

The fourth and last update of the Fukushima Daiichi Nuclear Power Station accident (December 1, 2011 to March 11, 2012)

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Abstract: This article provides the fourth update on the Fukushima Daiichi accident, from December 1, 2011 to March 11, 2012. As the last update, it will close the series that constitutes the one-year historical record of the accident, focusing on the attainment of a stable shut-down cooling state at the stricken Fukushima Daiichi nuclear power station (NPS), although the recovery operation will continue for many years in the future. The contents of this last update deal particularly with the Mid-and-long-Term roadmap for debris disposal, the decontamination and decommissioning of the Fukushima Daiichi NPS, the issues of radioactive contamination and decontamination around the Fukushima Daiichi NPS, and four investigation committees' interim reports on the Fukushima Daiichi accident, published by TEPCO, the government, the National Diet and an independent body respectively. Furthermore, specific effects of the Fukushima Daiichi accident on international collaboration will be summarized at the end of this article.

Keyword: Fukushima Daiichi accident; tsunami; decontamination guideline; stress test

1 Introduction

March 11, 2012 was the first anniversary of the Great East Japan Earthquake Disaster. One year had passed since the Fukushima Daiichi accident occurred on March 11, 2011. The accident was the severest nuclear accident in Japan's history, a 7 on the international nuclear event scale (INES), and was caused by the largest scale earthquake and tsunami in Japanese history. An aerial view of the Fukushima Daiichi nuclear power station (NPS) after March 11, 2011 is shown in Fig. 1, and the outer appearances of reactor buildings No. 1 to 4 are shown in Fig. 2.

This article presents the fourth and last report in this series, and discusses the aftermath of the Fukushima Daiichi accident as observed from December 1, 2011 to March 11, 2012. It complements the first, second and third articles, which reported the updates from March 11, through May 31, 2011, from June 1 through August 31, 2011, and from September 1 through November 30, 2011, respectively. The contents of this last update deal in particular with the announcement of the Mid-and-long-Term roadmap, the various social



Fig. 1 Bird's eye view of the Fukushima Daiichi NPS after the accident.



Fig. 2 Appearance of No.1 to No.4 reactor buildings (clockwise from left top).

Received date: March 12, 2012
(Revised date: March 22, 2012)

issues of radioactive contamination and subsequent decontamination surrounding the Fukushima Daiichi NPS, and four investigation committees' interim reports on the Fukushima Daiichi accident published by the Tokyo Electric Power Company (TEPCO), the Japanese government, the National Diet and an independent body respectively. In addition, some effects of the Fukushima Daiichi accident on international collaboration will be summarized at the end of this article.

2 Mid-and-long-Term roadmap for the decommissioning of the Fukushima Daiichi NPS

2.1 Declaration of “cold shutdown” state

On December 16, 2011, Prime Minister Yoshihiko Noda, who is also the chair of the Nuclear Emergency Response Headquarters (NERHQ), declared that the stricken Fukushima Daiichi NPS was “brought under the state of cold shutdown” or “brought under control”. According to the NERHQ, a “cold shutdown” is defined as:

- (i) The temperature at the bottom area of the reactor pressure vessel as well as that inside the pressure containment vessel (PCV) are below 100 °C;
- (ii) Steam generation inside the PCV is controlled by water injection and release of radioactive materials from the PCV is well mitigated to an acceptable level;
- (iii) The reliability and safety of the temporary reactor cooling system (what is called “circulation system of injected water to cool the stricken reactor”) are maintained.

PM Noda stressed the need to accelerate the (1) decontamination work in no-entry zones and government-designated evacuation zones, (2) the disposal of contaminated debris and (3) the establishment of temporary and permanent storage facilities, in order to help many evacuees in the Fukushima Prefecture return to their homes in the near future (NHK, December 16, 2011).

2.2 Reliable sensors need to be developed to confirm the reactor state accurately

The official announcement by the NERHQ confirming the cold shutdown state before the end of the year

2011 had been criticized by many domestic and foreign media agencies because of the doubtful measurements in the stricken reactors. Therefore, in order to confirm the “cold shutdown” state more conservatively, the NERHQ requested that the temperatures inside the reactors should fall below 80 °C, due to the error margin of a thermometer's reading of up to 20 °C.

However after having declared the cold shutdown at the end of the year 2011, one of the 3 thermometers attached to the bottom of reactor No. 2 indicated that the temperature rose up to 94.9 °C on February 13, 2012. Later, this thermometer indicated that the temperature went up above 100 °C and more, although in the meantime the other thermometers consistently indicated temperatures below 50 °C. On February 16, 2012, TEPCO explained that this abnormally high reading of the thermo-couple of No.2 reactor could be attributed to malfunctioning due to a break of the lead cable of this thermometer. TEPCO also announced that they had started to develop a new, more reliable temperature measurement technique, to be applied to the stricken reactors in order to confirm the cold shutdown state accurately.

2.3 Announcement of the Mid-and-long-Term roadmap

2.3.1 Goals of steps 1 and 2 have been achieved

On December 21, 2011, TEPCO announced that it had achieved stable conditions for both step 1 and step 2 of the short-term roadmap. The main objective of step 1 in the short-term roadmap, the “steady downward trend in radiation levels” had been achieved by July 2011, while the objective of step 2, that the “release of radioactive materials is under control and radiation doses are being significantly held down” was achieved by the end of December 2011.

2.3.2 Approval of Mid-and-long-Term roadmap

As the goals of steps 1 and 2 of the short-term roadmap had been achieved, the objectives of the “Mid-and-long-Term roadmap” were approved at the joint meeting between the government and TEPCO on December 21, 2011. The report of “The Mid-and-long-Term roadmap towards the Decommissioning of the Fukushima Daiichi NPS Units No.1 to 4” was announced on December 21,

2011. The details of the Mid-and-long-Term roadmap are illustrated in Table 1, following its three-phase classification of the time span up to the end of the decommissioning of the Fukushima Daiichi NPS. The roadmap did not give an estimate of the overall costs of the decontamination process throughout all phases, 1 to 3.

Table 1 Summary of the Mid-and-long-Term roadmap

	Main target	Individual items
Phase 1 (Time span: Within 2 years)	- Start of fuel removal from spent fuel pool -R&D necessary for the removal of fuel debris	-Reduce the radiation impact due to additional emissions from the site and from the radioactive waste -Maintain stable reactor cooling and accumulated water processing while improving their credibility -Commence R&D on decontamination towards the removal of fuel debris -Commence R&D of radioactive waste processing and disposal
Phase 2 (Time span: Within 10 years)	-R&D on the removal of fuel debris -Reinforcement of PCV	-Complete fuel removal from the spent fuel pools in all units -Complete preparations for the removal of fuel debris -Continue stable reactor cooling -Complete the processing of accumulated water -Continue R&D on radioactive waste processing and disposal, and commence R&D on decommissioning of reactor facilities
Phase 3 (Time span: Within 30-40 years)	-Implementation of tasks of fuel debris removal to fulfill until the end of decommissioning	-Complete the fuel debris removal (in 20-25 years) -Complete the decommissioning (in 30-40 years) -Implement radioactive waste processing and disposal

Source: December 21, 2011, Mid-and-long-Term Roadmap towards the Decommissioning of Fukushima Daiichi Nuclear Power Units 1-4, TEPCO (Digest Version)

The new roadmap timetable as shown in Table 1 includes a plan to begin removing used fuel rods from spent fuel pools in all four reactor buildings of the Fukushima Daiichi Units No. 1 to 4, within 2 years. The removed spent fuel will be temporarily stored on-site at the Fukushima Daiichi NPS. The work to remove the melted fuel inside the Units No. 1 through No. 3 reactors should be completed in 25 years, after

which the dismantling of the reactors and of the buildings will begin. The work to scrap the Fukushima Daiichi NPS should be completed within 40 years (NHK, December 15, 2011).

3 Various social matters determined by radioactive contamination

The first update of the Fukushima Daiichi accident in this series explained the then situation, with the radioactive contamination, and the spread at home and abroad of biased rumors on food safety and on products' quality. The second update explained the redefinition of the evacuation areas by the Nuclear Safety Commission (NSC), and the recovery process in the decontaminated areas. The third report elaborated the contamination map compiled by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Radioactive Materials Contamination Response Committee under the Cabinet Office. Following here, in this fourth report, various social matters caused by radioactive contamination will be outlined in the next chapter.

3.1 External radiation exposure in Fukushima

The Prefectural Government of Fukushima (hereafter abbreviated as PGF), where TEPCO's damaged Fukushima Daiichi NPS is located, has been conducting health checkups for all 2 million residents following the Fukushima Daiichi accident on March, 2011. On December 13, 2011, the PGF announced the result of an external radiation exposure survey conducted by medical interview with 1,727 people living in 3 municipalities including Namie Town and Iitate Village. The surveyed people had been exposed to the risk of radiation for 4 months after the accident. The survey result showed that although some Fukushima residents were exposed to a maximal 14.5 mSv (millisievert, that is unit of ionizing radiation) radiation dose, 97.4% of people were exposed to less than 5 mSv. According to the survey result, the PGF concluded that health damage by radioactive exposure would not be expected for the surveyed people. (This survey result did not include the people who worked at the Fukushima Daiichi NPS.) However, as many as 110,000 people have been obligated to live with restrictions and in evacuation for a long period of time, in order to avoid radiation contamination and to

assuage fears for their health linked to any potential exposure to contaminated air, soils, water and food.

3.2 Proposed radiation exposure limit

The International Commission on Radiological Protection (ICRP) recommends 1 mSv per year as the long-term annual limit for the general public. However, the NSC met with a dilemma when deciding by what radioactive exposure level the government should allow evacuees to return home. At first the NSC temporarily adopted the wide-range radiation limit of 1-20 mSv per year. If the level of 20 mSv per year is taken, the evacuation zone would shrink, which would enable more evacuees to return home. This scenario was initially the one intended by the government. However, such a provisional level of exposure is controversial and causes fears of endangering public health, especially in the case of pregnant women and mothers who worry about their children's health. Therefore, concerned people called for the limit of one mSv per year, by referring to the ICRP's recommendation. On December 15, 2011, upon the advice issued by the NSC, the Radiation Council of the MEXT proposed provisional guidelines that set a radiation exposure limit by the following three stages scheme: (1) 10 mSv while decontaminating evacuation zones, within 2 years, (2) 5 mSv or less in the next stage, and (3) 1 mSv in the long term (NHK, December 16, 2011).

3.3 Milk producers strengthening screening test

Japanese dairy companies have been tightening tests on their products, after radioactive cesium was detected in powdered milk made by the major Japanese food company Meiji. Meiji announced on January 31, 2012, that radioactive cesium was found in samples of powdered milk for infants. The product was processed at a plant near Tokyo in March 2011, after the nuclear accident. On February 1, 2012, major Japanese milk producers announced that screening tests for radiation had been initiated in about 180 milk factories in response to growing concerns among consumers.

Ever since the Ministry of Health, Labor, and Wealth (MHLW) decided to strengthen food safety standards for milk in April 2011, there has been a growing call from consumers for more screening. Under the stricter

standards, milk will be allowed to contain only 50 Bq (Becquerel, that is unit of radioactivity) per kilogram, one quarter of the current permissible level that has been in effect since April 5, 2011, as subject to the guidelines of MHLW (NHK, February 2, 2012).

3.4 Government buys contaminated rice

In late November 2011, the PGF found that the rice produced in specific areas of the Fukushima Prefecture had been contaminated by radioactive cesium. The radiation level was between 510 and 590 Bq of cesium per kilogram, which is above the national limit of 500 Bq. The PGF decided to check the crops of 24,000 farmers including more than one third of its rice farmers, a few days after the rice was harvested. The PGF established a sales ban of contaminated rice on November 26, 2011. Both rice farmers and the Fukushima Prefecture appealed that the Japanese government should buy rice in store. In January, the Ministry of Agriculture, Forest and Fisheries (MAFF) decided to purchase all the rice produced in 8 districts including the cities of Date, Nihonmatsu, and Fukushima in Fukushima Prefecture, as well as any other rice with radiation levels above 100 Bq per kilogram. MAFF asked TEPCO to shoulder the cost of the purchase as damage compensation. MAFF estimated that the total amount of rice bought will reach about 4,000 tons (NHK, December 27, 2011).

In addition to rice, MAFF announced that as of the end of February 2012, the vegetables and raw milk in which radioactive substances were detected would be disposed by means based on advice from the NSC. Farmers can ask to be compensated for their economic loss in relation to the sales ban or to the restriction caused by the nuclear power plant accident, as subject to the Nuclear Damage Compensation Law.

3.5 An apartment building contaminated

On January 19, 2012, an apartment building was found to have been built with concrete contaminated by a highly radioactive substance, in Nihonmatsu city, which is within 50 km of the Fukushima Daiichi NPS. The concrete structure of this apartment contained gravel from a stone-crushing site in the Namie town, which is within the evacuation zone around the Fukushima Daiichi NPS. The mayor of Nihonmatsu

city asked METI Minister Yukio Edano to quickly set up appropriate radiation standards to be met in order for gravel and other construction materials to be allowed for shipment, as well as for the damage compensation for residents of the apartment. Edano said he would try to instruct TEPCO to begin compensation procedures as soon as possible (NHK, January 20, 2012).

3.6 NIMBY on disposing disaster debris

A general feeling of “Not in My Backyard” (NIMBY) is growing with regard to nuclear waste and debris, among citizens both near and far away from the Fukushima Daiichi NPS. The mayor of the Futaba town, which is within 5 km of the Fukushima Daiichi NPS, opposed the government's plan to build a facility for storing contaminated soil (NHK, January 4, 2012). (Environment Minister Goshi Hosono stated that Futaba town was chosen because the areas exposed to over 100 mSv of radiation per year are concentrated in this town.) Residents in Yokosuka city in Kanagawa Prefecture (west of Tokyo) have been objecting to burying incinerated disaster debris with radioactive fallout from the stricken Fukushima Daiichi NPS (NHK, February 17, 2012). Organizers of the Daimonji bonfire festival (traditional Buddhist event) in the middle of August in Kyoto City had canceled the use of firewood made from fallen trees from the March 11 tsunami, because radioactive substances were found in the wood (NHK, August 13, 2011). And significant numbers of farmers and fishermen groups in the Kanto district are concerned with rumors about possible contamination that could hurt the health and businesses of local farmers and fishermen. So far, Tokyo is the only prefecture that has accepted the debris from Fukushima for final disposal (NHK, February 17, 2012).

3.7 Cooperation agreement with Ukraine

The effects of the Chernobyl accident that occurred in 1986 still pose a serious threat in Ukraine, where vast areas are still contaminated with radioactive materials. The Japanese government aims to sign a bilateral agreement with Ukraine to cooperate on settling the aftermath of nuclear accidents. The cooperation is expected to cover the exchange of data on health problems, soil recovery from the spread of radioactive substances, and mutual visits of experts to survey the

impact of the accidents. The agreement will be the first agreement of this kind that Japan enters with a foreign country (NHK, January 17, 2012).

4. Decontamination guidelines outside of Fukushima Daiichi NPS

4.1 Government guidelines

The “Special Act of The Environmental Pollution Countermeasure to deal with the discharge of radioactive materials from the Fukushima Daiichi accident” was enacted on December 14, 2011. The Ministry of Environment published the 164-page long document, with the guidelines for collecting, delivering and storing the radioactive-tainted soil and other materials, which have been produced by the many radioactive elements discharged from the Fukushima Daiichi NPS. The guidelines aim to reduce the risks to public health as soon as possible. The government is responsible for disposing the contaminated sludge and debris of more than 0.23 mSvs per hour, and for shouldering the cost of the decontamination work.

The description of the guidelines is very detailed, covering many different subjects about the decontamination work: the water volume and the pressure for decontaminating buildings should be adjusted as excessive amounts of water, *e.g.* high pressure washes with 15 MPa may cause the dispersion of radioactive materials. To save water, moss and dead leaves should be removed by hand before high pressure water spraying. The used water should not be drained but collected in buckets. Separate containers should be used for different levels of radiation in contaminated soil. Safe distances between the storage spaces and residential areas should be kept (NHK, December 11 and 14, 2011).

4.2 IAEA recommendations

On October 14, 2011 the International Atomic Energy Agency (IAEA) survey team to Japan announced its assessment of the decontamination efforts undertaken by several Japanese organizations, stating in particular that to remove radiation from the entire affected area would be counterproductive because the decontamination costs would amount to more than 1 trillion yen (US\$12.99 billion). Therefore “This investment of time and effort in removing

contamination beyond certain levels (the so-called optimized levels) from everywhere, such as all forest areas and areas where the additional exposure is relatively low, does not automatically lead to reduction of doses for the public. It also involves a risk of generating huge amount of residual material” (NHK, October 14, 2011). It was a rational advice, but it is not certain that the IAEA advice will be reflected in the decontamination policy of the Japanese government.

4.3 Two-year plan to allow evacuees to return home

On January 26, 2012, the Ministry of Environment announced a two-year plan to complete decontamination of some evacuation zones surrounding the Fukushima Daiichi NPS, in order to ultimately allow evacuees to return relatively soon to their home towns, which are scattered across 11 municipalities. The areas with a radiation level above 50 mSv per year were categorized as “non-residential permit area”, and those areas were ruled out of the decontamination plan, because there is no effective decontamination process to deal with such areas. But the Ministry of Environment decided that the communities around the Fukushima Daiichi NPS with a contamination level below 50 mSv should start full-scale decontamination work by late January, 2012 (NHK, January 26 and 31, 2011).

4.4 Developing a new decontamination process and technology

On November 18, 2011, the Japan Atomic Energy Agency (JAEA) announced the selection result of a public call for demonstration projects of decontamination technology. Twenty-five proposals were accepted for the JAEA-supported two-year projects, with the acceptance process including on-site testing. Examples of accepted proposals are: (1) cesium removal and recovery device and cesium washing by use of nano-bubble water, (2) blasting contaminated wood and bark, (3) decontaminating debris by use of dry ice blasting, (4) decontaminating the forest without high-pressure blast water and (5) blasting contaminated soils with plants penetration.

5. The Investigation Committees on the Fukushima Daiichi accident

5.1 Introduction

There are at least four major committees that have been undertaking independent investigations and verifications for the causes of the severe accident at Fukushima Daiichi NPS. They are the investigation committees of TEPCO, of the Japanese government, of the National Diet, and of the Independent Investigation Commission formed voluntarily by several opinion leaders. The background of the committees and of the committee members, and the purpose, target and investigation methods of individual committees can be very different, but the motivation to draw lessons to ensure and upgrade nuclear safety seems common to all these committees. The investigations of all the committees are still under way and have not reached their final conclusions, but their intermediate reports have been published before the time of writing.

5.2 TEPCO committee

5.2.1 Establishment

In June 2011 TEPCO set up the “Fukushima Nuclear Accident Investigation Committee”, chaired by Masao Yamazaki, an executive vice president of TEPCO. The members of this committee were selected from other sectors than the nuclear power division of TEPCO, to investigate the nuclear division’s conduct. In order to also get an outside viewpoint, TEPCO furthermore established the “Accident Investigation Verification Committee”, chaired by Genki Yagawa (Professor Emeritus the University of Tokyo). The intention of the latter committee is to ensure outside scrutiny and to get comments on the investigation results compiled by the former committee from a technical and independent point of view. The objectives of both committees (hereinafter referred to as the TEPCO committee, taken as a whole) is to clarify the causes of the accident by investigating and verifying the facts of TEPCO itself as the core actor in the accident, and to incorporate the lessons learned into future business operations.

5.2.2 TEPCO’s account

On December 2, 2011 TEPCO publicized the press release regarding the interim report by its committee.

The account of the accident in the interim report^[1] can be summarized as follows:

(i) Scale of earthquake and tsunami

On March 11, 2011 at 14:46 the 9.0-magnitude earthquake occurred. This was the largest magnitude earthquake in recorded history in Japan. This powerful earthquake was caused by the combination of several earthquakes whose focal area ranged approximately 500km in length and 200km in width, extending from offshore of Iwate Prefecture to offshore of Ibaraki Prefecture. This seismic activity led to the occurrence of the largest tsunami in Japanese history. The ground motion that the nuclear power station experienced was of an intensity of a “6 upper” level by the Japanese seven levels of earthquake scale, and it was nearly equivalent to the Design Basis Seismic Ground Motion of the plant design.

Table 2 Strategy for preventing core damage

No	Objective	Contents
Strategy 1	Thorough Tsunami Countermeasures	Countermeasures for mitigating the impact of tsunami hazard, which was the direct cause of the Fukushima accident. Implement thorough tsunami countermeasures for protecting vital facilities
Strategy 2	Securing Functions by adopting Flexible Countermeasures	Implement practical and flexible countermeasures for preventing core damage even under the accident condition of multiple equipment failures and loss of multiple functions like Fukushima (Multiple facility failure and function loss due to both the long-hours station black out condition and the loss of long-hours heat removal functions)
Strategy 3	Mitigation of the Impact after Reactor Core Damage	Although top priority should be placed on the prevention of core damage, implement additional countermeasures to mitigate the impact that occurs in case of core damage

(Source: Fukushima Nuclear Accident Analysis Report, December 2, 2011)

(ii) Height of tsunami

The height of the tsunami was approximately 13m. The area surrounding the major buildings of Units 1

to 4 was flooded to a depth of approximately 1.5m to 5.5m. The depth of the water surrounding the major buildings of Units 5 and 6 was less than 1.5m. Measurements of the tidal level and wave height were not possible due to the impact of the tsunami. These values were analytically obtained based on the observed flood height.

(iii) Countermeasures on tsunami, functionality damage and the impact after reactor core damage

In order to prevent similar accidents from occurring again, various strategic countermeasures for preventing core damage were identified, as elaborated in Table 2.

5.2.3 Compliance with government regulation is not enough

TEPCO’s interim report admitted that according to the general interpretation among the public, TEPCO, as the operator of the Fukushima Daiichi NPS, should be held primarily responsible for the Fukushima Daiichi accident. TEPCO has been content to passively follow the government’s guidelines, doing the minimum necessary to be covered in the case of an unexpected event:

(i) The accident management (AM) preparations were confirmed by the Japanese government as appropriate, and the preparations were put into practice together with the government. However, in the Fukushima Daiichi accident, the destruction caused by the tsunami resulted in the loss of almost all equipment and power source functions, including those for accident management (AM) measures prepared together with the government. The situation on the site was far beyond the originally estimated AM conditions, and under the framework of the prepared safety measures, the expansion of the accident could not be prevented.

(ii) Vital functions such as a reactor scram were designed based on the philosophy of operating on the safe side in the case of failure. TEPCO has obtained the establishment permit in accordance with the law on the premise that the structure and equipment of the reactor facility do not hinder the prevention of disaster.

As stated above, TEPCO stressed that they operated nuclear power plants in compliance with government

policy, but that the policy itself was not sufficient to prevent the accident.

5.3 The government committee

5.3.1 Establishment

The Investigation Committee on the Accidents at the Fukushima NPS of TEPCO (hereinafter referred to as the government committee) was established by a cabinet decision on May 24, 2011, with the aim of making policy recommendations on measures to prevent further spread of the damage caused by the accident and a recurrence of similar accidents in the future. The government committee conducts wide-ranging investigations into the causes of the accident and into the causes that might have contributed to the spread of damage, shedding light on what are suspected to be the background factors. Similarly, various topics concerning the measures that were taken to prevent the spread of damage are being investigated. The committee also pays attention to organizational and institutional issues relating to the parties concerned, for instance the Nuclear and Industrial Safety Agency (NISA), the NSC of Japan, the Prime Minister's Office, many related ministries and agencies, local governments in the affected regions, nuclear power support organizations and academic societies.

This committee is chaired by Yotaro Hatamura, Professor Emeritus at the University of Tokyo, and has held 6 plenary meetings in addition to establishing three sub-committees to discuss (1) the social system (background of the Fukushima Daiichi accidents), (2) the causes of the accidents (technical), and (3) the prevention of damage expansion (evacuation, *etc.*). (Yotaro Hatamura is an academic leader of "Failure/Error Knowledge". He published the book "Shippaigaku no susume (Learning from Failure)" in Japanese edition, focusing on Cause Analysis (CA), Failure Prevention (FP), and Knowledge Distribution (KD), see <http://www.sozogaku.com/hatamura/>)

The basic standpoint of this governmental committee can be summarized as follows:

For those people living at home and abroad who worry about the Fukushima Daiichi accident, the government committee should respond with such keen issues as the causes and the background of the

accident, prevention of damage expansion, situation of stricken nuclear plants after the accident, radiation exposure estimation utilizing the Systems for Prediction of Environmental Emergency Dose Information (SPEEDI), evacuation process of residents, and dumping of contaminated water into the sea among others (Chapter 1). Furthermore, the committee tackles problems of contamination of agriculture/livestock, air, soil and water, and issues relating to providing information to the nation and to the international community. The government committee should act preemptively to prevent accidents, by deploying countermeasures especially for tsunamis, severe accidents and complex disasters.

However, the government committee does not investigate the following subjects: (1) whether or not nuclear power generation is good, (2) cost of nuclear power generation, (3) issues of nuclear damage compensation and decontamination, as it would take too many years to assess them.

5.3.2 Interim report

On December 26, 2011, the government committee released the interim report^[2] as a result of its investigation and verification undertaken to find out the causes of accidents and damages at Fukushima Daiichi NPS. It also made recommendations to prevent reoccurrence of a similar accident. The 506-page report was based on interviews with more than 450 people, including government officials and plant workers. The final report will be submitted in the summer of 2012.

5.3.3 Position of the report and widely proliferated issues

The government interim report is on the way to completion by the summer of 2012, and the government committee has publicly disclosed it so that it should meet the requirements of those that the accident concerns at home and abroad. To this purpose, the government committee has accumulated facts, and list of challenges in this regard. Other relevant organizations are undertaking the various countermeasures based on the lessons from the Fukushima Daiichi accident.

According to the government committee's interim report, here below are the core issues to the accident at the Fukushima Daiichi NPS, which were selected and partly moderated by the authors. They are (1) responses by central and local governments to the accidents, (2) responses to the accidents, including misjudgment of operational situation of Isolation Condensers (IC) at Unit 1, (3) poor handling of alternative water injections at Unit 3, and explosions in the Units 1 and 3 reactor buildings, (4) the measures taken for preventing the expansion of damage, including utilization of SPEEDI and initial radiation monitoring, (5) the decision-making of evacuation of residents and confusion in localities, (6) inappropriate precautionary measures against tsunamis and severe accidents, including such measures as undertaken by TEPCO against natural disasters, (7) reasons why the measures against tsunamis and severe accidents were insufficient, and (8) recommendations on the new nuclear safety regulatory body, among other topics.

5.3.4 Preliminary conclusions; criticism of both TEPCO and the regulatory authorities

Which side is primarily responsible for the Fukushima Daiichi accident, TEPCO as an operator, or the government as a permit organization? The government committee harshly criticized both TEPCO and the regulatory agencies in its interim report published on December 26, 2011, by pointing out the following three factors in the occurrence of the accident and the response after the accident;

- (i) Lack of severe accident measures against tsunamis
Even if the probability of a high and strong tsunami hitting the plant was very low, precautionary measures should have been undertaken to alleviate the enormous risk of extremely large scale damages caused by such a tsunami;
- (ii) Lack of preparation against complex disasters
The disaster prevention program should have been formulated by assuming that the severe accident of the nuclear power plant would become a complex disaster;
- (iii) The lack of vision needed to see the entire picture of the accident
The emergency response preparedness should be based on a systemic picture of an accident.

The government committee criticized the stance of the government in dealing with the Fukushima Daiichi accident and requested the government to take the following points into account in establishing the new regulatory body. These are: (1) independence and transparency, (2) organizational competence in responding to an emergency, (3) the role of providing information, (4) securing of competent human resources and staff education for upgrading needed, and (5) collection and accumulation of scientific knowledge. In this report, the government committee stressed the need for a paradigm shift in the basic principles of disaster prevention programs for such a large system.

5.4 The National Diet committee (NAIIC)

5.4.1 Establishment

The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (hereinafter referred to as NAIIC) was set up by the National Diet under a new specific law. Such a unique National Diet committee was established for the first time in Japan's National Diet history. The purpose of NAIIC is to conduct an investigation independently from the government committee, to conduct it from the ordinary people's and from a neutral standpoint, using multilateral approaches, and to propose a policy statement on the prevention of expanding damages and the reoccurrence of similar accidents. NAIIC is independent from the traditional nuclear administration, and also comprehensively discusses not only technical issues, but also institutional ones (<http://www.naiic.jp/>). NAIIC is chaired by Kiyoshi Kurokawa (Professor Emeritus at the University of Tokyo and currently Professor of Medicine, National Graduate Institute for Policy Studies; Chairman, Health and Global Policy Institute). Other commissioners are a seismologist, a radiological scientist, a lawyer scientist outside of the nuclear sector, a person from the local communities and people with other such diverse backgrounds.

5.4.2 Powerful authorization

NAIIC has a legal right of summoning officials from the government and TEPCO, and even of compelling them to submit data, under the law. In this regard it is different from the government committee. NAIIC started its activities on December 8, 2011. The first

meeting of NAIIC was held on December 19. Chairman Kiyoshi Kurokawa explained that this experts group would examine the interim report compiled by the government and by the TEPCO committees, including issues that the government and TEPCO were unable to present and release. The final report will be published this summer. At the second meeting of NAIIC, which was held on January 16, 2012, it demanded the presence of Yotaro Hatamura, chairman of the government committee, as well as of TEPCO officials, to record evidence. They were virtually summoned as “Sankonin (witness)”, or relevant person at NAIIC. According to media reports, NAIIC is said to call for former PM Naoto Kan’s presence as well.

5.4.3 National Diet versus Government and TEPCO

According to a New York Times report from January 15, the National Diet was challenging the government’s account of the accident at the Fukushima Daiichi NPS, and was going to start its own investigation into the disaster - including an inquiry into how much the March earthquake may have damaged the plant’s reactors even before the tsunami. Critics in Japan and overseas have called for a fuller accounting of whether TEPCO sufficiently considered historically documented tsunami risks, and whether it could have done more to minimize the damage once waves hit the plant.

5.5 Independent Investigation Commission

The Independent Investigation Commission on the Fukushima Nuclear Accident was established in September 2011 by the Rebuild Japan Initiative Foundation. It consists of six commissioners with technological, legal, and energy expertise. According to handouts delivered for the news conference at the Foreign Correspondents’ Club of Japan, held on March 1, 2012, the Commission’s findings are “truly independent, unfettered by concerns for existing organizations and frameworks”, and also announced was the 420-page report^[3] on the Fukushima Daiichi accident. It is chaired by Koichi Kitazawa, Professor Emeritus at the University of Tokyo, a scientist who until September 2011 was president of the Japan Science and Technology Agency. The six commissioners provided guidance to the Working Group comprising approximately 30 university and

think-tank researchers, lawyers, and freelance journalists, and interviewed around 300 people, including former PM Naoto Kan, former METI Minister Banri Kaieda, and other high-ranking government officials of NISA, JAEC, and other such agencies, but excluding the TEPCO officials that did not comply with the inquiry.

6. Stress test results and the restarting of nuclear power plants

6.1 Chronology of actions

The purpose of the stress tests is to reassure the general public and the localities that host nuclear power plants. On July 11, 2011 Cabinet Minister Yukio Edano, METI Minister Banri Kaieda (both at the time), and Minister in charge of the nuclear accident Goshi Hosono ordered NSC and NISA to work out the two stages stress tests for all nuclear power stations nationwide excluding the Fukushima Daiichi NPS and the Fukushima Daini NPS. Accordingly, NISA has outlined a plan in which the two-stage stress tests would involve computer simulations to gauge the reactors’ endurance during earthquakes, tsunamis, loss of electrical power supplies and loss of cooling systems. On July 22, 2011 NISA ordered such a report to be compiled and submitted by nuclear power plant operators, with the overall evaluation (the so-called “stress test”) with regard to the nuclear power plant safety, to be given upon approval of NSC, and subject to the guidelines of NISA.

Unlike the stress tests conducted in European nations, the Japanese government had set the stress tests as a pre-condition for restarting nuclear power plants after their periodic inspection. Restarting nuclear power plants after periodic inspection should satisfy the following two conditions: (1) the nuclear power plant withstands adequately earthquakes/tsunamis and the event of beyond design basis events, and (2) reassurance among the general public and the localities hosting nuclear power plants.

6.2 The first stage stress test evaluation

In compliance with the guidelines of NISA, nuclear power plant operators have begun to submit to NISA the first stage evaluation results of the stress tests. On October 28, 2011, KEPCO, the biggest PWR operator

in Japan, submitted the evaluation report to NISA with the stress test result for Ohi Unit No. 3 unit, and then on November 17, 2011, for Ohi Unit No. 4, both units being in the Fukui Prefecture. On January 18, 2012, NISA's committee discussed the draft appraisal on the stress test reports for Ohi Units No. 3 and 4. On February 8, NISA's expert panel agreed to complete their evaluation of computer-simulated stress tests for the 2 nuclear power reactors in Ohi (NHK, February 9, 2012).

On February 13, 2012, NISA submitted its report to the NSC. The NSC chairman Haruki Madarame responded that he expected to complete a report on the examination by the end of March at the latest. If the Commission members concur, the government will make the final decision on whether to approve the restarting of the nuclear power plants. Resumption of the nuclear power plants also needs the consent of the local governments that host the plants, and the latter are not likely to agree with restarting the nuclear power plants. Indeed, Fukui Prefecture and Ohi Town are calling for the central government to work out new safety standards based on the lessons from the Fukushima Daiichi accident.

6.3 The IAEA advice on the stress test

According to the IAEA report, the IAEA safety review mission was conducted by a team of five IAEA and three international experts, with support from IAEA public information and administrative staff, from January 23 to 31, 2012. The mission consisted of meetings at NISA's offices in Tokyo and of a visit to the Ohi NPS that provided an example of how the comprehensive safety assessment was being implemented by Kansai Electric Power Company (KEPCO). The conclusion of the team was that NISA's instructions and review process for the comprehensive safety assessments were generally consistent with IAEA Safety Standards ^[4]

6.4 The seismic margin and tsunami; key evaluation points

As far as emergency safety measures are concerned, substantial improvements were made in the ability of both units to continue water injection and heat

removal when all AC power supplies and ultimate heat sinks are lost. According to KEPCO and TEPCO, the safety margins were fully confirmed at all the plants for each item of important safety-related equipment against events beyond design (Source; Editor Hisako Sakurai, "Atoms in Japan"/JAIF, January 30).

6.5 Opinion survey; cautious about restarting

On February 8, 2012, NHK publicized its opinion survey of residents of all the municipalities where nuclear power plants are located. NHK surveyed 29 municipalities, excluding those in the Fukushima Prefecture. The result of this survey is shown in Table 3. It is seen from this table that more than 70% of Japanese municipalities that host nuclear power plants are cautious about restarting nuclear power plants. Five of them, or 17%, said they would give the go-ahead for the nuclear power plants to resume operation. But 21 municipalities, or 72%, said they would not allow it, or that they cannot yet decide. Municipalities that expressed caution said they cannot be sure whether the nuclear power plants are really safe, and cited the difficulty of persuading residents while the government has yet to decide on its nuclear policy.

Table 3 Result of opinion surveys for all municipalities where nuclear power plants are located.

Do you agree with restarting nuclear power plants?		
Result of opinion poll		
	Numbers of prefectures	Percentage
Yes	5	17%
No	21	72%
Unspecified	3	11%

(Source: NHK, February 8, 2012)

Asked what is needed to restart the nuclear power plants beside stress tests, 48% respondents mentioned a satisfactory investigation into the Fukushima Daiichi accident and understanding by local residents. And 38% cited new government safety regulations. The municipalities stressed their concern over nuclear power plant safety, and demanded more government accountability (NHK, February 8, 2012).

6.6 Looming severe power shortage in 2012

If the present deadlock and delays associated with stress tests continue, the country could see all 54 nuclear reactors shut down. And Japan would face

again the extremely hot issues of severe electric power supply and demand imbalances (NHK, January 13).

Unless the stress test results will meet the required conditions, the restarting of the idle reactors will be delayed, which will subsequently lead to a severe power shortage throughout Japan in 2012. We note that unlike in the case of European countries, the stress tests in Japan are set as a precondition for restarting the reactors.

7. Change of legislative framework for nuclear power and safety

Until March 31, 2012, METI has jurisdiction over nuclear power reactor facilities in Japan, and the Law for Establishment of the METI clearly stipulates that the NISA is an “organization to ensure the safety of nuclear energy,” based on the provisions of the Reactor Regulation Act and of the Electricity Business Act. In concrete terms, the Minister in charge of METI is responsible for regulatory activities over nuclear installations, such as the license for reactor installment pursuant to the Reactor Regulation Act, the approval of construction plans and the pre-service inspection pursuant to the Electricity Business Act. The Minister in charge of METI relegates these regulatory activities to NISA, which independently makes decisions or may consult its proposed decision with the Minister in charge of METI without the involvement of the Agency for Natural Resources and Energy (ANRE).

In light of the Fukushima Daiichi accident, however, public opinion harshly criticized the government and the nuclear power plant stakeholders, because NISA, as the safety regulator, and ANRE, as a business promoter, unethically live together under METI’s administration. The former PM Naoto Kan decided to separate NISA from METI, and to annex NISA to a newly established agency under the Ministry of Environment.

On January 6, 2012, Environment Minister Goshi Hosono stated at the press conference that for the purpose of ensuring nuclear safety, the draft amendment of the Reactor Regulation Act, which transfers responsibility from METI’s Minister, to the Environment Minister, is considered by the National Diet. According to the explanation of the draft

amendment proposal, Japan should immediately recover the legislative reliability and re-assurance of nuclear safety that were lost due to the Fukushima Daiichi accident. The proposal has also invoked that a “Nuclear Regulatory Agency” (NRA) should be established, as a single regulatory agency, distinctively apart from other nuclear utilization actors, and to this purpose falling under the Ministry of Environment, effective from April 1, 2012. The new NRA would also have to take over SPEEDI from MEXT.

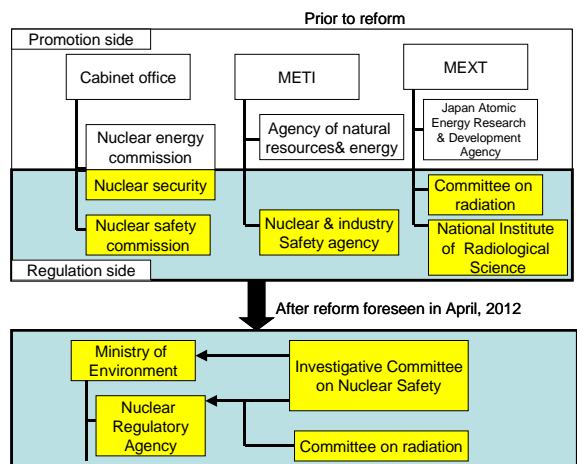


Fig. 3 Institutional reform of nuclear regulation regime in Japan from April 2012.

METI: Ministry of Economy, Trade and Industry
 MEXT: Ministry of Education, Culture, Sports, Science and Technology

However as of this article of March issue, it was difficult for the national Diet to pass timely the act of the institutional change of nuclear regulation regime as shown in Fig.3 which was assumed to become effective on April 1, 2012, because some members of the Diet still argue that the NRA better be independent of the Cabinet than the proposition by the government that the NRA be under Ministry of Environment so that the Cabinet can control the situation of national nuclear emergency like the Fukushima Daiichi accident.

8. Nuclear export agreements ratified

8.1 Bilateral Agreements with Russia, South Korea, Vietnam and Jordan

In late December, 2011, Japan’s National Diet ratified bilateral agreements for cooperation in the peaceful uses of nuclear energy with four countries: Russia, South Korea, Vietnam and Jordan, with whom the

Japanese government had already signed agreements before the Fukushima Daiichi accident of March 11, 2011. However, the National Diet approval had been pending since the Fukushima Daiichi accident.

The Japanese government has also been negotiating similar bilateral agreements with five other countries: Brazil, Mexico, Turkey, India and South Africa, due to be signed and ratified by the Diet before the end of 2012. Furthermore, there are three countries, Switzerland, Kuwait and Mongolia, that are reported to have proposed bilateral agreements with Japan after the Fukushima Daiichi accident.

The ratification of bilateral agreements with the four-abovementioned countries would allow Japan to export nuclear power facilities and to transfer the related technology to those countries. On December 7, 2011, Prime Minister Yoshihiko Noda stated at the National Diet that Japan has a duty to share with the rest of the world the lessons learned from the Fukushima Daiichi accident, and stressed that it would be meaningful for Japan to offer safe nuclear technologies to those countries that request them, while ensuring the peaceful use of nuclear power by monitoring the conditions in the recipient nations. But he expressed caution about signing similar pacts with more countries, stressing the need to first review the Fukushima Daiichi accident carefully.

On January 30, 2012, Takuya Hattori, President of the Japan Atomic Industrial Forum (JAIF), said during his New Year's message that he welcomed the nuclear cooperation agreements between Japan and Vietnam, South Korea, Jordan and Russia that had been approved by the Japanese National Diet.

8.2 Reason of exporting nuclear technology

There has been a looming argument in Japan and abroad as to whether or not the domestic policy by the ruling Democratic Party of Japan (DPJ) to lower Japan's reliance on nuclear power in meeting its future energy needs is in contradiction with the objective of promoting the export of nuclear technology. The present Japanese government, led by the DPJ, has been promoting the export of nuclear reactor technology because it deems the export of infrastructure technologies as a pillar of its economic

growth policy. But there is now a fear that Japanese firms would lose their fair chances of signing the contracts that had already been offered formally and informally to them by many countries even after Fukushima Daiichi accident.

9. Regional nuclear cooperation forums

The Forum for Nuclear Cooperation in Asia (FNCA) at the Ministerial Level Meeting was held on December 16, 2011 in Tokyo. The FNCA is a Japan-initiated cooperation framework for the peaceful use of nuclear technology in Asia, consisting of 12 member countries, Australia, Bangladesh, China, Indonesia, Kazakhstan, Korea, Malaysia, Mongolia, Philippines, Thailand and Vietnam, and Japan. At the Tokyo meeting, FNCA countries expressed their gratitude to the Japanese government for providing information related to the accident and asked the Japanese government to continue providing this information through the FNCA, under the shared view that nuclear safety in Asia can be enhanced through the effective sharing of knowledge at an international level. Japan replied that it would disseminate the information positively and continuously.

The trends in the 12 countries present at the FNCA meeting can be summarized as follows. Australia has maintained the position that it does not foresee the national introduction of nuclear power. Bangladesh has been building its Rooppur Nuclear Power Plant (RNPP) to meet rising demand for electricity. China strengthened safety regulations at its operating nuclear facilities, and carried out safety assessments of all nuclear power plants after the Fukushima nuclear accident. For the moment, safety inspections nationwide have been finished, and safety assessment reports have been preliminarily accomplished. The preliminary results show that all operating facilities are safe, and that the quality of nuclear facilities under construction satisfies the required safety standards. Indonesia carried out, in November 2011, a national opinion poll in the wake of the Fukushima Daiichi accident, and the results showed that 49.5% of respondents agreed with the nuclear energy option, 35.5% did not agree, and 15% abstained respectively. Japan would like to support efforts for nuclear capacity building, including the human resource

development of member countries. Japan will also continue to cooperate with countries in Asia for the advancement of nuclear science and technology and for the effective utilization of such advancements, including for nuclear power generation for the purposes of human health and socio-economic development in each country. Kazakhstan is among the states carrying on investigations in the field of peaceful applications of nuclear energy and it is going to construct nuclear power stations. Korea will enhance the reliability of its nuclear energy exports by successfully completing Jordan's research reactor and the UAE nuclear power plant, and by fulfilling its international role through supporting infrastructure development in developing countries. Malaysia is currently undertaking the prerequisite detailed studies prior to any decision to implement nuclear power projects. Mongolia provides that the exploitation of radioactive minerals and nuclear energy should play an important part in its sustainable development and national security. The Philippines was seriously considering the inclusion of nuclear power as part of its national energy mix. Thailand has postponed the decision to embark on a nuclear power program for three years as a result of the Fukushima accident. Vietnam has decided to start nuclear power development between 2020 and 2030.

10. COP17 and issue of extension of Kyoto Protocol

The impact of the Fukushima Daiichi accident on Japan has been affecting Japanese environmental policy in terms of the climate change effect of CO₂ emissions. On December 6, 2011 Environment Minister Goshi Hosono stated at a press conference that although Japan had been contributing to global warming prevention by committing to cut its CO₂ emissions by 2012 by 6 percent from their 1990 level, meeting this target has become harder and harder as a result of more and more suspensions of nuclear power plants in Japan. On December 7, 2011, Goshi Hosono stated at the ministerial meeting of the 17th UN Framework Convention on Climate Change (COP17) in Durban, South Africa that Japan would not join the extension of the Kyoto Protocol because even if it were to be extended after its expiration in 2012, it would cover only about a quarter of global emissions. By the same reasoning as Japan, Canada and Russia

had already stated the position that they would not sign up to the Kyoto extension or to another round of emissions reduction targets unless the many countries defined as emerging economies would also sign up to meeting binding targets.

In the near-term perspective, in the wake of the Great East Japan Earthquake and of the Fukushima Daiichi accident, the prolonged suspension of nuclear power plants has been forcing the Japanese industrial sector to switch its power mix to LNG, coal and oil. This has been causing a spike in CO₂ emissions in Japan, while the energy-saving efforts due to the heightened awareness among both the service and the household sectors has been making a dent in energy consumption, thereby lowering their CO₂ emissions. However, no interim analytical research report has arrived yet as to which sector is prevailing.

In its Mid-and-long-Term perspective, the Japanese government is revising its energy and environmental policies. By the summer of 2012, the Japanese government will release a new basic energy plan in order to seek "innovative" energy-mix options aimed at safety, economy, environmental preservation and security.

11. Closing remarks

Persistent anti-nuclear sentiments are growing in Japan. On December 10, 2011 a signature-collection campaign started, aiming to hold a referendum in Tokyo and Osaka that would press citizens to express their views on nuclear power generation. An influential media reported that "a referendum on the issue would prompt citizens to see the development of such a blueprint as their own concern and start thinking about it" (Asahi Shimbun, December 10, 2011).

On January 14, 2012 the Japanese non-governmental organization (NGO) "Peace Boat" staged an anti-nuclear demonstration in Yokohama, in support of the two-day "Global Conference for a Nuclear Power-Free World". The conference drew thousands of participants, including about 100 experts and activists from 30 countries, not least Germany and the U.S.A., as well as nearly 200 domestic groups according to the Japan Times from January 15, 2012.

On March 11, 2012, thousands of anti-nuclear protesters held rallies on the first anniversary of the Fukushima Daiichi accident, in central Tokyo, in the city of Koriyama in Fukushima, and in other prefectures that host nuclear power plants or related facilities, including Shizuoka, Saga and Aomori.

An NHK survey (March 8, 2012) has found that nearly 80% of municipalities hosting or located near nuclear power plants are wary about resuming operations at reactors that are offline for their regular inspections.

There has been little media coverage of the “pro-nuclear” movement. A great surge of anti-nuclear sentiment in public opinion and even in the Diet could severely undermine efforts to implement the governmental policy of restarting nuclear power plants after the stress tests.

The authors of this article would like to further report on the aftermath of the Japanese nuclear situation in subsequent volumes of the IJNS, although this series update of the state of the Fukushima Daiichi NPS ends with the present work.

Nomenclatures

AM	Accident Management
ANRE	Agency of Natural Resources and Energy
CEO	Chief Executive Officer
DPJ	Democratic Party of Japan
EPZ	Emergency Planning Zone
FNCA	Forum for Nuclear Cooperation in Asia
GHG	Greenhouse Gas
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
JAIF	Japan Atomic Industrial Forum
JAEC	Japan Atomic Energy Commission
KEPCO	Kansai Electric Power Company
MAFF	Ministry of Agriculture, Forestry and Fisheries
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labor and Welfare
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of the Environment

NERHQ	Nuclear Emergency Response Headquarters
NIMBY	Not in My Backyard
NAIIC	Nuclear Accident Independent Investigation Commission
NISA	Nuclear and Industrial Safety Agency
NHK	Nippon Hoso Kyokai (Japan Broadcasting Corporation)
NPS	Nuclear Power Station
NRA	Nuclear Regulatory Agency
NSC	Nuclear Safety Commission
PCV	Pressure Containment Vessel
PM	Prime Minister
SPEEDI	Systems for Prediction of Environmental Emergency Dose Information
TEPCO	Tokyo Electric Power Company

APPENDIX

Updated calendar: December 1, 2011 through March 11, 2012, cited from NHK and Asahi Shimbun. 2011

December 3	TEPCO’s investigation committee report was published
December 6	COP17 held in Durban, South Africa
December 8	NAIIC was established
December 10	Signature-collecting campaign for nuclear referendum started in Tokyo and Osaka
December 10	MOE compiled guidelines for the removal of radioactive materials
December 13	Fukushima Prefecture announced the result of its radioactive exposure of residents survey
December 13	MOE issued specific rules for cleaning up fallout substances from the Fukushima Daiichi NPS
December 15	The Radiation Council of MEXT proposed the provisional guidelines of radiation exposure limit
December 16	FNCA at the Ministerial Level Meeting was held in Tokyo
December 17	PM Noda declared the cold shut-down of Fukushima Daiichi NPS
December 21	The Mid-and-long-Term roadmap for the stricken Fukushima Daiichi NPS was announced
December 26	The government Investigation Committee for Fukushima Daiichi announced the interim report
Late December	The National Diet ratified the bilateral agreements for cooperation with 4 countries

Russia, South Korea, Vietnam and Jordan

2012

January 6 The draft amendment of Reactor Regulation Act was proposed at the National Diet

January 11 JAEC commenced discussing the issue of nuclear fuel cycle

January 18 Government's Committee on cost assessment on NPS started

January 24 TEPCO shut down Unit No.5 of the Kashiwazaki-kariwa NPS for inspection

January 26 MOE announced the 2-year plan to complete decontamination of evacuation zones

Late January MAFF decided to purchase all the rice produced that showed traces of radiation across 8 districts including Fukushima

January 31 IAEA mission report on Japan's safety assessments announced

January 31 Meiji, a confectionery company, announced that radioactive cesium was found in samples of powdered milk for infants.

February 13 NISA evaluated a stress-test for Units No. 3 &4 of Ohi NPS as satisfactory

February 20 Fukushima Prefecture announced the result of radioactive exposure estimation

February 20 KEPCO shut down Unit No. 3 of Takahama NPS for regular inspection, meaning that no nuclear power generation in place in western Japan

February 27 Independent Investigation Committee on Fukushima Daiichi accident report was published

March 11 Of 54 nuclear power units, only 2 units operate

First anniversary of the disaster

- [3] Independent Investigation Commission on the Fukushima Nuclear Accident: Report on the Fukushima Nuclear Accident, March 1, 2012
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All of the news sources quoted in this article were cited from the press releases of the National Diet, NERHQ, the Cabinet Office, JAEC, MOE, NISA /METI, IAEA, TEPCO, and NHK. The news monitored the statements and press conferences of the Chief Cabinet Minister, as well as of other relevant organizations. The Asahi Shimbun, The Japan Times and the Mainichi Shimbun are also quoted due to their continuous media coverage from March 11 to the present. Major sources of reference are listed below:

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