

Chapter 2

Realization of Sustainable Growth and Societal Development into the Future

Section 1 Realization of Recovery and Restoration from the Earthquake Disaster

Numerous efforts to resolve the various issues listed in Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake (determined by Reconstruction Headquarters in response to the Great East Japan Earthquake on July 29, 2011) showing the policy for recovery and restoration from the GEJE, to rebuild promptly victim's lives and realize a secure and safe society are being undertaken by making full use of STI including creation of new industries, development of decontamination and improvement of disaster information systems with the most advanced technology calling upon the wisdom of industry-academic-government.

1 Promotion of Measures to Accomplish the Important Issues

(1) Reconstruction and revival of industries in the disaster areas

The industries in the disaster areas suffered significant damage by the earthquake, tsunami and diffusion of radioactive material. Thereafter, the various problems exposed by the earthquake disaster are being resolved by making full use of S&T towards realizing the vigorous revival with prompt reconstruction of the base of economic and industrial activities, while the advanced R&D taking advantage of strength and characteristics of each area is being pursued in the field of research leading to creation of a new growing industry and employment which are expected to help the reconstruction in the disaster areas.

The Ministry of Internal Affairs and Communications (MIC) is to establish new facilities for R&D and empirical experiments at Tohoku University and others with the aid of National Institute of Information and Communications Technology (NICT) (refer to Part 1, Chapter 2, Section 2, 2 (2)) and actively send information about the results home and abroad, to organize a new R&D and innovation base with industry-academia-government collaboration in the information and communication fields.

MEXT is promoting R&D based on the "Tohoku Marine Science Center" established as network system for reconstruction support by universities or research institutes in collaboration with local governments or ministries concerned. In particular, the Ministry is conducting survey research on reconstruction of the marine ecology offshore Tohoku in the Pacific, suffered through piles of rubble or loss of seaweed beds and tideland, and technology development leading to creation of a new industry (refer to Part 1, Chapter 2, Section 2, 2 (2)). The Ministry is also promoting the "Tohoku Medical Megabank" project conducting the cohort study of local residents in close cooperation with construction of a regional medical information center with support of MIC and the Ministry of Health, Labour and Welfare (MHLW), in order to contribute to reconstruction of the medical services for the disaster areas and to provide early next-generation medical care such as individualized medicine for the disaster areas (refer to Part 1, Chapter 2, Section 2, 2 (2)).

The Ministry of Agriculture, Forestry and Fisheries (MAFF) started large-scale experimental study for the farming industry - farming village type of model areas located in Miyagi Prefecture, the fishery industry - fishing village type of model areas located in Iwate Prefecture, making full use of advanced

technology in the field of agriculture, forestry and fisheries, in order to accelerate reconstruction and revival of agriculture, forestry and fishing as key industries and farming or fishing villages in the disaster areas and to develop a new growing agriculture, forestry or fishing industry. In particular, the Ministry started the experimental study on precise environmental control technology for horticultural facilities, functional ingredients enhancement technology for vegetable, rapid growing technology for abalone and others in collaboration with public experimental research institutions.

The Ministry of Economy, Trade and Industry (METI) is assisting demonstrations or performance evaluations of the practical technology, conducted jointly by testing and research institutes established by companies, universities or local governments in the disaster areas, as promotion efforts of commercializing superior practical technology meeting the needs in the disaster areas. The ministry is also taking measures to promote R&D in industry-academia-government collaboration in the growing fields such as medical, information and communication, and renewable energy and to create new industries or employment. In particular, the Ministry is assisting the development and demonstration of medical equipment in collaboration with Monodzukuri companies and medical institutions, as efforts leading to activation of local industries in Fukushima Prefecture, and the improvement project of medical industry base centering on Fukushima Medical University through Recovery Fund concerning Nuclear Emergency Preparedness in Fukushima established for restoration from the nuclear hazards (refer to Part 1, Chapter 2, Section 2, 2 (2)). For the efforts to assist the business deployment leading to reconstruction of the disaster areas in Tohoku and reconstruction of Japan, the Ministry has organized a subsidy system for improvement and development of the base of study and system development for which companies and bodies concerned form the best consortium in an IT integration field¹. For the efforts to introduce and expand renewable energy, the ministry is assisting the improvement of the renewable energy R&D base in industry-academia-government collaboration (refer to Part 1, Chapter 2, Section 2, 2 (2)), demonstration project aiming at commercialization of the world's largest floating offshore wind turbine, construction of the smart community making full use of renewable energy or storage battery, and others.

(2) Recovery and revival of social infrastructures

In the disaster areas a lot of civil engineering or building structures were destroyed or washed away, social infrastructures were blocked due to the earthquake, tsunami and liquefaction, and so enormous damage was caused. The technical advice for recovery of bridges and banks which suffered from the tsunami, or R&D for functional recovery of lifelines and improvement in aseismic capacity of structures is being provided in the light of such damage. Additionally, measures are being taken to strengthen disaster-resistance of the information and communications facilities, and to carry out R&D of Information and Communication Technology (ICT) for understanding the situations in a disaster area.

In case of the GEJE intensive use of telephones or widespread and great damage of communication facilities made it impossible to secure the communication means necessary in disaster. In light of the lessons learned from such communication failure, MIC is conducting R&D and empirical experiments of the “congestion reduction technology for mobile phones in a time of disaster” or “speedy self-sustained

¹ There is huge potential for creation of a new business in the event of an industrial structural change by integration of IT in this field, where Japan has the advantage in elemental technologies (for example, energy, medical and health, agriculture, robot, or car and transportation).

network configuration and communications means securement technology even in case of destruction of communications infrastructures by disaster” and others to strengthen disaster-resistance of the information and communications network. The ministry is also conducting R&D of the network robot technology which realizes sensitive operation with information gathering and situation analysis via networks towards practical application in the disaster response field. In NICT, furthermore, the ministry is conducting R&D of the airborne synthetic aperture radar, Polarimetric and Interferometric Synthetic Aperture Radar System 2 (Pi-SAR2), which can flexibly and as needed observe land surface situations in the event of disaster whatever the weather, the electromagnetic wave sensing technology which can make a non-destructive diagnosis of structural health of buildings if there is possibility of damage by earthquakes.

MEXT has constructed an analysis model for spreading damage and recovery process of lifeline facilities in the “Special Project for Earthquake Disaster Mitigation in the Tokyo Metropolitan Area.”

National Research Institute for Earth Science and Disaster Prevention (NIED) is conducting a large seismic motion experiment using 3-D Full-Scale Earthquake Testing Facility (E-Defense) for the purpose of analysis of destructing process of urban structures such as buildings and lifeline facilities by seismic motions, development of effective disaster mitigation technology, and maintenance and sustainable utilization of city functions in a time of disaster. In FY 2011, the institute has investigated the seismic behavior of subterranean structures such as tunnels, subways and the interaction between those subterranean structures and ground with the seismic motion experiment.

Public Works Research Institute (PWRI) is surveying bridges affected by the tsunami, liquefaction of river banks and damage situation of sewage lines in the disaster areas, and providing the technical advice about judgment of serviceability, securement of public health and method of emergency rehabilitation, after has organized a system capable of responding to external request for technical guidance for earthquake damage. The institute is also providing the technical advice about survey of damage situation, prevention of second disaster and method of reconstruction in case of landslide caused by main shock and frequent aftershocks.

National Institute for Land and Infrastructure Management (NILIM) is conducting the review on recovery measures of facilities or the validation of technical standards based on understanding and analysis of the disaster situations, including preparation of the “Guidelines on Tsunami Inundation Simulations for Tsunami Countermeasures based on the 2011 off the Pacific Coast of Tohoku Earthquake” showing the standard method for prompt and appropriate tsunami flooding simulation, in order to assist to design recovery and reconstruction plans for the disaster areas.

(3) Realization of safety living in the disaster areas

1) Reinforcing of efforts for disaster prevention and mitigation measures in the disaster areas

In and around the aftershock area of “The 2011 off the Pacific coast of Tohoku Earthquake” (hereinafter referred to as “Off the Pacific coast of Tohoku Earthquake”) in eastern Japan, the greater seismic activities have been occurring and it is likely that great aftershock or induced seismicity will occur in the future, so that destructive shaking and major tidal wave may be generated. Taking in account this prediction, efforts to expand and enforce the survey and observation of earthquake and tsunami is being undertaken for the purpose of understanding their generation mechanism, providing prompt and accurate information on

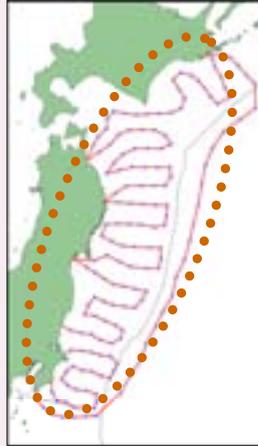
them. In addition, a disaster information providing system developed in the aim of collecting, preparing and transmitting the information useful for disaster response, recovery and reconstruction, has been set in the disaster areas. Furthermore, surveillance and monitoring technology for lifesaving has been developed and measures to mitigate damage from fires caused by earthquake have been considered.

In FY 2011, MEXT started the “Ocean Bottom Seismic and Tsunami Network Planning along the Japan Trench” which helps to convey quick and accurate information based on direct detection of earthquakes and tsunamis, with an ocean bottom observation cable network built around the hypocentral region (Figure 2-2-1). In FY 2011, the ministry also started the “Research on Earthquake and Tsunami off the Pacific Coast of Tohoku” which helps to understand a seismogenic mechanism through observation of the present crustal structure and activity as well as history study of the past earthquakes and tsunamis along northern Sanriku and Boso offings, and has observed ocean crustal movements at many observation points laid out in and around the marine areas offshore Miyagi Prefecture to clarify fixation of the plate boundary. Furthermore, the ministry has conducted seismic activity or crustal structure research around the hypocentral region of the Off the Pacific coast of Tohoku Earthquake in partnership with researchers of institutes including universities, with support of Grant-in-Aid for Scientific Research.

NIED is collecting, preparing and providing information useful for disaster response, recovery and reconstruction in the disaster areas - including disaster information on seismic motion or landslides, evacuation from earthquake-affected areas or capacity of evacuation centers - on a website “All 311 Great East Japan Earthquake Cooperative Information Platform” utilizing each type of map and geospatial information, launched in collaboration with various bodies and individuals.

Fire and Disaster Management Agency (FDMA) started the development of surveillance and monitoring technology with an unmanned helicopter for rapid finding and saving survivors in tsunami-hit sites, traverse technology applicable to fire-fighting in rubble- or water-covered areas, and rescue technology for survivors in need of help. The agency is also conducting the studies on prediction of strong ground motion of petrochemical complex, on preventive measures against and estimation of petroleum tank damage caused by the tsunami, in order to establish the technical standards for tsunami countermeasures and the petroleum tank damage estimation system, and conducting the studies on fire-prevention and fire-fighting measures for extinguishing blazes at rubble or scrap metal deposit after the earthquake. Furthermore, the agency is conducting the studies on preventive technology, damage prediction and fire-prevention measures based on survey analysis of fire or fire spreading cause during the GEJE, and started the study to understand fire risk of technology concerned with renewable energy whose utilization is predicted to be promoted in the future and to elaborate a policy of safe fire-fighting.

Figure 2-2-1/ Outline of Ocean Bottom Seismic and Tsunami Network Planning along the Japan Trench



Source: Created by MEXT

2) Response to accident at TEPCO Fukushima NPS

(i) Implementation of radiation monitoring

In response to the accident at the Tokyo Electric Power Company, Incorporated Fukushima Daiichi Nuclear Power Station (hereinafter referred to as “TEPCO Fukushima Daiichi NPS”), the radiation monitoring in the peripheral areas and nationwide is being enhanced, the details of distribution of radioactive substances are being clarified and the information on them is being published. Additionally, studies on a distribution method of dosimeters for dose measurement and a safe handling or storage method of radioactive substances in sewage treatment plants are being conducted in Fukushima Prefecture.

The government established the Monitoring Coordination Meeting (Table 2-2-2) consisting of relevant ministries, Fukushima Prefecture and others in July 2011 with a view to surely and systematically implement the radiation monitoring for the accident at TEPCO Fukushima Daiichi NPS and has held the conference four times in FY 2011. In this conference, the “Comprehensive Monitoring Strategy” including the division of roles between bodies concerned with implementation of information gathering, measurement and analysis of radiation monitoring as well as the contents of radiation monitoring implemented by the bodies concerned was defined on August 2, 2011 and modified on March 15, 2012 (Figure 2-2-3). In addition, MEXT has summarized the information on the monitoring performed by bodies concerned and published the summarization on the website¹.

¹ <http://radioactivity.mext.go.jp/ja/>

Table 2-2-2/ Members of Monitoring Coordination Meeting

Co-chair: (the 1st and 2nd meeting) Minister of State for Science and Technology Policy: Goshi HOSONO, Senior Vice-Minister of MOE: Shoichi KONDO, Parliamentary Secretary of Cabinet Office : Yasuhiro SONODA, Vice Minister of MEXT: Kumiko HAYASHI
 (the 3rd and 4th meeting) Minister of MOE: Goshi HOSONO, Senior Vice-Minister of Cabinet Office: Ikko NAKAMURA (attendance at the 3rd meeting), Senior Vice-Minister of Cabinet Office: Tadahiro MATSUSHITA (attendance at the 4th meeting), Parliamentary Secretary of Cabinet Office: Yasuhiro SONODA, Vice Minister of MEXT: Mieko KAMIMOTO, Vice Minister of MOE: Satoshi TAKAYAMA

Source: Created by MEXT

Figure 2-2-3/ Monitoring implementation system of each ministry in accordance with the Comprehensive Monitoring Strategy

Main monitoring in accordance with the Comprehensive Monitoring Strategy (modified on March 15, 2012)		* Monitoring implementation system of each ministry in accordance with the Comprehensive Monitoring Strategy
<p>Monitoring of the environment in general throughout Japan (MEXT, relevant prefectural authorities)</p> <ul style="list-style-type: none"> - Real-time publication of measurement results of air dose rate at monitoring posts in each prefecture - Monthly concentration measurement of radioactive substances for precipitation composition (dust in rain or the air), once three months for clean water (at the faucet) to the same accuracy of analysis as the level research before the accident - Aerial monitoring in wide-areas such as Hokkaido, West Japan, as well as the area of a relatively-high level of deposition amount of radioactive substances in the prefectures adjacent to Fukushima Prefecture 	<p>Monitoring of seaports, airports, parks, sewage etc. (MLIT, local authorities and others)</p> <ul style="list-style-type: none"> - Concentration measurement of radioactive substances in sewage sludge - Measurement of air dose rate at seaports, airports, urban parks etc. 	
<p>Monitoring of the environment in general throughout Fukushima Prefecture (MEXT, Nuclear Emergency Response Headquarters, Fukushima Prefecture and others)</p> <ul style="list-style-type: none"> - Real-time publication of measurement results of air dose rate at 545 portable monitoring posts placed in Fukushima Prefecture and 130 placed in the prefectures adjacent to Fukushima Prefecture. - Continuous measurement of air dose rate, airborne dust etc. around the NPP - Check of distribution of air dose rate and deposition situations of various radioactive substances on the ground as well as survey of radioactive substances transfer in the land areas (expanding the survey areas and contents since the last June survey) - Periodical aerial monitoring within 80 km of the NPP - Detailed monitoring of the evacuation order areas 	<p>Monitoring of waste in water environment, natural parks etc. (MOE, Fukushima Prefecture)</p> <ul style="list-style-type: none"> - Concentration measurement of radioactive substances in water, sediment and environment samples from rivers, lakes, marshes, water sources, ground waters and coasts in Fukushima Prefecture and neighboring prefectures - Analysis of wild plants and animals - Concentration measurement of radioactive substances in ground water under and influent water from landfill sites and measurement of air dose rate on the boundary zones of refuse incineration plants or landfill sites according to the Act on Special Measures in relation to Measures for Environmental Pollution by Radioactive Materials 	
<p>Monitoring in marine areas (MEXT, MLIT, MOE, MAFF, Japan Coast Guard, Fukushima Prefecture)</p> <ul style="list-style-type: none"> - Concentration measurement of radioactive substances in marine water, soil and organisms in (1) marine areas adjacent to TEPCO Fukushima Daiichi NPP, (2) coastal areas, (3) offshore areas, (4) oceanic regions and (5) Tokyo Bay, centering on Fukushima Prefecture and neighboring prefectures 	<p>Monitoring of farm soil and forests (MAFF, Fukushima Prefecture)</p> <ul style="list-style-type: none"> - Refinement of monitoring with expanding survey points in Fukushima Prefecture and neighboring prefectures, in particular in FY 2012 understanding of alteration in concentration of radioactive substances and clarification of the transfer characteristics - Concentration measurement of radioactive substances in forest soil, effluent water from forests wood and others in test areas in Fukushima Prefecture. - Concentration measurement of radioactive substances in reservoirs in Fukushima Prefecture. 	
<p>Monitoring of schools and nursery centers (MEXT, MHLW and Fukushima Prefecture)</p> <ul style="list-style-type: none"> - Real-time publication of measurement results of air dose rate at about 2,700 real-time dose measurement systems placed at schools in Fukushima Prefecture. - Concentration measurement of radioactive substances in water in outdoor pools - Check of radioactive substances concentration in school lunches after being provided to students through continuous inspection. 	<p>Monitoring of foods (MHLW, Fisheries Agency, relevant prefectural authorities)</p> <ul style="list-style-type: none"> - Concentration measurement of radioactive substances in foods - Measurement of actual exposure dose due to ingestion of contaminated foods 	
	<p>Monitoring of tap water (MHLW and relevant prefectural authorities)</p> <ul style="list-style-type: none"> - Concentration measurement of radioactive substances in pure water from purification plants or raw water from intake sources 	
<p>* The results of each monitoring as shown above are collectively published via the portal site set up on the MEXT website.</p>		

Source: Created by MEXT

MEXT has been conducting the emergency monitoring with a monitoring car or a ship, as well as the aerial monitoring in the land and marine areas around TEPCO Fukushima Daiichi NPS immediately after the accident at Fukushima Daiichi NPS. The Ministry has also measured air dose with the help of nearly 100 institutes of universities throughout Japan at 2,200 points within 80 km of TEPCO Fukushima Daiichi NPS, analyzed with a high accuracy the radioactive concentration of radionuclides with the help of 21 institutes of universities throughout Japan, produced the “Map of Radioactive Contamination (Radiation Dose Distribution Map)” (Figure 2-2-4) displaying the distribution condition of air dose and radionuclides of iodine 131, radiocesium, plutonium, strontium and others, and surveyed the transfer condition of radioactive substances in environment around TEPCO Fukushima Daiichi NPS, bringing together the knowledge of experts in environmental radioactivity, in order to understand in detail distribution condition of radioactive substances released due to the accident at TEPCO Fukushima Daiichi NPS. The Ministry has published the necessary results from these activities on the website, and then issued a report summarizing knowledge concerning the behavior of radioactive substances around TEPCO

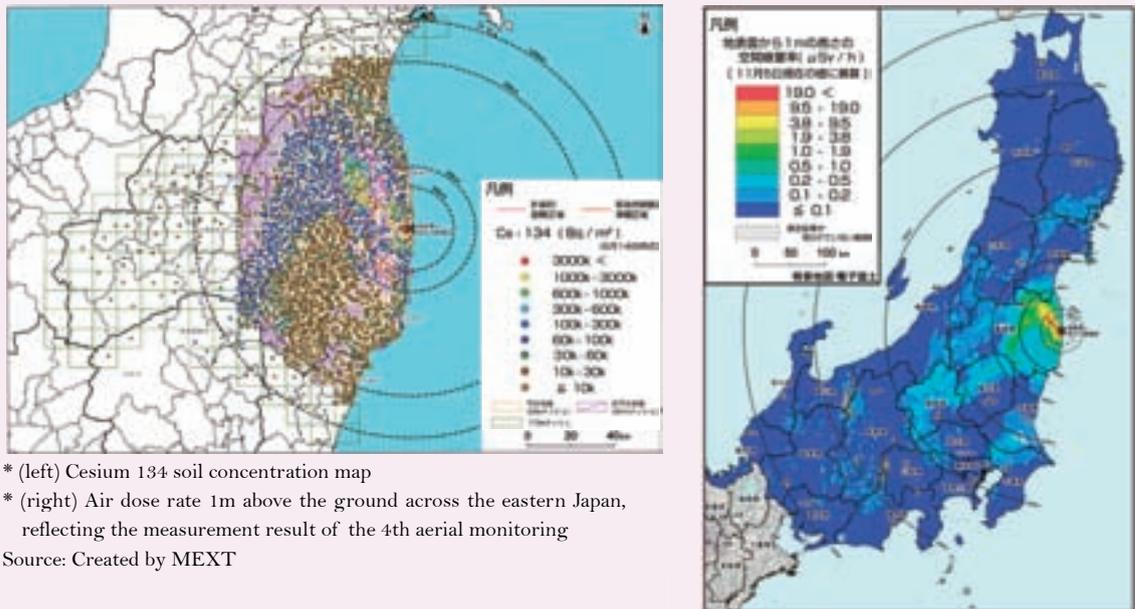
Fukushima Daiichi NPS in March 2012. Since the period of December the Ministry has conducted a more detailed survey in the limited areas with relatively-high dose, to check the seasonal tendency of effects of radioactive substances, widening survey areas from Iwate Prefecture in the north to Yamanashi Prefecture in the south, and increasing types of radionuclides covered.

In addition, MEXT distributed simplified integrating dosimeters for comprehensive dose measurement in schools, improved real-time radiation dose measurement systems in Fukushima Prefecture, and set up portable monitoring posts, distributed survey meters in every municipality of Fukushima Prefecture and neighboring prefectures, in order to provide information for making decisions concerning school safety or to help estimate individual dose of residents.

Furthermore, the ministry added fixed monitoring posts, improved environmental sample analysis equipment (germanium semiconductor detector) and conducted aerial monitoring to survey the effects of radioactive substances not only in Fukushima Prefecture but also throughout the country with an enhanced radiological survey system across the country.

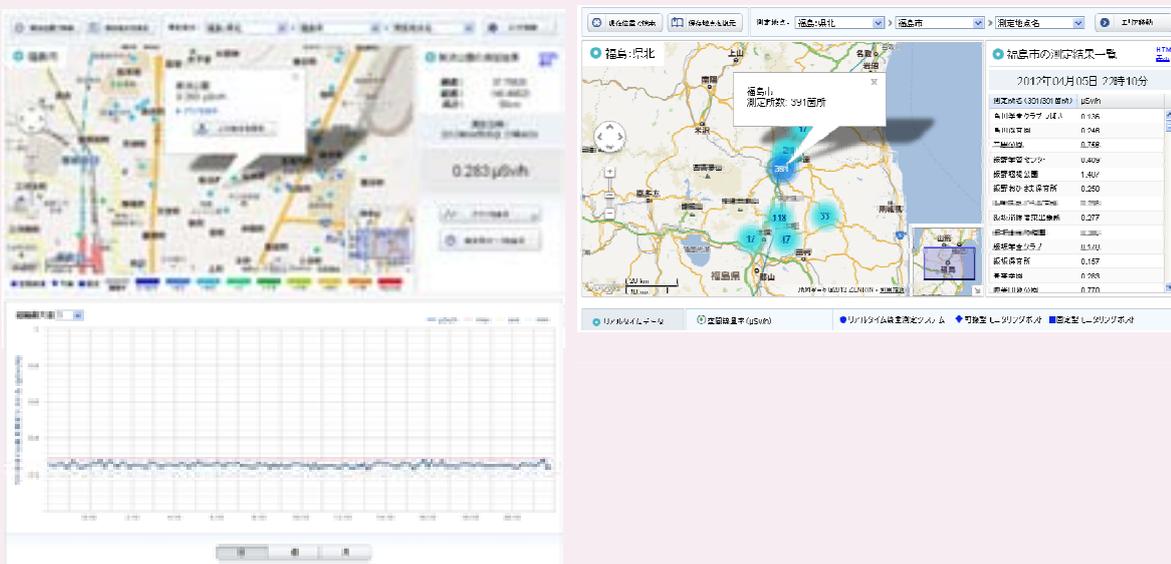
The air dose rate measured and the charts produced by the real-time radiation dose measurement system set up in Fukushima Prefecture and the monitoring posts set up around the country, as mentioned above, is being displayed on the MEXT website on a real-time basis (Figure 2-2-5).

Figure 2-2-4/ Map of Radioactive Contamination



* (left) Cesium 134 soil concentration map
 * (right) Air dose rate 1m above the ground across the eastern Japan, reflecting the measurement result of the 4th aerial monitoring
 Source: Created by MEXT

Figure 2-2-5/ Real-time Display System



Source: Created by MEXT

MAFF published a concentration distribution map produced based on the radiocesium concentration measurement of farm soil at about 580 points in 6 prefectures concerned including Fukushima Prefecture on August 30, 2011, and an extended edition of the concentration distribution map produced based on the measurement at about 3,400 points in 15 prefectures on March 23, 2012. The Ministry also published a concentration distribution map produced based on the measurement results of the air dose rate in forests and the radiocesium concentration of sedimentary organics and soil at 391 points in Fukushima Prefecture on March 1, 2012.

National Institute for Land and Infrastructure Management (NILIM) conducted the behavior research of radioactive substances in sewerage treatment plants and the survey on radioactive substances contained in exhaust gas from sewage sludge incinerators in Fukushima Prefecture as emergency measures after the earthquake, and is now conducting a survey on the radioactive substances leached from sewage sludge or a study on safe handling, storage and disposal of sewage sludge containing radioactive substances.

(ii) Efforts toward decontamination

Bodies concerned are working together to establish the effective decontamination technology for removal of soil contaminated with radioactive substances due to the accident at TEPCO Fukushima Daiichi NPS and conducting R&D for decommissioning of nuclear reactor. They are also assisting in improving an R&D base for medical services and decontamination in Fukushima Prefecture.

The Cabinet Office and Ministry of the Environment (MOE) are conducting a decontamination empirical model project for the caution zones in Fukushima Prefecture, the zones defined in 12 municipalities designated as the planned evacuation zones and the Joban Expressway to obtain knowledge necessary for the effective decontamination. They are also publicly calling for contribution to discovery etc. superior technologies available in the field of decontamination efficiency, removal reduction, and

conducting demonstration tests of the decontamination technology in terms of decontamination effects, economic efficiency and safety check.

MEXT is subsidizing the Fukushima Nuclear Disaster-linked Fund established for Fukushima Prefecture, which helps Fukushima Prefecture to improve an R&D base for radiology or the most advanced diagnosis and a base facility for study and research on environmental restoration and creation technology with a function of information distribution on decontamination and radiation, to develop an exposure dose monitor for low-dose areas (refer to Part 1, Chapter 2, section 2, 2, (2)).

Japan Atomic Energy Agency (JAEA) is developing technology, conducting evaluation and demonstration of decontamination in collaboration with local governments including Fukushima Prefecture, universities, institutes and private companies in Japan and overseas. In particular, the agency has developed the decontamination technology with adsorbent or natural mineral for soil, river and agricultural water, and developed software which evaluates how an air dose rate may be reduced by decontamination of polluted soil to release it to the public.

MAFF has urgently developed the fundamental decontamination technology for topsoil scraping, soil disturbance or removal with water and layer reverse plow for farm soil, demonstrated effects of the technology and released results of the demonstration test achieved up to now to the public, for the purpose of revival of the farmland polluted with radioactive substances.

(iii) Efforts toward decommissioning of TEPCO Fukushima Daiichi NPS

It is important to make mid- and long-term efforts towards decommissioning of TEPCO Fukushima Daiichi NPS in the future. In December 2011, the Cabinet Office organized R&D issues necessary for decommissioning in the “Advisory Committee for Formulating Mid- and Long-term Strategies to Clean up the Fukushima Dai-ichi NPP of TEPCO” established under the Atomic Energy Commission. In accordance with the organization, R&D Promotion Headquarters established under the former is promoting R&D necessary for fuel or fuel debris extraction from spent fuel pool, waste disposal and others in collaboration with the bodies concerned such as the government, TEPCO, JAEA and makers.

(iv) Efforts to eliminate the uncertainties held by residents in the disaster areas

In response to increasing concerns of residents in Fukushima Prefecture about radiation, opportunities for communication including workshops are being provided for the purpose of the diffusion of accurate knowledge on health investigation, analysis of it and radiation risk.

In response to increasing concerns of residents in Fukushima Prefecture about radiation, JAEA as radiation expert close to the people continues to provide information on radiation risk, effect on health and others, and opportunities for communication with the residents on the request of school personnel¹. The agency also set up an accession section for the experts consulted on decontamination of schools or offering technical advice for municipality in Fukushima Prefecture, and has dispatched to the section the experts giving guidance on decontamination in living environment for children including school, route to and from school according to the principles of “Children first.”

The National Institute of Radiological Science set up telephone counseling services and has held

¹ Meetings for responding to questions about radiation has been held at 169 times after the disaster (as of the end of FY 2011).

lectures and seminars (at 466 times as of the end of FY 2011) in Fukushima Prefecture and others for the purpose of diffusion of accurate knowledge on effects of radiation on human body and relief of people's anxiety.

In addition, the institute is developing and operating the external exposure dose evaluation system for residents in the disaster areas, which is applicable for the "Healthcare Control Survey for Prefectural residents" started by Fukushima Prefecture in May 2011 in collaboration with the Team in Charge of Assisting the Lives of Disaster Victims and Fukushima Medical University, thus cooperating with other activities by providing technical assistance.

(v) Regarding compensation for nuclear damages

Since the accident at TEPCO Fukushima Daiichi and Daini Nuclear Power Stations (hereinafter collectively referred to as "TEPCO Fukushima NPSs"), a number of residents have been forced to live in evacuation shelters or to give up business activities including manufacturing and sales. It is essential that victims such as these receive compensation promptly, fairly and appropriately to enable them to get their safe and secure lives back as quickly as possible.

MEXT organized the Dispute Reconciliation Committee for Nuclear Damage Compensation according to the Act on Compensation for Nuclear Damages to relieve the victims as soon as possible through compensation for nuclear damages. The Committee formulated guidelines to determine the scope of nuclear damage that could be sorted into categories: First Guidelines on April 28¹, Second Guidelines on May 31², Addendum to the Second Guidelines on June 20³, Interim Guidelines on August 5⁴, Supplement to the Interim Guidelines on December 6, 2011⁵, Second Supplement to the Interim Guidelines on March 16, 2012⁶).

The Ministry also established the "Nuclear Damage Compensation Dispute Resolution Center" with support of the Ministry of Justice (MOJ) and legal professionals, and it began reconciliation of disputes between TEPCO and victims since September 2011.

The Government will 1) taking every possible measure for prompt and appropriate compensation for damage, 2) stabilizing the condition of TEPCO Fukushima NPSs and avoiding any adverse impact on related business operators, etc. dealing with the accident, and 3) supplying stable electricity which is indispensable for people's living, established the Nuclear Damage Compensation Facilitation Corporation, in accordance with the "Nuclear Damage Compensation Facilitation Corporation Act" (Act No. 94 of August 10, 2011), to provide compensation-related support, with the aim of minimizing the burden on public finance. The Government has also made a provisional payment for prompt relief to victims, according to the "Act on Emergency Measures for Damage Caused by the 2011 Nuclear Accident" (Act No. 91 of August 5, 2011).

¹ First Guidelines on Determination of the Scope of Nuclear Damage Resulting from the Accident at TEPCO Fukushima Nuclear Power Stations

² Second Guidelines on Determination of the Scope of Nuclear Damage Resulting from the Accident at TEPCO Fukushima Nuclear Power Stations

³ Addendum to the Second Guidelines on Determination of the Scope of Nuclear Damage Resulting from the Accident at TEPCO Fukushima Nuclear Power Stations

⁴ Interim Guidelines on Determination of the Scope of Nuclear Damage Resulting from the Accident at TEPCO Fukushima Nuclear Power Stations

⁵ First Supplement to the Interim Guidelines on Determination of the Scope of Nuclear Damage Resulting from the Accident at TEPCO Fukushima Nuclear Power Stations (damage associated with voluntary evacuation)

⁶ Second Supplement to the Interim Guidelines on Determination of the Scope of Nuclear Damage Resulting from the Accident at TEPCO Fukushima Nuclear Power Stations (damage associated with the re-definition of the evacuation areas by the Government)

2 System Reform for Restoration and Recovery from Earthquake Disaster

As efforts to quickly and effectively realize industrial revival and area rehabilitation in the disaster areas, Japan is promoting foundation of R&D bases to accelerate industry-academia-government collaboration in and around the disaster areas.

In particular, Japan is improving R&D bases through collaboration between industry, academy and government as efforts to create new industries to contribute to restoration of the disaster areas.

Table 2-2-6/ Main measures for realization of restoration and recovery from earthquake disaster (FY 2011)

Ministry	Research organization	Subject
Ministry of Internal Affairs and Communications (MIC)	MIC	R&D to Strengthen Disaster-Resistance of the Information and Communications Network
		R&D of Life-Support Type Robot Technology
	National Institute of Information and Communications Technology (NICT)	R&D of Electromagnetic Wave Sensing Infrastructure Technology
		R&D for Fundamental Network Technologies [literal translation]
(Fire and Disaster Management Agency (FDMA))	National Research Institute of Fire and Disaster (NRIFD)	R&D for Fire-fighting Security [literal translation]
		Study on Safety Improvement of Hazardous Materials and Dangerous Facilities [literal translation]
		Study on Security against Diversifying Fires [literal translation]
Ministry of Education, Culture, Sports, Science and Technology (MEXT)	MEXT	Tohoku Medical Megabank project
		Improvement of Ocean Bottom Seismic and Tsunami Network Planning along the Japan Trench [literal translation]
		Dense Oceanfloor Network System for Earthquakes and Tsunamis
		Evaluation Study of Continuous Movements Associated with the Tokai, Tonankai and Nankai Earthquakes
		Technology Development of Underwater GPS [literal translation]
		Observation and Research of Earthquake and Tsunami Generated off the Pacific Coast of Tohoku [literal translation]
		Formation of Tohoku Marine Science Center
		Research on Distribution of Radioactive Substances
Ministry of Agriculture, Forestry and Fisheries (MAFF)	MAFF	Development of Radioactive Materials Removal Technology for Farm Soil [literal translation]
		Development of Radioactive Materials Removal and Reduction Technology for Forests and Farmland [literal translation]
		Advanced technology development project for reconstruction of the disaster areas [literal translation]
Ministry of Economy, Trade and Industry (METI)	METI	Demonstration research project to create technical innovation for earthquake disaster reconstruction [literal translation]
		Establishing New Industry-academic-government Collaborative Framework in the Tohoku Area R&D Program for New Industry Creation through IT Integration
		Floating Offshore Wind Farm Demonstration Project
		Accelerated Examination and Accelerated Appeal Examination to Support Recovery from Earthquake Disasters
Ministry of Land, Infrastructure, Transport and Tourism (MLIT)	MLIT	Implementation of Emergency Geological Surveys and Research
		Examination of Realizing Self-preserving Harbor Facilities [literal translation]
	National Institute for Land and Infrastructure Management (NILIM)	Development of Design Technology for Aseismic Performance of Structures based on Earthquake Characteristics of Large-scale Ocean-trench Earthquakes [literal translation]
		Study on Evaluation Methods and Standards of Earthquake Safety of Non-structural Element (Exterior Materials) [literal translation]
		Study on Immediate Earthquake Damage Estimation Technology for Large-scale and Wide-area Earthquakes [literal translation]
		Study on Mechanism of Sewage Sludge Polluted with Radioactive Substances and Guidelines for Sewage Sludge Treatment [literal translation]
		Examination of Enhancement of Hydro facilities in Eastern Japan [literal translation]
		Development of Fire Safety Countermeasures Technology for Tall Structures after Earthquakes [literal translation]
	Public Works Research Institute (PWRI)	Study on Tsunami Inundation Prediction System to Improve Disaster Countermeasures [literal translation]
		Technology Development of Combined Countermeasures for River Banks against Large-scale Earthquakes and Tsunamis [literal translation]
	Japan Meteorological Agency (JMA), MLIT	Upgrade of Tsunami Forecast Information and Enhancement of Tsunami Prevention System [literal translation]
		Study on Countermeasures against Local Heavy Rains (the so-called "Guerrilla Rain") [literal translation]
	Meteorological Research Institute, JMA	Study on Accuracy Upgrade of the Earthquake Early Warning System [literal translation]
Upgrade of Tsunami Forecast Information and Enhancement of Tsunami Prevention System [literal translation]		