.

Because the current analyses are not always able to utilize every necessary information, which means that the analyses result are provisional, we will make effort to have more accurate status of the reactor core through further investigation.

For the Unit 2 and 3, we will also conduct the similar analyses.

引用：東京電力　公式フェブサイト
http://www.tepco.co.jp/en/press/corp-com/release/11051509-e.html

2-1-3. 今後の見通し

Q4. How long is it estimated to bring the situation under control?

A4. The following two steps set as targets in the previous roadmap remain the same:

Step 1: Radiation dose is in steady decline.

Step 2: Release of radioactive materials is under control and radiation dose is being significantly held down.

(Note) Issues after Step 2 will be categorized as "Mid-term Issues"

Target achievement dates tentatively set in the previous roadmap remains the same, although there will still be various uncertainties and risks:

Step 1: targeting mid July

Step 2: around 3 to 6 months (after achieving Step 1)

See Attachment <2-5> for further details.

(METI: Ministry of Economy, Trade and Industry, May 17, 2011)
http://www.meti.go.jp/english/earthquake/nuclear/roadmap/pdf/110517TEPCO_status1.pdf
http://www.meti.go.jp/english/earthquake/nuclear/roadmap/pdf/110517TEPCO_status2.pdf

(Reference: April 17, 2011)
The following two steps are set as targets: "Radiation dose is in steady decline" as "Step 1" and "Release of radioactive materials is under control and radiation dose is being significantly held down" as "Step 2." Target achievement dates are tentatively set as follows: "Step 1" is set at around 3 months and "Step 2" is set at around 3 to 6 months after achieving Step 1.
We would like to announce, within 6 to 9 months as our target, to the residents of some of the areas whether they will be able to come home.

(METI: Ministry of Economy, Trade and Industry, April 17, 2011)
http://www.meti.go.jp/english/speeches/pdf/20110417_a.pdf
http://www.meti.go.jp/english/speeches/20110417.html

Column **<Reference Information>**

General Data on Fukushima Daiichi Nuclear Power Station disclosed by TEPCO
福島第一原発基礎データ(株式会社東京電力が開示)

		Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Output(MW)		460	784	784	784	784	1100
Start Commercial Operation		1971 5/26	1974 7/18	1976 5/27	1978 10/12	1978 4/18	1979 10/24
No. of Fuel Assemblies loaded	(Tons-U)	69	94	94	94	94	132
	(pieces)	400	548	548	548	548	764
Main Contractor		GE	GE Toshiba	Toshiba	Hitachi	Toshiba	GE Toshiba
Location		Ohkuma-machi, Futaba-gun, Fukushima Pref.				Futaba-machi, Futaba-gun, Fukushima Pref.	

Note: Figures for fuels loaded indicate the weight (in tons-U) of uranium fuel in the upper row and the number (in pieces) of fuel assemblies in the lower row.

引用:東京電力　公式フェブサイト
http://www.tepco.co.jp/en/corpinfo/overview/pdf-4/14-e.pdf

2-2. 飲料水、食品および大気等 (Water, Food, Atmosphere, etc.)

2-2-(1). 飲料水 Tap Water

飲料水の基準値

Q2-1. What is the index levels of intake of tap water?

A2-1. For radioactive iodeine:300 Bq/kg (for infants: 100 Bq/kg)
For cesium: 200bq/kg.
Users are requested to refrain from drinking tap water when they exceed the index levels.

飲料水の検査方針

Q2-2. What is the monitoring policy?

A2-2. MHLW(Ministry of Health, Labor and Welfare)implements monitoring focused on water supply utilities in Fukushima prefecture and Its neighboring regions (Miyagi, Yamagata, Niigata Ibaraki, Tochigi, Gunma, Saitama, Tokyo, Kanagawa and Chiba). Furthermore, the MHLW accumulates the monitoring results, by collecting nation-wide results of the survey conducted by MEXT and water supply utilities. Inspections are performed more than once per week.

摂取制限と公表

Q2-3.What are the requests for the restrictions on intake of tap water and public announcement by the MHLW?

A2-3.MHLW summarizes the nation-wide inspection results and regularly announces them publicly together with the charts indicating the inspected areas and non-inspected areas. In principle, the MHLW requests the restriction of intake and public announcement to water supply utilities whose average inspection results of the radioactive materials in tap water in the last three days exceeds the index levels. However, in case a single inspection outcome considerably exceeds the index levels, the MHLW requests the restriction of intake and public announcement to the said water supply utility.

摂取制限の解除

Q2-4. What are the recommended measures for the cancellation of intake restrictions by water supply utilities?

A2-4. Water supply utilities restricting the intake of tap water are recommended to lift their restrictions in case the average inspection results of radioactive materials in tap water in the last immediate 3 days falls below the index levels and that the outcomes have been on the decrease. The MHLW also requests that they properly publicly announce the cancellation of the intake of tap water.

(MHLW: Ministry of Health, Labor and Welfare, April 4, 2011)
http://www.mhlw.go.jp/english/topics/2011eq/dl/april_8_01.pdf

現在の東京都の数値。

Q2-5 *What are the current levels of Iodine and Cesuim detected in tap water in Tokyo?*

A2-5.No radioactive Iodine (131), Cesuim (134 and 137) was detected at five (5) Monitoring points(purification plant) on June 19, 2011. (ND ((Not detectable))

(Bureau of Waterworks Tokyo Metropolitan Government)
http://www.waterworks.metro.tokyo.jp/press/shinsai22/press110324-02-1e.pdf

2-2-(2). 食品 Food

検査の対象となる自治体。

Q2-1. Which local governments are covered by inspection?

A2-1. Local governments instructed by the prime minister (Fukushima prefecture, Ibaraki prefecture, Tochigi prefecture, and Gunma prefecture) and the adjacent local governments (Miyagi prefecture, Yamagata prefecture, Niigata prefecture, Nagano prefecture, Saitama prefecture, and Chiba prefecture) and the local government producing food exceeding the prospective regulation values (Tokyo)

現在までの検査結果。

Q2-2. What are the results of inspections so far?

A2-2. Because the distance from the Fukushima No. 1 Nuclear Power Plant is considered to influence the conditions of fallout the most, the results are sorted out by prefecture (excluding Fukushima prefecture).

A. Vegetables (iodine-131)

(a) Average or median values exceeding 1,000Bq/kg

Spinach (Ibaraki prefecture, Tochigi prefecture, and Chiba prefecture), Parsley (Ibaraki prefecture, Chiba prefecture), Garland chrysanthemum (Tochigi prefecture, Chiba prefecture), Kakina (Tochigi prefecture), Sanchu asian lettuce (Chiba prefecture), Qing-geng-cai (Chiba prefecture), and Celery (Chiba prefecture)

(b) Average or median values are between 500Bq/kg and 1,000Bq/kg

Spinach (Kanagawa prefecture, Saitama prefecture, Gunma prefecture), Sunny lettus (Ibaraki prefecture), Mizuna (Chiba prefecture, Ibaraki prefecture), Komatsuna (Chiba prefecture, Tokyo, Saitama prefecture, Kanagawa prefecture), Kakina (Gunma prefecture), Leek (Green onions) (Chiba prefecture), and Garland chrysanthemum (Gunma prefecture)

B. Milk (iodine-131)

Average or median values are above 500Bq/kg Raw milk (Ibaraki prefecture)

4/4 厚生労働省資料による規制値超過例

Notes) Cases in which sum of cecium-134 and -137 exceed the provisional regulation values.

Parsley (Ibaraki prefecture, 2,110Bq/kg), Spinach (Ibaraki prefecture, 1,931Bq/kg), Komatsuna (Tokyo, 890Bq/kg), Spinach (Tochigi prefecture, 790Bq/kg), Kakina (Gunma prefecture, 555Bq/kg), Mizuna (Ibaraki prefecture, 540Bq/kg)

優先して検査される品目。

Q2-3. What are the items used as indexes (food items checked with a priority)?

Q2-3. a.Spinach, Garland chrysanthemum, Kakina, Mizuna, Komatsuna (those grown in garden farming are selected with a priority)

b. Milk

c. Other items separately instructed by the government

検査頻度と対象地域。

Q2-4. *How often and in which area is the inspection conducted?*

A2-4. About once per week (days of the week to be planned in advance). However, in case radioactive substances exceeding or close to the provisional regulation values are detected, the government may instruct on the number of inspections to be conducted.

For agricultural products, the local governments divide prefectural areas into appropriate districts. In order to understand the situation of the spread over the area, samples are taken in a number of municipalities per relevant area which is appropriately divided by the local governments.

出荷制限・摂取制限

Q2-5. What are the requirements for establishing items and areas to which restriction of distribution and/or consumption of foods concerned applies by the government?

A2-5. 全体

1) As for the items exceeding the provisional regulation values, if it is considered that production areas spread, areas and items are covered.

地域

2)As for the areas, the policy will be on the prefectural basis, taking into consideration of the duty to label production areas in the JAS regulation. However, if the management by prefectures and municipalities are possible, the prefecture will be divided into multiple blocks.

品目

3) As for the items, they will be considered on an individual food item basis in the light of the data obtained so far.

出荷制限･摂取制限の解除

Q2-6 What are the requirements for cancelling items and areas to which restriction of distribution and/or consumption of foods concerned applies by the government?

A2-6 The cancellation will be based on the application of the relevant local government.

(MHLW: Ministry of Health, Labor and Welfare, April 4, 2011)
http://www.mhlw.go.jp/english/topics/2011eq/dl/food-110404_3.pdf

各地域の検査結果。

Q2-5. *What are the current levels of radioactive contaminants in foods tested in respective prefectures?*

See Attachment <2-1> for further details.

(MHLW: Ministry of Health, Labor and Welfare, July 18, 2011)
http://www.mhlw.go.jp/english/topics/2011eq/dl/18July2011.pdf

2-2-(3). 大気 Atmosphere

基本方針。

Q2-1.What are the basic policies?

A2-1.Basic policies are as follows;

(1) Gamma-ray dose rate

*Mobile monitoring

Continuous survey to cover wider areas with higher concentration of radioactive materials while decreasing the frequency of measurements at current fixed points

*Increase in fixed measurement points using personal dosimeters

(2) Analyses of radioactive concentration

*Air, surface, and soil sampling

Prioritized sampling in the areas with higher gamma-ray dose rate

*Beta-emitter nuclide analyses

Further analyses of radiation level of 90Sr for the samples with higher content of radioactive iodine and cesium

(3) Aerial Survey

*Aerial survey of surface contaminations by aerial survey systems loaded on SDF helicopters will be done as soon as possible**.

*** Aerial survey of surface contaminations by aerial survey systems loaded on SDF helicopters has been started from March 25, 2011 on a test basis and is expected to be continued by taking findings of the test into consideration as well as by adjusting with Ministry of Defense and Nuclear Safety Commission of Japan.*

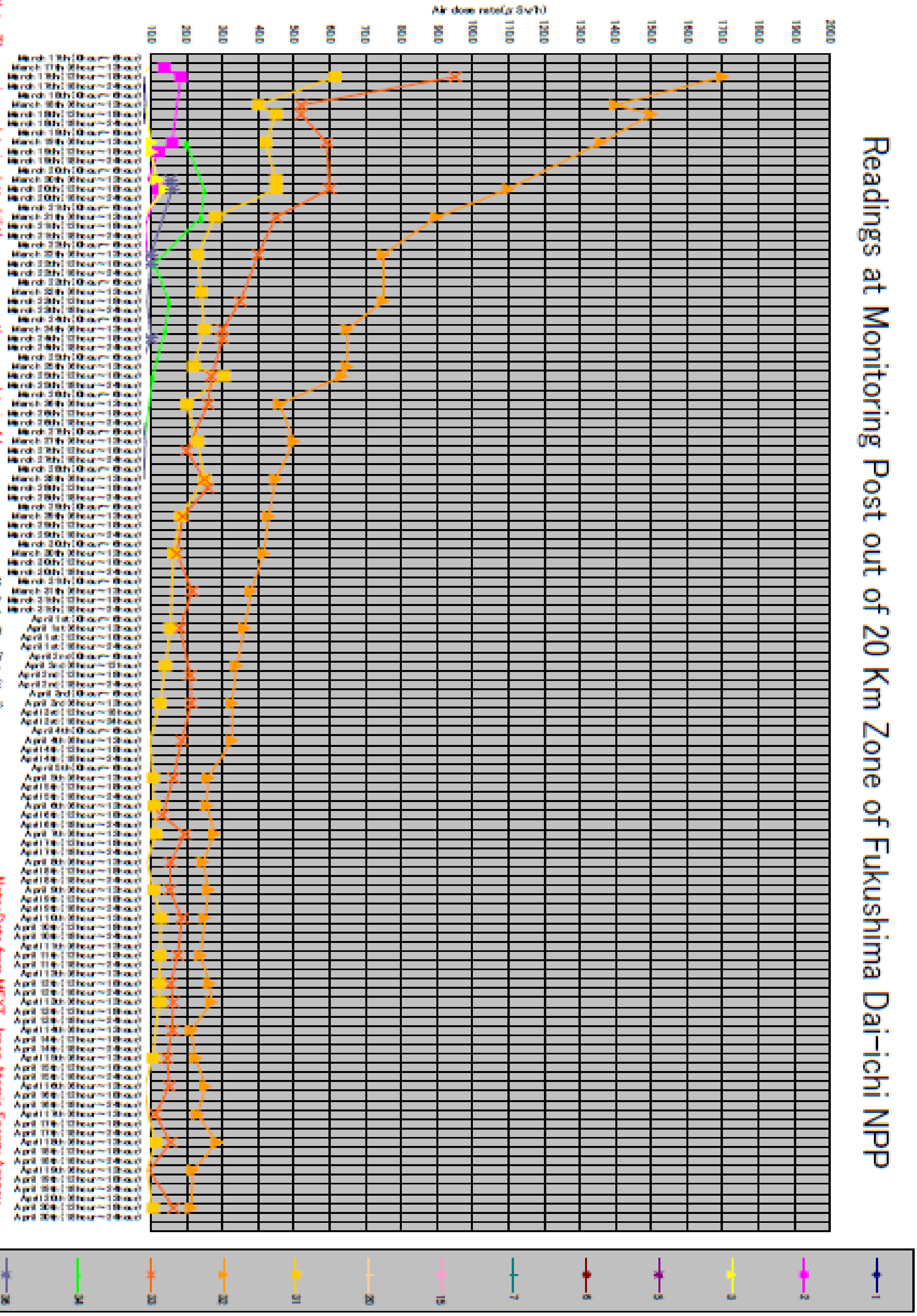
(MEXT: Ministry of Education, Culture, Sports, Science and Technology, March 21, 2011)http://www.mext.go.jp/component/english/__icsFiles/afieldfile/2011/03/23/1304084_1.pdf

東日本地区の放射能測定値の推移。(過去1ヶ月間)

Q2-2. *What is the trend in the maximum radiation levels detected in eastern Japan for the past one month?*

A2-2. **See attachment <2-2 & 2-3> for comparison of the data inspected on March 18 and June 18, 2011.** See also following chart.

Readings at Monitoring Post out of 20 Km Zone of Fukushima Dai-ichi NPP



Note: The maximum data is plotted if there are more than one data in 4 hours.

Note: This graph only shows the data over 10 μSv/h.

Note: Data from MEXT, Japan Atomic Energy Agency, and NUCLEAR Safety Technology Center

2-2-(4). 海洋 Ocean

海域モニタリング計画 (文部科学省: MEXT)

Q2-1. What is the purpose of the sea area monitoring plan ?

A2-1 A monitoring survey will be implemented in the sea area in order to identify the status of release of radioactive substances from the Fukushima Dai-ichi Nuclear Power Station.

Q2-2. What is the sea area monitoring action plan ?

A2-2. A research vessel of the Japan Agency for Marine-Earth Science and Technology will measure the air dose rates over and collect seawater samples from the coastal waters near the nuclear facility. The seawater samples collected will be brought back and sent to the Japan Atomic Energy Agency for analysis.

Q2-3. What are the monitored items ?

A2-3 (1) Radioactivity concentrations in the seawater

(2) Air dose rates over the sea

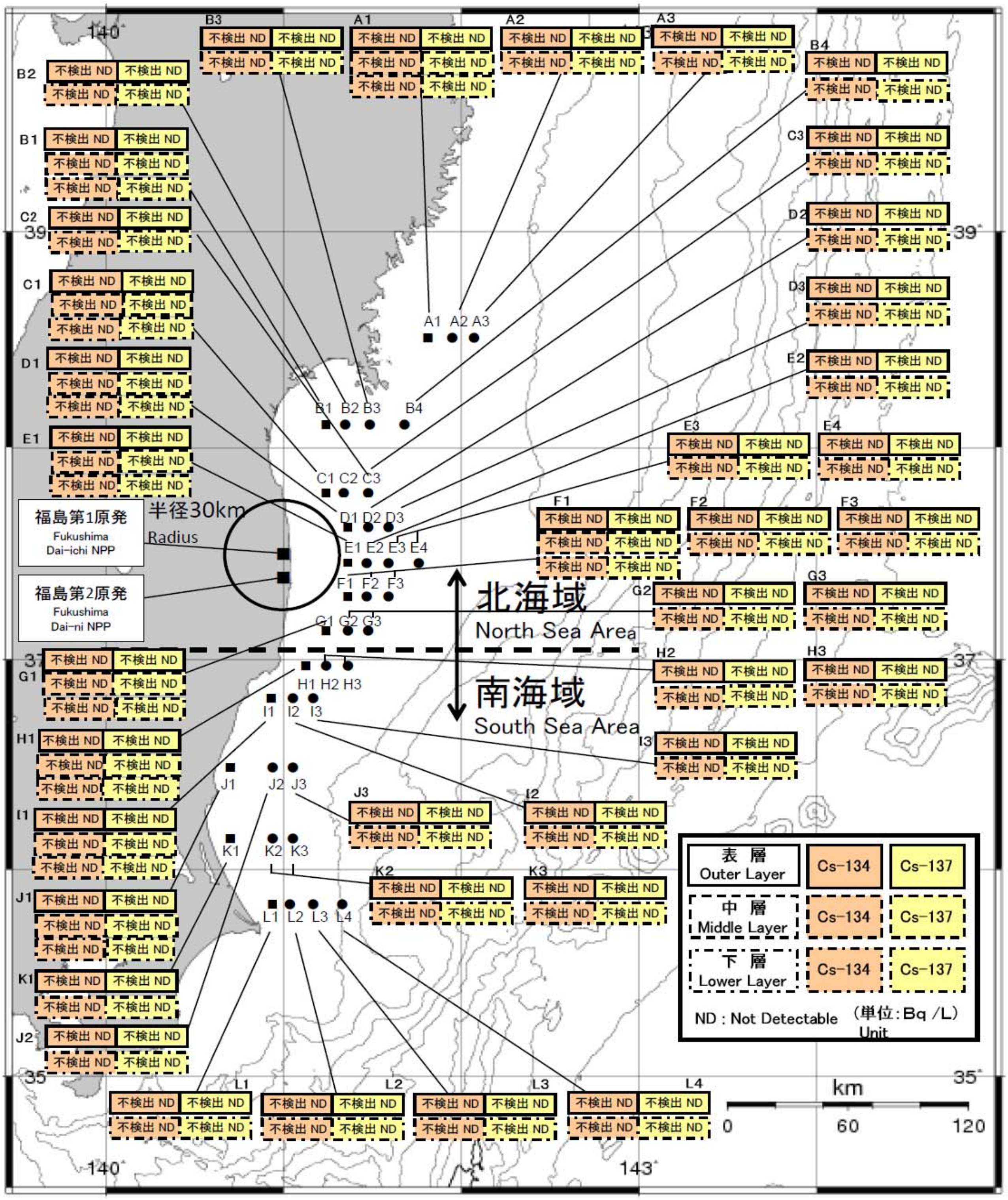
(3) Radioactivity concentrations in airborne dust over the sea

(MEXT: Ministry of Education, Culture, Sports, Science and Technology, March 22, 2011)http://www.mext.go.jp/component/english/__icsFiles/afieldfile/2011/03/23/1304084_2_1.pdf

Q2-4. What is the latest findings of the monitoring ?

A2-4 See below illustration.

海域モニタリング結果（平成23年7月5日～9日採水）
Readings of Sea Area Monitoring (Jul 5-9, 2011)

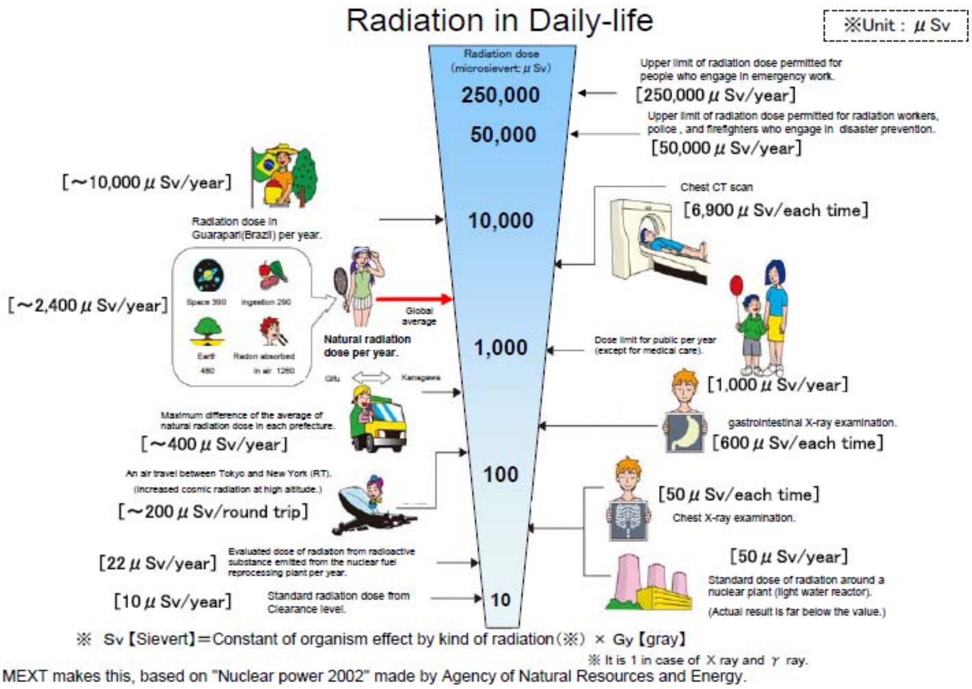


2-2-(5). その他 Others

日常生活での被爆。

Q2-1. *What are the radiation levels in daily-life?*

A2-1. *See following illustration prepared by MEXT.*



(MEXT: Ministry of Education, Culture, Sports, Science and Technology, March 20, 2011)

http://www.mext.go.jp/component/english/__icsFiles/afieldfile/2011/04/21/1305267_042110.pdf

放射線、ダイオキシン汚染と生活習慣による発がんリスク

Q2-2. *What are the risks of cancer by dioxin exposure and our lifestyle habits?*

A2-2. *See following illustration showing respective risks prepared by National Cancer Center in Japanese language and translated by JST.*

As of July 20, 2011

Risks of Cancer - Radiation Dioxin And Lifestyle Habit (**JPHC Study) -

Relative Risk	All Cancer **Solid Cancer: Hiroshima/Nagasaki Dioxin: Occupational Exposure/Plant Exposure Accident in Italy	Specific Cancer *10-15 years after the exposure in the Chelnobyl of the victims at the age of 18 or younger.
10〜		Hepatitis C infected patient (Liver: 36) Patient with a history of being infected Helicobacter pylori (Gastric: 10)
2.50〜9.99		**1000mSv (thyroid: 3.2)** Smokers (lung: 4.2-4.5) Drinking alcohol more than 360.8 ml per day (Esophagus: 4.6)
1.50〜2.49	**1000-2000mSv (1.8)** Smokers (1.6) Drinking alcohol more than 541.2 ml per day (1.6)	**150-290mSv (thyroid: 2.1)** Daily intake of high-salinity (Stomach: 2.5-3.5) Lack of Exercise (Colon <male>: 1.7) Obese (BMI>30) (Bowel: 1.5) (Breath after menopause: 2.3)
1.30〜1.49	500-1000mSv(1.4) Level of 2,3,7,8-TCDD in the blood several thousand times (Occupational Exposure)(1.4) Drinking alcohol more than 360.8 ml per day (1.4)	**50-140mSv (thyroid: 1.4)** Passive Smoking <Female with no smoking habit> (lung: 1.3)
1.10〜1.29	200-500mSv (1.19) Obese (BMI≧30)(1.22) Under-weight (BMI<19)(1.29) Lack of Exercise (1.15-1.19) High-Salinity (1.11-1.15)	
1.01-1.09	**100-200mSv (1.08)** Insufficient vegetable intake (1.06) Passive smoking <Female with no habit of smoking> (1.02-1.03)	
Undetectable Level	**Less than 100mSv** Level of 2,3,7,8-TCDD in the blood several hundred times (Occupational Exposure)(1.4)	

**JPHC Study: Japan Public Health Center-Based Prospective Study

**Solid Cancer＝All cancer except for leukemia (固形がん、白血病以外のがん)

(National Cancer Center)

http://www.ncc.go.jp/jp/information/pdf/cancer_risk.pdf

Column

ベクレル(Bq)とシーベルト(Sv)

ベクシル : The becquerel is the SI-derived unit of radioactivity. One Bq is defined as the activity of a quantity of radioactive material in which one nucleus decays per second.

http://en.wikipedia.org/wiki/Becquerel

シーベルト : The sievert (symbol: Sv) is the International System of Units (SI) SI derived unit of dose equivalent radiation. It attempts to quantitatively evaluate the biological effects of ionizing radiation

http://en.wikipedia.org/wiki/Sievert

シーベルトの単位(3つの単位の関係)

1 シーベルト（Sv）＝1000 ミリシーベルト（mSv）＝100 万マイクロシーベルト（μSv）

http://www.nirs.go.jp/information/info.php?i13

ベクレル(Bq)とシーベルト(Sv)の換算表

Please refer to the chart in A. 2-４ below for coefficients between Bq and Sv

東京在住者の累積放射線量試算（1ヶ月間）

Q2-3. The air dose rate in Tokyo is declining, but it is still continuing to be above normal. About how much milli Sv is the accumulated dose (for about a month from March 14 to April 11) of a resident in Tokyo?

A2-3. This section explains both the external radiation exposure and internal exposure, i.e. ingestion of radioactive substances in the body. The following calculated values represent typical radiation doses, and the dose varies depending on individual's behaviors and eating habits.

体の外から受ける放射線量

The dose of external radiation exposure from radioactive substances in the air is found to be about **16 micro Sv for a month** (assuming that the person stays outdoors for 8 hours a day) since March 14, by adding up the data announced by the MEXT and then subtracting the average dose at normal times.

放射性物質を体の中に取り込むことによって受ける放射線量（水、食品、呼吸）

Water: Radiation exposure doses should take into consideration water, food and breathing. Suppose you drink 1.65 liter of tap water a day. The exposure from tap water will be an estimated **10 micro Sv** or thereabouts using the data from the Tokyo Metropolitan Government (Please refer to Question *Q2-3 below).*

Food: Suppose you drink milk containing 20Bq/kg iodine-131, 1 Bq/kg Cesium-137 and 1 Bq/kg Cesium-134, eat fish likewise containing 2 Bq/kg, 1 Bq/kg, 1 Bq/kg, respectively, and also eat vegetables containing 150, 10, 10 Bq/kg, respectively, every day for one month. Your exposure dose is estimated to be about **69 micro Sv.**

Inhalation: The exposure from inhaling radioactive materials in the air is estimated to be about **21 micro Sv** based on the Tokyo Metropolitan Government's data about radioactive substances in the dust, in the case of breathing 22.2 cubic meter of air.

上記合計

With all the above figures combined, the total is about **120 micro Sv** for a month. This is lower than the upper level of radiation exposure in a round trip by airplane between Tokyo and New York and not hazardous to your health. You, however, need to pay close attention to announcements by the governmental offices and follow instructions and guidance when they are issued.

自分が生活する地域の累積放射線量の計算例

Q2-4 How can I find my accumulated dose in the area where I live?

A2-4. You can calculate it to a certain degree, though it is slightly complex.

First, you can find an amount of radiation received from radioactive substances in the air by adding all the figures announced by the MEXT for a period from the day of the accident to the present. The following is the calculation of the radiation dose in Tokyo mentioned in *Question Q2-2.*

例（空間線量）

Example: Calculation of radiation exposure in reference to the announced air doses

The air dose was 0.0927 micro Sv/h on average according to the MEXT's data (for 29 days from March 14 - April 11)

0.0927 x 24 hours x 29 days ＝ 64.5 micro Sv ----- ①

The average air dose in Tokyo in normal times is 0.028-0.079 micro Sv/h, so the median value 0.0535 is used as follows.

0.0535 × 24 hours × 29 days = 37.2 micro Sv ------ ②

①－② ＝ 27.3 ----- ③

If you go out for 8 hours and stay indoors for 16 hours, the reduction coefficient is:

1x 8/24＋0.4×16/24 ＝ 0.6---- ④

The dose of radiation received is:

③ x ④ = 27.3 x 0.6 = 16.38 ≒ **16 micro Sv.**

例（水、食品）

Example: Calculation of exposure dose from radioactive substances occurring in food and water

The exposure dose from radioactive substances in water or food (including potential exposure from radioactive substances ingested into the body) can be estimated by the following formula.

Dose of radiation received (micro Sv) = Effective dose coefficient (the values given in the chart below) x radioactive concentration (Bq/kg) x food intake (kg)

Effective dose coefficients※ (micro Sv/Bq)

	Iodine-131	Cesium-137	Cesium-134
New-born baby(3 months)	0.18	0.020	0.026
Infant(Age 1)	0.18	0.012	0.016
Child (Age 2-7)	0.10	0.0096	0.013
Adult	0.022	0.013	0.019

※(Oral ingestion; NIRS compiled the data based on "ICRP Database of Dose Coefficients: Workers and Members of the public, CD-ROM, 1998")

Suppose 1kg of water contains 8.59Bq iodine-131, 0.45Bq Cesium-137 and 0.28Bq Cesium-134※ . If an adult drinks 1.65 liter of water a day for 29 days, the radiation exposure doses will be:

Iodine-131： 0.022 x 8.59 x 1.65 x 29 = 9.0 micro Sv.---①

Cesium-137： 0.013 x 0.45 x 1.65 x 29 = 0.28 micro Sv---②

Cesium-134： 0.019 x 0.28 x 1.65 x 29 = 0.25 micro Sv---③

Exposure dose ＝ ① ＋ ② ＋ ③ ＝ 9.53＝**about 10 micro Sv.**

※ The average of the data announced by the Tokyo Metropolitan Government from March 18 to April 11.

The estimate given above in *Q&A2-2* uses values close to the average of the Results of radiation tests on distributed foods (11 samples of milk, 241 samples of vegetables and 5 samples of fish) presented by the Ministry of Health from March 19 to April 11. When a total of Cesium isotopes 134 and 137 combined is given, the ratio of the two substances is assumed to be 1 to 1.

例（空気吸入）

Example: Calculation of dose of radiation received from radioactive substances existing in the air

To estimate radiation dose from inhaling radioactive substances in the air, you need a concentration of radioactive substances in the air. Such data, however, are rarely announced. In question *Q&A2-2* mentioned above, the data presented by the Bureau of Labor and Industrial Affairs (http://www.sangyo-rodo.metro.tokyo.jp/) are used to calculate as follows.

Dose of radiation received (micro Sv) = Effective dose coefficient (the values in the chart below) x radioactive concentration (Bq/m3) x respiratory coefficient (22.2m3 a day here) x number of days

	Iodine-131	Iodine-134	Cesium-137	Cesium-134
New-born baby(3 months)	0.072	0.0011	0.00	0.070
Infant(Age 1)	0.072	0.00096	0.10	0.063
Child (Age 2-7)	0.037	0.00045	0.070	0.014
Adult	0.0074	0.000094	0.039	0.020

※ (Oral ingestion of particles (Type F); NIRS compiled the data based on "ICRP Database of Dose Coefficients: Workers and Members of the public, CD-ROM, 1998")

The highest levels of radioactive concentration for Iodine-131, Iodine-132, Cesium-137 and Cesium-134 in the dust in the air in Tokyo were recorded from 10:00 to 11:00 hours on March 15 as being 241, 281, 60 and 64Bq/m3.,respectively. Thus, a rough estimate of the amount of radiation potentially received from inhaling 22.2m3 of air /h would be as follows.

Iodine-131: 0.0074 x 241 x 22.2 x 1/24 = 1.05 micro Sv. ---①

Iodine-132: 0.000094 x 281 x 22.2 x 1/24 = 0.0244 micro Sv. ---②

Cesium-137: 0.039 x 60 x 22.2 x 1/24 = 2.16 micro Sv. ---③

Cesium-134: 0.020 x 64 x 22.2 x 1/24 = 1.18 micro Sv. ---④

Radiation dose in this hour = ① + ② + ③ + ④ = **5.01 micro Sv.**

Repeat this calculation for all the hours and add them up. The above question *Q&A2-2* refers to the total of all values recorded from March 14 to April 11. Iodine vapor is not included.

With respect to children's respiratory coefficients per day, the ICRP suggests (in publication 71) 2.86 m^3/day for a new born baby (3 months), 5.16 m^3/day for an infant (age 1), 8.72 m^3/day for a child (age 5), 15.3 m^3/day for a child (age 10) and 20.1 m^3 for a child (age 15).

You can estimate your accumulated dose, to some extent, by combining the dose of radiation received from air dose, the dose from breathing in air containing radioactive substances and the radiation dose from the intake of food or water containing radioactive substances.

(National Institute of Radiological Sciences; April 22, 2011)
http://www.nirs.go.jp/ENG/data/pdf/i14_e3.pdf

2-3. 避難 (Evacuation)

震災直後の政府指示

Q3-1. *What was the evacuation request by the Government immediately and a couple of days after the earthquake? Also, how many residents were affected by the evacuation request?*

A3-1 On the evening of March 11, the evacuation of residents from areas within 3 kilometers of the plant was ordered by the Prime Minister out of concern regarding the possible leakage of radiation from the Fukushima Daiichi Nuclear Power Plant. Residents living in the area of 3 to 10 kilometers around the plant were also ordered to stay indoor. On the following day, March 12, the radiation dose in the area around the plant increased, and the evacuation zone was increased to 10 kilometers around the plant, and shortly thereafter to 20 kilometers. On March 15, residents living in the area 20 to 30 kilometers around the plant were instructed to stay indoors. Approximately 140,000 people live within a 30-kilometer radius of the plant, and of these approximately 87,000 live within 20 kilometers of the plant.

それ以降の政府指示、区域設定根拠

Q3-2 *What did the Government request the residents to do afterwards? and on which recommendation or guideline is it based?*

A3-2. On April 10, judging from changes over time in the radiation dose rate in air at various locations and calculations made using SPEEDI, the Nuclear Safety Commission indicated that there were areas northwest of the plant in which the integrated dose rate exceed 20 millisievert per year and the NSC presented measures to deal with the situation to the government. Based on the recommendations of the NSC, the government held discussions with the affected communities, and on April 22 the area 20 kilometers around the Fukushima Daiichi Nuclear Power Plant was declared a **"Caution Zone"** to which entry was prohibited. In addition, the instruction to remain indoors was lifted for the area 20 to 30 kilometers around the plant and the area northwest from the Caution Zone outside20 kilometers of the plant was designated a**"Planned Evacuation Zone."** Also, **"Emergency Evacuation Preparation Zones**" are designated in the areas within the zone 20 to 30 kilometers around the plant

(Science Council of Japan, May 2, 2011)
http://www.scj.go.jp/en/report/houkoku-110502-7.pdf

*Q3-3. How did the Government designate **"Planned Evacuation Zone."**?*

A3-3. High accumulated dose has been detected in some surrounding area 20km-outside of the Nuclear Plant, which has been caused by locally *accumulated radioactive material released from the Plant as a result of the difference in weather as well as geographical conditions. To stay and live in these areas could lead to the exposure of higher accumulated doze.*

*Based on this understanding and considering "radioprotection index under emergent exposure" required by International Commission on Radiological Protection (ICRP) as well as International Atomic Energy Agency (IAEA) (20-100 mSv per year), **"Planned Evacuation Zone."** has been designated as a area where accumulated dose could reach 20 mSv within one year from the date of explosion.*

(Prime Minister of Japan and his Cabinet, April 22, 2011)
http://www.kantei.go.jp/saigai/20110411keikakuhinan.html

See attachment <2-4> for more specific FAQs
http://www.kantei.go.jp/foreign/kan/statement/201103/15message_e.html

2-4. 今後の見通し：収拾に向けた取り組み (The Way to Handle the Situation)

Q4. How long is it estimated to bring the situation under control?

A4. The following two steps are set as targets: “Radiation dose is in steady decline” as “Step 1” and “Release of radioactive materials is under control and radiation dose is being significantly held down” as “Step 2.” Target achievement dates are tentatively set as follows: “Step 1” is set at around 3 months and “Step 2” is set at around 3 to 6 months after achieving Step 1. We would like to announce, within 6 to 9 months as our target, to the residents of some of the areas whether they will be able to come home.

See Attachment <2-5> for further details.

(METI: Ministry of Economy, Trade and Industry, April 17, 2011)
http://www.meti.go.jp/english/speeches/pdf/20110417_a.pdf
http://www.meti.go.jp/english/speeches/20110417.html

2-5. レベル7 (Level 7)

Q5-1. *Which organization or entity assesses the events in Fukushima Dai-ichi Nuclear Power Station and which rating is applied to as a result of its assessment?*

A5-1. The Rating of the International Nuclear and Radiological Event Scale (INES) on the events in Fukushima Dai-ichi Nuclear Power Station (NPS), Tokyo Electric Power Co. Inc. (TEPCO), caused by the Tohoku District - off the Pacific Ocean Earthquake is temporarily assessed as Level 7, considering information obtained after March 18th.

(METI; April 12, 2011)
http://www.nisa.meti.go.jp/english/files/en20110412-4.pdf

レベル7とは。

Q5-2. *How serious is the situation to be assessed as level 7?*

A5-2. Major Accident: Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures.

See Attachment <2-6> for further details.

(IAEA: International Atomic Energy Agency)
http://www.iaea.org/Publications/Factsheets/English/ines.pdf

レベル7の根拠。

Q5-3. *What is the rationale for assessing as level 7 this time?*

A5-3. Nuclear and Industrial Safety Agency (NISA) estimated the total amount of discharged radioactive materials from the reactors of Fukushima Dai-ichi NPS to the air, making a trial calculation using the result of analysis of the situation of the reactors and so on, which was carried out by Japan Nuclear Energy Safety Organization (JNES). This estimation resulted in the value corresponding to Level 7 of INES rating*.

* The value representing radiation impact, which is converted to the amount equivalent to ^{131}I (Iodine), exceeds several tens of thousands of tera-becquerel (of the order of magnitude as 10^{16} Bq).

(METI; April 12, 2011)
http://www.nisa.meti.go.jp/english/files/en20110412-4.pdf

As of July 20, 2011

2-6. チェルノブイリ事故との違い (Differences between Fukushima and Chernobyl)

Q6. *How is the accident different from the Chernobyl one in terms of its cause, modality, amount of radioactive materials released and casualties etc?*

A6-1. *See attached comparison sheet prepared by MOFA below.*

Major Differences between the Chernobyl accident and the accident at the Fukushima Dai-ichi Nuclear Power Station

April 18, 2011

	Chernobyl	Fukushima Dai-ichi
Cause of accident	Violations of operating rules and regulations during an emergency shutdown test.(including disabling safety systems)	Loss of cooling functions resulting from the loss of power sources due to the tsunami, though the reactors shut down automatically during the earthquake.
Modality of accident	The reactor, without a containment vessel by design, exploded at the core. Updrafts due to the explosion and the subsequent fire dispersed radioactive substances contained in the core across a wide area.	With the containment vessels in place and no major damage to the pressure vessels, most of the radioactive substances are thought to remain within the pressure vessels.
Amount of radioactive materials released (Iodine-131 equivalent*)	5.2 million terabecquerels (5.2 x 10^{18} Bq) (Source: IAEA Report of the Chernobyl Forum Expert Group 'Environment')	NISA estimate: 0.37 million terabecquerels (3.7 x 10^{17} Bq) NSC estimate: 0.63 million terabecquerels (6.3 x 10^{17} Bq) (About one-tenth that of the Chernobyl accident)
Casualties	28 people died due to acute radiation sickness (massive radiation exposure) (Source: IAEA Frequently Asked Chernobyl Questions) (Note: Acute fatal exposure is 8,000 mSv or more.)	No one has died. (At present, no one has suffered from radiation damage due to radiation exposure, either. The maximum allowable exposure is limited to 250 mSv for workers at the plant.)
Evacuation and exposure of surrounding residents	Surrounding residents were ordered to evacuate *after* a large amount of radioactive substances was released into surrounding areas. Many of the residents were exposed to high levels of radiation until the evacuation was completed.	The evacuation directive was issued *before* the release of radioactive substances. This limited local residents' exposure to radiation at a low level.

* The estimates by the Nuclear and Industrial Safety Agency (NISA) and the Nuclear Safety Commission (NSC) have been converted to Iodine-131 equivalents by NISA according to the INES User's Manual.

(Ministry of Foreign Affairs; April 18, 2011)

http://www.mofa.go.jp/j_info/visit/incidents/pdfs/differences.pdf

Q6-2. *What is the difference in the amount of discharged radioactive materials?*
(福島第一原発から大気中への放射能物質の想定放出総量とチェルノブイリでの放出量。)

A6-2. The amount of discharged radioactive materials of Fukushima Plant is approximately 10 percent of the Chernobyl accident which was assessed on the same level. *Please refer to the following chart for comparison;*

	Assumed amount of the discharge from Fukushima Dai-ichi NPS		(Reference) Amount of the discharge from the Chernobyl accident
	Estimated by NISA	Announced by NSC	
^{131}I … (a)	1.3×10^{17} Bq	1.5×10^{17} Bq	1.8×10^{18} Bq
^{137}Cs	6.1×10^{15} Bq	1.2×10^{16} Bq	8.5×10^{16} Bq
(Converted value to ^{131}I) … (b)	2.4×10^{17} Bq	4.8×10^{17} Bq	3.4×10^{18} Bq
(a) + (b)	3.7×10^{17} Bq	6.3×10^{17} Bq	5.2×10^{18} Bq

NISA: Nuclear and Industrial Safety Agency
NSC: Nuclear Safety Commission of Japan
INES: International Nuclear and Radiological Event Scale

（Notes） The conversion of the values to be equivalent to radiation impact of 131I regarding the NISA's estimation and the NSC's announcement were carried out by NISA in accordance with the INES User's Manual.

(Ministry of Economy, Trade and Industry; April 12, 2011)
http://www.nisa.meti.go.jp/english/files/en20110412-4.pdf

Column

1. 原発内に残る推定放射能量：

*According to the estimate released by TEPCO dated April 12, 2011, radioactivity of **720,000,000** terebequerels generated by atomic fission was found to be present in the core fuel at Unit 1 to 6 as well as in the stored spent nuclear fuel as of March 11, 2011 when the quake hit, which has fallen to **150,000,000** terebequerels as at April 11, 2011 after the half-time has elapsed.*

【ニュース原文】

東電が１２日に公表した推計によると、震災時の３月１１日時点で、同原発１～６号機の炉心燃料や貯蔵されている使用済み核燃料内には、核分裂で生成された**７億２千万**テラベクレルの放射能が存在した。寿命の半減期がすぎ、４月１１日時点では**１億５千万**テラベクレルまで減少した。

April 13, 2011, Sankei Online News

http://sankei.jp.msn.com/life/news/110413/trd11041300490004-n1.htm

2. 放出推定総量の上方修正：

2011 年 6 月 6 日 NISA（原子力安全・保安院）更新データに基づく上方修正（**37 万**テラベクシル → **77 万**テラベクシルへ）

In April, when it declared Fukushima Daiichi a top-level event on the international scale that ranks nuclear disasters, Japan's Nuclear and Industrial Safety originally estimated that the radioactive release from the plant at a minimum of **370,000** terebequerels. A terabecquerel is equal to one trillion becquerels, a unit of radioactivity equal to one nuclear decay per second. Japan's Emergency Response Center raised that estimate this week to **770,000** terabecquerels from March 11 to March 16, the first five days after the accident. At Chernobyl, in the former Soviet republic of Ukraine, the radioactive release amounted to 5.2 million terabecquerels.

Jun 7, 2011, CNN Online News

http://edition.cnn.com/2011/WORLD/asiapcf/06/07/japan.nuclear/index.html

周辺住民の被爆状況

A6-3. Damage/ Impacts of the residents living around the plant

In Chernobyl, 270 thousand people in high-exposure area are calculated to have been exposed 50 mSv or above and 5 million people in low-exposure area is calculated from 10 to 20 mSv, which didn't affect their health except for thyroid cancer among children. Of the children who drank huge amount of contaminated milk, 6 thousand children had surgery and 15 children have died.

In Fukushima, the milk with more than 100 Bq/kg is not distributed according to the interim standard; 300(100 for infant)Bq/kg. There is no problem. The people living near the Fukushima plant have been exposed 20 mSv or below. There is no impact from radiation.

(Prime Minster of Japan and His Cabinet, April 15, 2011)
http://www.kantei.go.jp/saigai/senmonka_g3.html

As of July 20, 2011

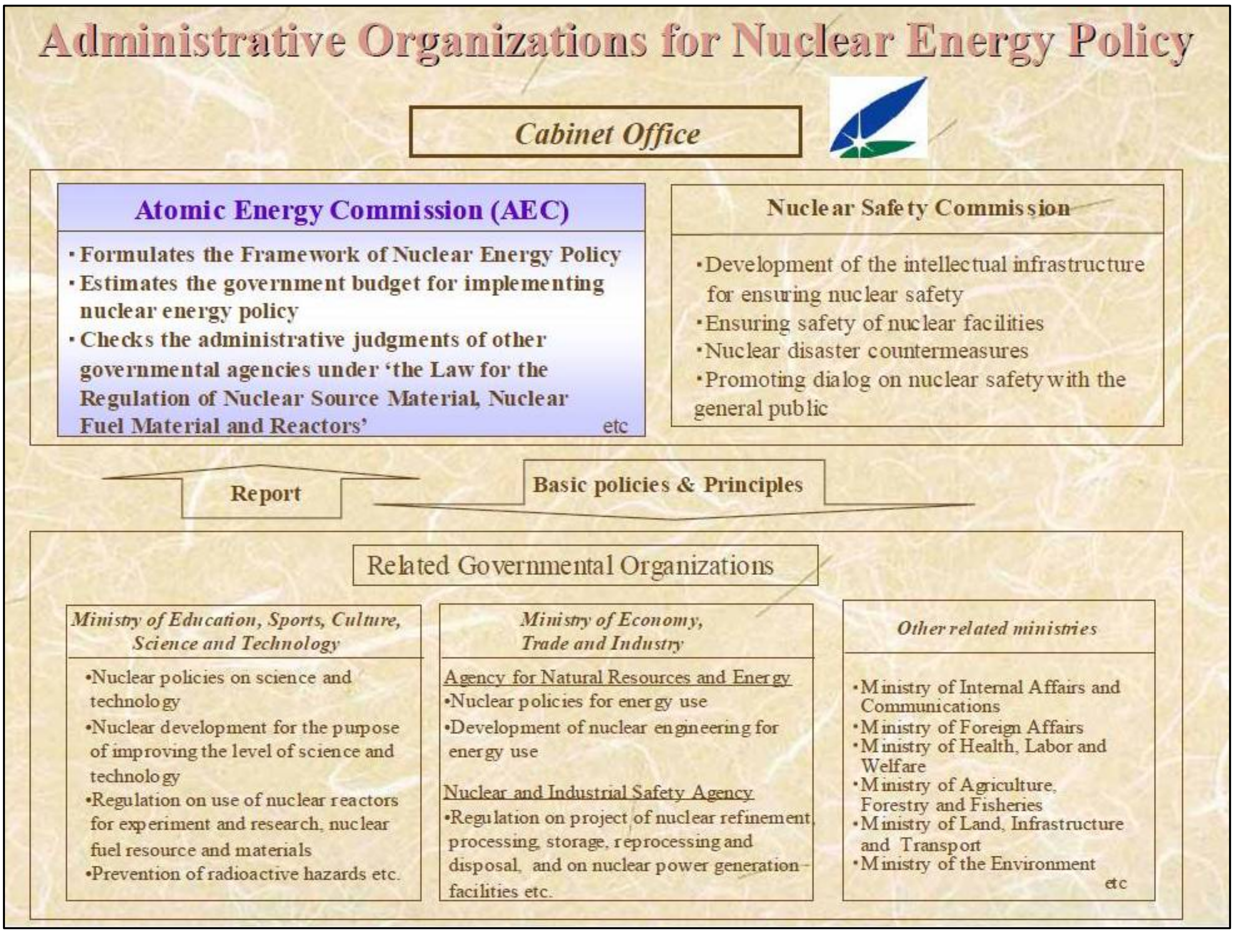
2-7. 日本の原子力政策/安全管理関連組織について(Japanese Governmental bodies concerning nuclear policy and safety)

Q7-1. What governmental bodies are concerned with nuclear policy/safety in Japan?

A7-1-1. The Administration of Atomic Energy in Japan

The Atomic Energy Commission is set up in the Cabinet Office together with the Nuclear Safety Commission, which is responsible for assuring safety of nuclear research, development and utilization activities. MOFA, MEXT, MHLW, MAFF, METI, MLIT, and MOE promote administration for nuclear energy research, development, and utilization in consistent with the basic policies specified by the Atomic Energy Commission. Actual activities for promoting research, development and utilization of nuclear energy are promoted by research organizations, universities and private companies including electric utilities.

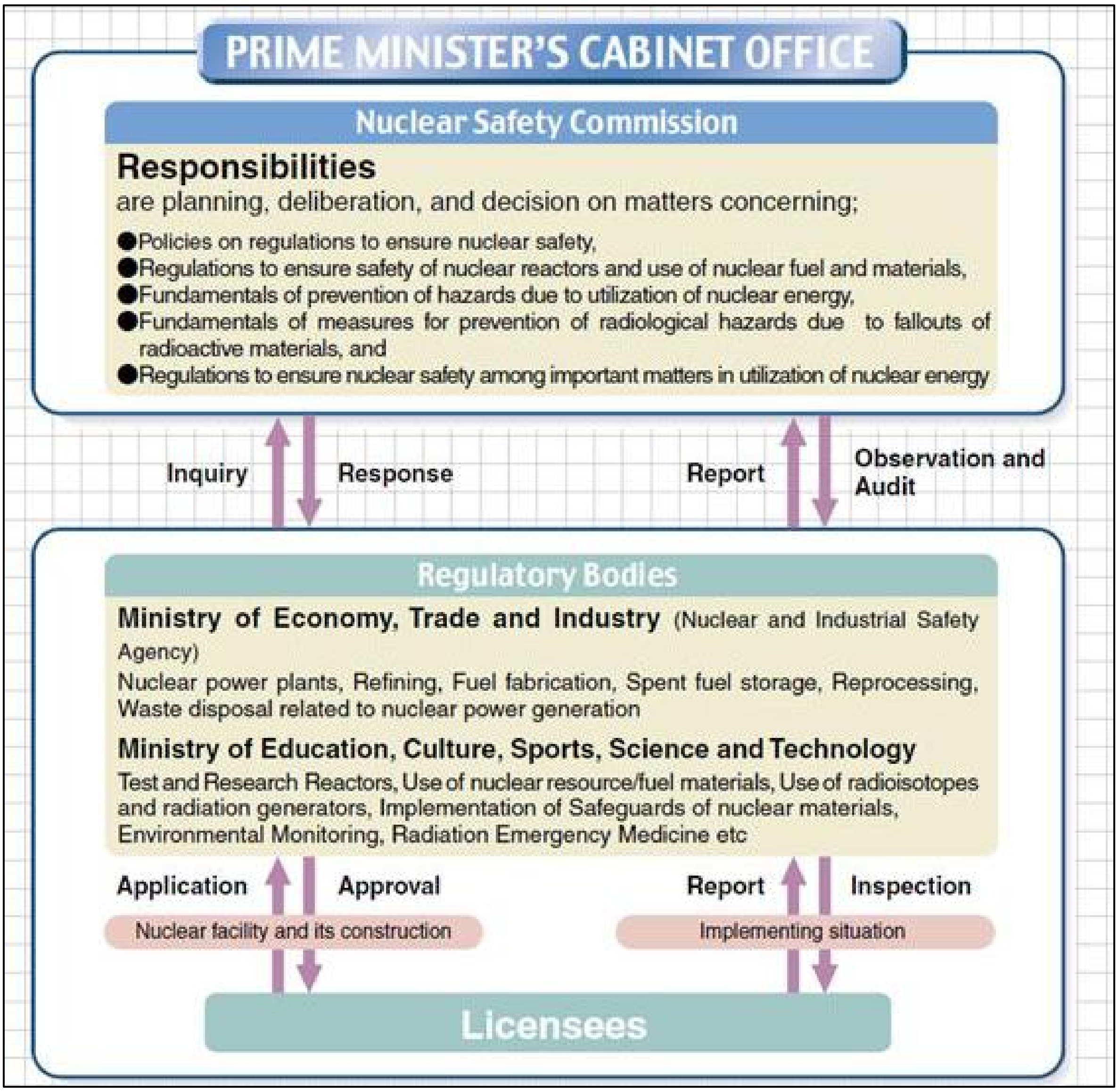
引用：内閣府原子力委員会　公式ウェブサイト
http://www.aec.go.jp/jicst/NC/about/index_e.htm



引用：内閣府原子力委員会　公式ウェブサイト
http://www.aec.go.jp/jicst/NC/about/organizations.pdf

As of July 20, 2011

A7-1-2. The Administrative Structure of Nuclear Regulation in Japan



引用：原子力安全委員会　公式ウェブサイト
http://www.nsc.go.jp/NSCenglish/aboutus/organization.pdf

A7-1-3. The outline of each administrative organization

Atomic Energy Commission (JAEC) since 1956 / 原子力委員会

Establishment of the Atomic Energy Commission

Earnest activities for nuclear research, development, and utilization in Japan began when the Atomic Energy Basic Law was established on December 19, 1955. The Law specifies that these activities shall be promoted, limiting them to peaceful purposes and making it a principle to assure their safety, making transparent the results, and promoting international cooperation, with a view to securing energy resources for the future, promoting science and industries, and thereby contributing to the improvement of both welfare of human society and the living standard of the people. The Atomic Energy Commission was set up based on the Law on January 1, 1956 to implement national policies for deliberately pursuing these goals or nuclear energy policies in a democratic manner.

The Role of the Atomic Energy Commission

The Atomic Energy Commission is composed of five Commissioners appointed by the Prime Minister with the Diet's consent for three-year terms. One of them is appointed as Chairman. Its mission is to plan, deliberate, and decide concerning basic policies or strategies for the promotion of research, development, and utilization of nuclear energy, to adjust the activities of administrative organizations concerned, to compile the budget for these organizations to pursue the policies, and to give opinions to the competent Ministers on the adequacy of applying the criteria of the Law on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors.

The Commission discusses with outside parties concerned, deliberates a written draft policy statement prepared by the Secretariat, and makes policy decision based on it at Commission meetings, which are open to the general public. Unofficial transcripts are produced for each meeting and are available on the Web for viewing approximately one week after the meeting. The meetings are held every Tuesday.

引用：内閣府原子力委員会　公式ウェブサイト
http://www.aec.go.jp/jicst/NC/about/index_e.htm

Nuclear Safety Commission (NSC) since 1978 / 原子力安全委員会

It's Roles

The utilization of nuclear energy in Japan is limited to peaceful purposes by ensuring nuclear safety, and is performed independently under democratic administration and public awareness so as to contributing to the improvement of the national living standard. In order to ensure nuclear safety, the pre-requisite of using nuclear energy, the government regulates, pursuant to the pre-enacted laws, the utilization of nuclear reactors, nuclear fuel materials, etc. The NSC has the role to make sure the safety in utilizing nuclear energy. When utilizing nuclear energy, risks of adverse effects on human health or environment by radiation and radioactive substances cannot be completely excluded. Safety goals of nuclear energy utilization are to ensure the risks below the socially acceptable limit. It is important for nuclear operators and regulatory organizations: to cooperate in working out an effective means and in continuing constant efforts to executing it for achieving these goals and further higher goals; and to facilitate public awareness.

The NSC presents scientifically sensible basic philosophy for ensuring nuclear safety from its expertise. It administers, through its suggestions and recommendations for improvement and corrective actions, the regulatory bodies and the nuclear operators. The NSC also promotes information dissemination and bilateral dialogue with the public for enhancing credibility of nuclear safety.

National nuclear regulatory systems and the NSC Responsibilities

The biggest role of the Nuclear Safety Commission of Japan (NSC) is to show the national basic philosophy of nuclear safety. To this end, the NSC formulates a set of regulatory guides for the regulators' safety review. For ensuring highly credible nuclear safety, the so-called "double-check" system is institutionalized in Japan: direct regulation of nuclear operators by the government regulatory agencies (METI, etc.), and supervision/auditing of those agencies by the NSC. The NSC watches and makes sure that the regulation activities by the regulatory agencies be conducted appropriately pursuant to the NSC nuclear safety basic philosophy. The NSC also conducts intensive investigations and deliberations in order to appropriately respond to new nuclear safety issues, as they emerge in regulations and/or safety programs by the nuclear operators. For example, the METI conducts safety reviews of new builds or modifications of existing nuclear power plants upon their applications. The NSC reviews, from its independent view points, the appropriateness of the METI safety reviews. Further in the construction and operation phases of those facilities, the NSC supervises and audits the nuclear safety regulatory activities of the regulatory agencies. The environment and technologies surrounding the utilization of nuclear energy constantly evolve. The NSC continually reviews the basic nuclear safety philosophy and administers the nuclear safety regulatory agencies, based on the lessons and knowledge from its aforementioned activities and the international resources.

引用：原子力安全委員会　公式ウェブサイト
http://www.nsc.go.jp/NSCenglish/index.htm

Nuclear and Industrial Safety Agency (NISA) / 原子力安全保安院

Establishment

The nuclear energy related safety administrations formerly operated by Science and Technology Agency and the Agency of National Resources and Energy have been transferred to and industrial safety administration previously directed by the Ministry of International Trade and Industry administrations being centralized and strengthened under NISA.

Mission

The Nuclear and Industrial Safety Agency （NISA） was established on January 6, 2001 as part of a reorganization of central government ministries. Our mission is to ensure the safety of the people's livelihoods through the regulation of the energy industry and related industries.

The staff teams at NISA, uplifted by such a worthy objective, continue to strive day and night to carry out their duties as agents who have received the mandate from the people of Japan.

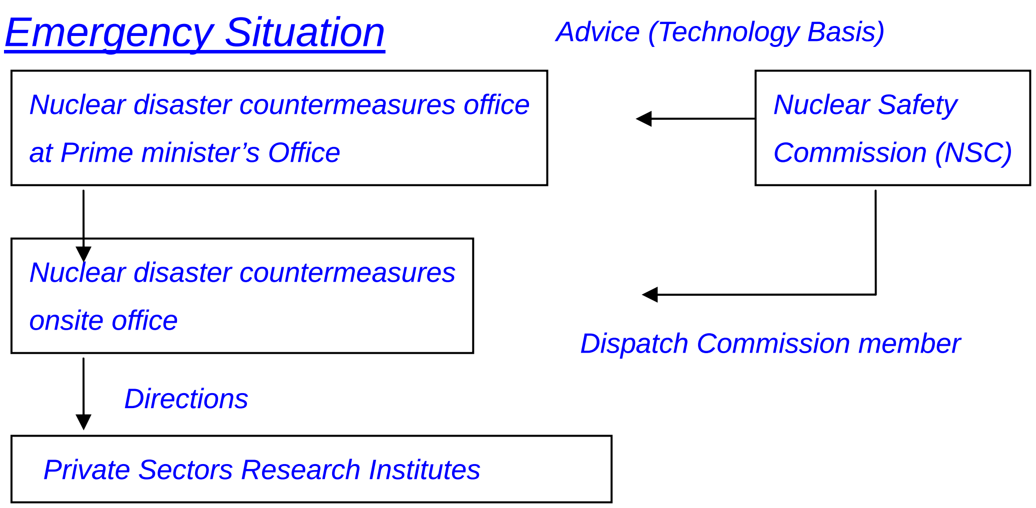
引用:原子力安全保安院　公式ウェブサイト
http://www.nisa.meti.go.jp/english/index.html

Agency for Natural Resources and Energy / 資源エネルギー庁

現在、我が国はオイルショック以来の原油価格の高騰という厳しい事態に直面しています。中国、インドの急速な成長等に伴うエネルギー需要拡大等をうけ、世界のエネルギー市場は大きな構造変化を迎えつつあります。こうした事態を踏まえ、米国、中国はじめ世界各国においてもエネルギー政策の見直し・強化が急速に進みつつあるところです。また、地球環境問題への対応も重要な課題となっています。こうした世界の厳しいエネルギー情勢を踏まえ、昨年、「新・国家エネルギー戦略」を策定しました。資源エネルギー庁は本戦略の実現に向け、積極的に取り組んでいきます。
引用:経済産業省　公式ウェブサイト
http://www.meti.go.jp/information/recruit/keizai/sigenenerugi/01.htm

Q7-2. How do the government/governmental bodies deal with nuclear emergency situation?

A7-2. The Prime Minister declares state of nuclear emergency and set up "Nuclear disaster countermeasures office" at Prime minister's Office and "Nuclear disaster countermeasures onsite office." The head of the "Nuclear disaster countermeasures office" is Prime Minister. The head of "Nuclear disaster countermeasures onsite office" Is designated by the head of "Nuclear disaster countermeasures office." The "Nuclear disaster countermeasures onsite office" consists of members of Nuclear and Industrial Safety Agency (NISA) mainly.



Source: Newspaper accounts
(Yomiuri 2011/4/5 afternoon, Asahi 2011/4/5, afternoon)

(参考)

原子力災害対策本部・原子力災害現地対策本部について原子力特別措置法より抜粋

第十六条　内閣総理大臣は、原子力緊急事態宣言をしたときは、当該原子力緊急事態に係る緊急事態応急対策を推進するため、内閣府設置法（平成十一年法律第八十九号）第四十条第二項　の規定にかかわらず、閣議にかけて、臨時に内閣府に原子力災害対策本部を設置するものとする。

２　内閣総理大臣は、原子力災害対策本部を置いたときは当該原子力災害対策本部の名称並びに設置の場所及び期間を、当該原子力災害対策本部が廃止されたときはその旨を、直ちに、告示しなければならない。

第十七条　原子力災害対策本部の長は、原子力災害対策本部長とし、内閣総理大臣（内閣総理大臣に事故があるときは、そのあらかじめ指定する国務大臣）をもって充てる。

－略－

９　前条第二項の規定は、原子力災害現地対策本部について準用する。

１０　前項において準用する前条第二項に規定する原子力災害現地対策本部の設置の場所は、当該原子力緊急事態に係る原子力事業所について第十二条第一項の規定により指定された緊急事態応急対策拠点施設（事業所外運搬に係る原子力緊急事態が発生した場合その他特別の事情がある場合にあっては、当該原子力緊急事態が発生した場所を勘案して原子力災害対策本部長が定める施設。第二十三条第四項において同じ。）とする。

１１　原子力災害現地対策本部に、原子力災害現地対策本部長及び原子力災害現地対策本部員その他の職員を置く。

１２　原子力災害現地対策本部長は、原子力災害対策本部長の命を受け、原子力災害現地対策本部の事務を掌理する。

１３　原子力災害現地対策本部長及び原子力災害現地対策本部員その他の職員は、

原子力災害対策副本部長、原子力災害対策本部員その他の職員のうちから、原子力災害対策本部長が指名する者をもって充てる。

引用: 総務省 e-Gov（イーガブ）
http://law.e-gov.go.jp/htmldata/H11/H11HO156.html

2-8. 地震発生地域における他原発の状況 (Status of other Nuclear Plants in the quake-hit area)

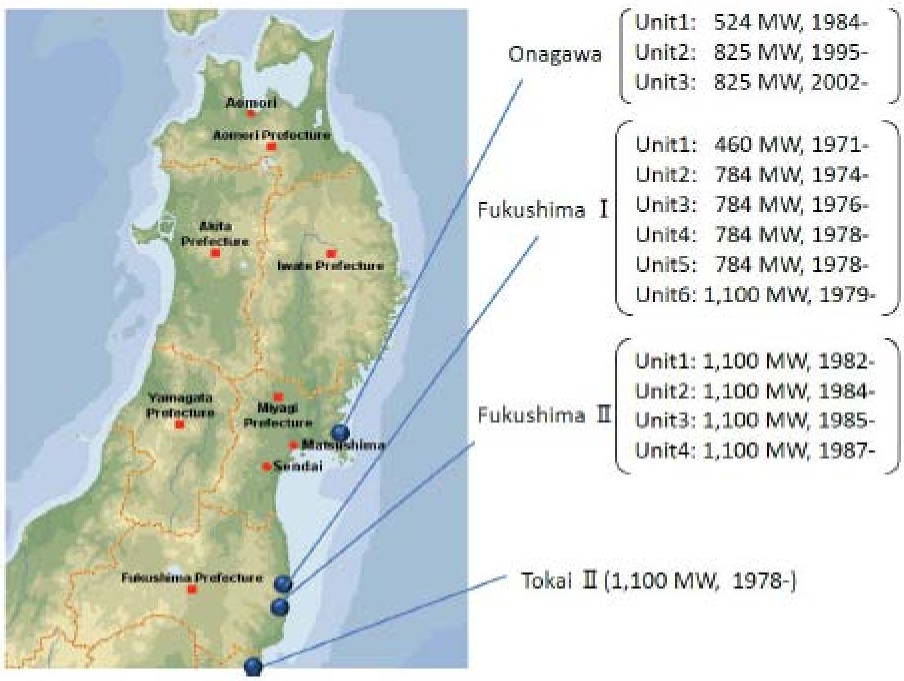
Q8. What is the situation of the other nuclear power plants in the area affected by the earthquake?

女川、福島第二、東海第二

A8-1. Onagawa Nuclear Power Station (NPS), Fukushima Dai-ni (II) NPS and Tokai Dai-ni (II) NPS

At the time of the earthquake occurrence, 11 reactors (Units 1, 2 and 3 at Onagawa (NPS) of Tohoku Electric Power Co. Ltd.; Units 1, 2, 3 and 4 of Fukushima Dai-ni (II) NPS of TEPCO; and an unit of Tokai Dai-ni (II) NPS of Japan Atomic Power Co. Ltd.) were automatically shut-down.

After the automatic shut-down, Units 1, 2 and 3 at Onagawa, Unit 3 at Fukushima II, and the Unit at Tokai II have been cold shut down safely.



(METI; April 9, 2011)

http://www.meti.go.jp/english/earthquake/nuclear/pdf/110409_0800_factsheet.pdf

浜岡

A8-2. Hamaoka NPS

For the Hamaoka NPS, seismic safety measures have been taken appropriately and the station satisfies the statutory safety standards such as technical standards. However, according to the long-term forecast by the Earthquake Research Committee of the Headquarters for Earthquake Research Promotion under the Ministry of Education, Culture, Sports, Science and Technology, the possibility of the envisioned Tokai Earthquake with a magnitude of approximately 8 to occur within 30 years is 87% and this is a

very urgent problem. At this station, the possibility of an earthquake of the seismic intensity of 6 to occur within 30 years is 84%, which is remarkably higher than the percentages for other power stations. The environment of this power station is totally different from those of other power stations. Considering the urgency of the potential damage by a large scale tsunami accompanying this projected earthquake and the March accident caused by tsunami, Minister Kaieda has come to make a tough decision and judged it necessary to take the action for "extra reassurance".
Thus, on May 6 he urged Chubu Electric Power to shut down all units at the Hamaoka NPS until the completion of mid- to long-term measures such as installation of tide embankments and water-tightening construction in nuclear buildings in addition to short-term measures. Therefore, if NISA confirms completion of mid- to long-term measures, the Hamaoka NPS will become sufficiently safe to be reactivated again according to our knowledge as we understand it at present. Shutdown was urged considering the special circumstances of an imminent risk of being hit by a large-scale tsunami (accompanying an earthquake) at this NPS and the seismic safety of the NPS itself is not considered as a problem. In addition, other nuclear power stations are not in such an urgent situation.

(METI; May 9, 2011)
http://www.meti.go.jp/english/speeches/20110509.html

Attachment<2-1>

As of July 20, 2011

Levels of radioactive contaminants in foods (data reported on 18 July 2011)

Note: This data sheet compiles individual test results shown in corresponding press release written in Japanese, available at http://www.mhlw.go.jp/stf/houdou/bukyoku/iyaku.html

	Press release date	Food origin		Sampling date	Food tested	Level of radioactive contaminants in food (expressed as radionuclide levels (Bq/kg)).		
		Prefecture	Area			Iodine-131	Cesium-134	Cesium-137
1	18-July-11	Fukushima	Not known	17-July-11	beef	ND	69	
2	18-July-11	Fukushima	Asakawa-cho	17-July-11	beef	ND	301	343
3	18-July-11	Fukushima	Kitakata-shi	Not Known	beef	ND	6	10
4	18-July-11	Fukushima	Minamisoma-shi	9-July-11	beef	ND	33	
5	18-July-11	Fukushima	Not known	Not Known	beef	ND	25	
6	18-July-11	Fukushima	Not known	Not Known	beef	ND	20	
7	18-July-11	Gunma	Not known	17-July-11	milk	ND	ND	
8	18-July-11	Niigata	Niigata-shi	17-July-11	melon	ND	ND	
9	18-July-11	Niigata	Niigata-shi	17-July-11	corn	ND	ND	
10	18-July-11	Niigata	Tsubame-shi	17-July-11	tomato	ND	ND	
11	18-July-11	Niigata	Tokamachi-shi	17-July-11	winter mushroom	ND	ND	
12	18-July-11	Ibaraki	Not known	17-July-11	sweet potato	ND	ND	
13	18-July-11	Ibaraki	Not known	17-July-11	eggplant	ND	ND	
14	18-July-11	Gunma	Not known	17-July-11	corn	ND	ND	
15	18-July-11	Fukushima	Koriyama-shi	18-July-11	raw milk	ND	ND	ND
16	18-July-11	Fukushima	Motomiya-shi	18-July-11	raw milk	ND	ND	ND
17	18-July-11	Fukushima	Ono-machi	18-July-11	raw milk	ND	ND	ND
18	18-July-11	Fukushima	Izumizaki-mura	18-July-11	raw milk	ND	ND	ND
19	18-July-11	Fukushima	Motomiya-shi	18-July-11	raw milk	ND	ND	ND
20	18-July-11	Fukushima	Not known	Not Known	beef	ND	2	ND

* levels in gray-highlight exceed action levels set by the MHLW for withdrawal from markets

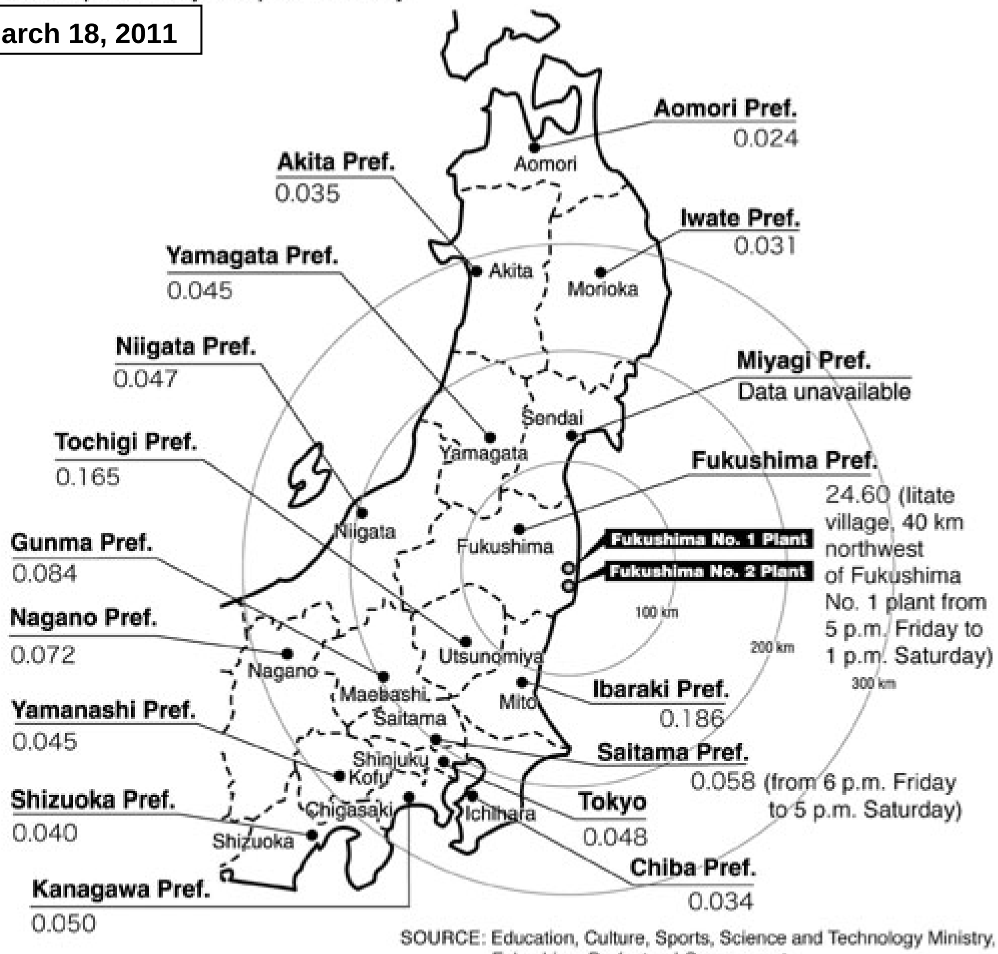
As of July 20, 2011

Attachment <2-2>

Maximum radiation level in eastern Japan

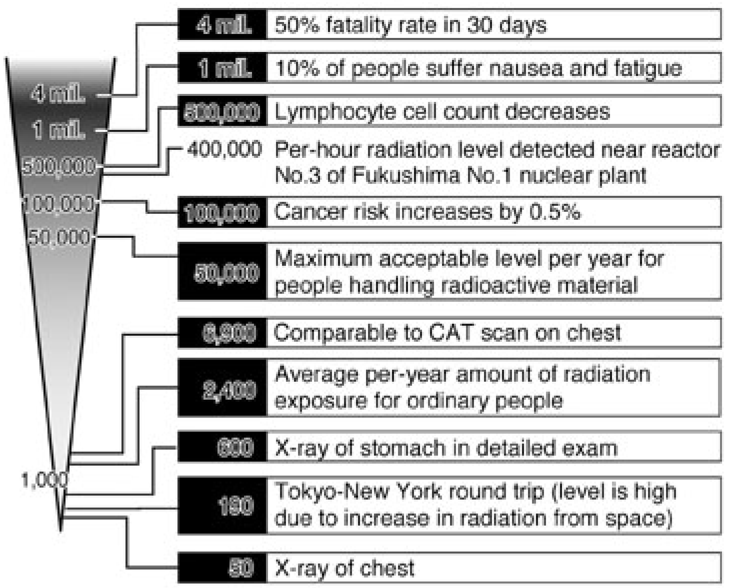
Data from 5 p.m. Friday to 5 p.m. Saturday

March 18, 2011



SOURCE: Education, Culture, Sports, Science and Technology Ministry, Fukushima Prefectural Government

Effects of radiation exposure



Unit of measurement in the above graphic is microsievert per hour.

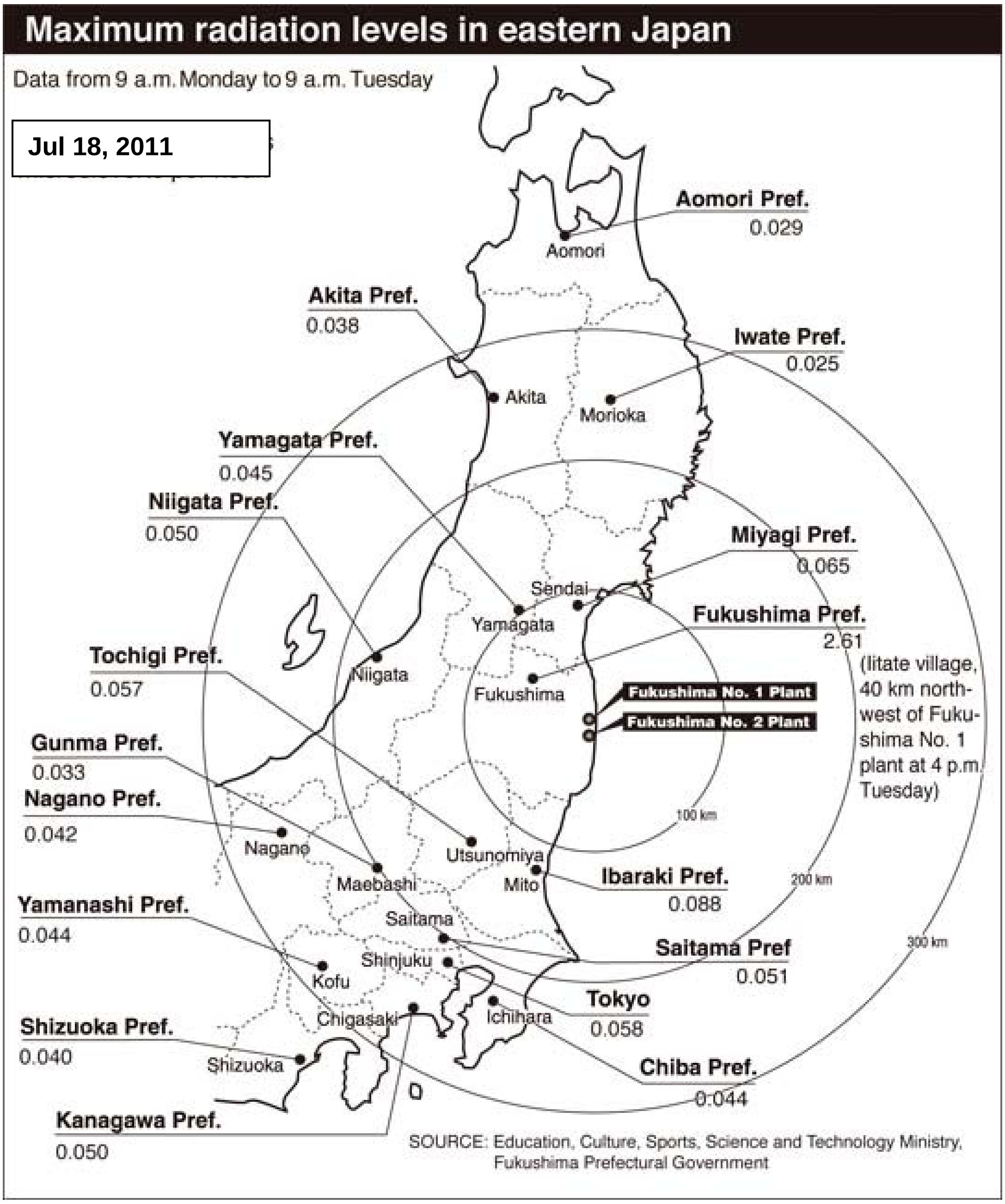
The graphic at left is in microsieverts.

SOURCES: Kyodo, National Institute of Radiological Science

1 millisievert = 1,000 microsieverts

As of July 20, 2011

Attachment <2-3>



FAQs for People Living Outside the Evacuation and In-house Evacuation Areas

Question 1. Will there be health risks if one is exposed to rain?

Answer The level of radioactivity is such that it will not cause any health risks when one is exposed to rain even in those areas outside the evacuation and In-house evacuation areas where traces of radioactivity have been detected. However, if it still worries you, take a shower to wash your hair and skin, and wash your wet clothes.

Question 2. Will children and pregnant women be safe?

Answer The level of radioactivity is such that it will not cause any health risks to children and pregnant women, who are highly sensitive to radioactivity, when they are exposed to rain even in those areas outside the evacuation and In-house evacuation areas where traces of radioactivity have been detected. There will be no problem in carrying on the pregnancy.

Question 3. Isn't the level of radioactivity in drinking water and agricultural produce going to increase in the days ahead?

Answer The level of radioactivity may rise depending on wind directions and rain in the days ahead. However, there is no need to be particularly concerned about this until governors concerned and others order restrictions on their shipments or intake.

Question 4. Is it all right to eat green vegetables other than the restricted items?

Answer There is no problem in eating green vegetables other than the restricted items.

Question 5. Do we need to take iodine tablets?

Answer At present there is no need to take iodine pills. Please pay attention to information from the Emergency Response Headquarters and follow their instructions.

Question 6. Whom can I contact for inquiries?

Answer Ministry of Education, Culture, Sports, Science and Technology and the National Institute of Radiological Sciences will respond to your questions and concerns. Please contact below for inquiries.

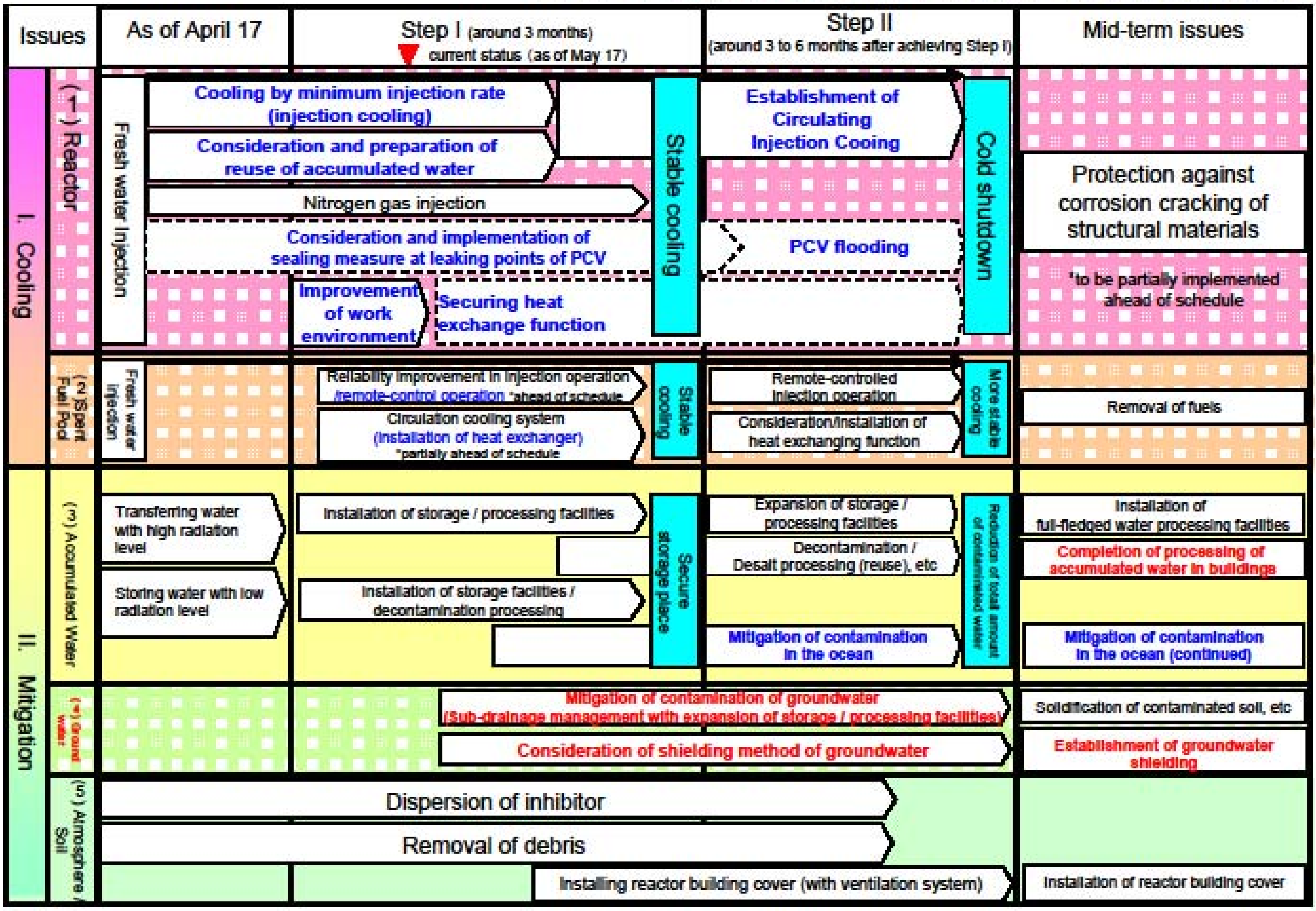
Note: Above does not cover all Q&As given in the Release and was selected by JST. (NISA: Nuclear and Industrial Safety Agency, March 23, 2011) http://www.nisa.meti.go.jp/english/files/en20110323-2-5.pdf

As of July 20, 2011

Attachment<2-5>

Current Status of Roadmap (issues/targets/major countermeasures) as of May 17

Red colored: newly added to the previous version. Blue colored: modified from the previous version



(METI; May 17, 2011)

http://www.meti.go.jp/english/earthquake/nuclear/roadmap/pdf/110517TEPCO_status2.pdf

As of July 20, 2011

Attachment<2-6>

INES

THE INTERNATIONAL NUCLEAR AND RADIOLOGICAL EVENT SCALE

GENERAL DESCRIPTION OF INES LEVELS

INES Level	People and Environment	Radiological Barriers and Control	Defence-in-Depth
Major Accident Level 7	• Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures.		
Serious Accident Level 6	• Significant release of radioactive material likely to require implementation of planned countermeasures.		
Accident with Wider Consequences Level 5	• Limited release of radioactive material likely to require implementation of some planned countermeasures. • Several deaths from radiation.	• Severe damage to reactor core. • Release of large quantities of radioactive material within an installation with a high probability of significant public exposure. This could arise from a major criticality accident or fire.	
Accident with Local Consequences Level 4	• Minor release of radioactive material unlikely to result in implementation of planned countermeasures other than local food controls. • At least one death from radiation.	• Fuel melt or damage to fuel resulting in more than 0.1% release of core inventory. • Release of significant quantities of radioactive material within an installation with a high probability of significant public exposure.	
Serious Incident Level 3	• Exposure in excess of ten times the statutory annual limit for workers. • Non-lethal deterministic health effect (e.g., burns) from radiation.	• Exposure rates of more than 1 Sv/h in an operating area. • Severe contamination in an area not expected by design, with a low probability of significant public exposure.	• Near accident at a nuclear power plant with no safety provisions remaining. • Lost or stolen highly radioactive sealed source. • Misdelivered highly radioactive sealed source without adequate procedures in place to handle it.
Incident Level 2	• Exposure of a member of the public in excess of 10 mSv. • Exposure of a worker in excess of the statutory annual limits.	• Radiation levels in an operating area of more than 50 mSv/h. • Significant contamination within the facility into an area not expected by design.	• Significant failures in safety provisions but with no actual consequences. • Found highly radioactive sealed orphan source, device or transport package with safety provisions intact. • Inadequate packaging of a highly radioactive sealed source.
Anomaly Level 1			• Overexposure of a member of the public in excess of statutory annual limits. • Minor problems with safety components with significant defence-in-depth remaining. • Low activity lost or stolen radioactive source, device or transport package.

NO SAFETY SIGNIFICANCE *(Below Scale/Level 0)*

Photo Credits: Chilean Nuclear Energy Commission, Genkai Nuclear Power Plant, Genkai, Japan/Kyushu Electric Power Co., J. Mairs/IAEA

International Atomic Energy Agency
Information Series / Division of Public Information
08-26941 / E

(IAEA: International Atomic Energy Agency)

http://www.iaea.org/Publications/Factsheets/English/ines.pdf

3. その他

3-1. JST の取り組み (JST's efforts to tackle the Great East Japan Earthquake

1. Dissemination of scientific and technological information:

JST (Japan Science and Technology Agency) provides special offers of its existing scientific and technological database services.

(1) Free Access to the related information

JST offers free access to scientific and technological information on databases which is related to the earthquake, disaster prevention, radiological defense and so on.

http://sti.jst.go.jp/topics/2011/03/000473.html#jstage

(2) Free Access by the related universities and research institutes

J-Dream II, fee-based online scientific and technological database operated by JST, is opened free of charge for universities and research institutes which deal with the damages or recoveries of the Great East Japan Earthquake, such as medical institutes and so on. (Free Access Offer of J-Dream II has been closed at the end of June, 2011)

http://pr.jst.go.jp/new/info20110328.html

2. Urgent Funding Programs:

JST has implemented urgent calls for proposals in order to let researchers continue their work without interruption because of the massive disaster as follows:

(1) Implementation Support Program (RISTEX)

Research Institute of Science and Technology for Society (RISTEX) opened the urgent call for proposals on the implementation of quick-impact R&D results mainly in the disaster area by the Great East Japan Earthquake (2011/4/7-4/22). Six (6) projects out of 124 proposals were selected on May 12, 2011.

http://www.ristex.jp/implementation/application/earthquake2011.html

http://www.jst.go.jp/pr/info/info797/besshi1.html

(2) J-RAPID Program (Urgent International Collaborative Research with USA etc.)

JST, in cooperation with National Science Foundation (NSF) of USA etc., has opened the urgent call for proposals on immediate research needs that arise from the Great East Japan Earthquake (2011/4/18- 2011/7/19). Fourteen (14) projects have been awarded as of July 19th ,2011.

http://www.jst.go.jp/sicp/announce_rapid.html

(3) Research Seeds Quest Program (RESQ)

JST opened the urgent call for proposals on exploration of seeds for research which were interrupted due to the Great East Japan Earthquake (2011/4/22-5/20). 101 projects had been selected from 316 proposals.

http://www.jst.go.jp/pr/info/info797/index.html

(4) Utilization of HECToR

JST has opened call for applications from Japanese researchers, who are being affected by the Great East Japan Earthquake and wish to use HECToR (Supercomputer), thanks to the kind offer from Engineering and Physical Sciences Research Council (EPSRC) of U.K., allocating 5% of its HECToR's computing capacity to JST. The call will be closed when the total amount of computing capacity allocated to Japanese researchers reaches JST's allocation. 3 (three) researchers are enjoying this offer as of July 19th , 2011.

3. Urgent Proposals by CRDS:

CRDS (Center for Research and Development Strategy) announced two proposals regarding the Great East Japan Earthquake. One was released on April 5, advocating the importance of urgent survey for damage, and the other was released on May 23, suggesting what science and technology can do and should do toward the recovery from this disaster.

http://crds.jst.go.jp/output/pdf/kinkyu_shinsai.pdf

http://crds.jst.go.jp/output/pdf/11sp02.pdf

4. Others:

Information on other JST efforts, including assistance to researchers supported by JST programs, science communication activities and so on, is announced on the website as below.

http://www.jst.go.jp/saigai.html