Recommendations

Recommendations from Science Council of Japan (SCJ) – with Confident Steps towards Reconstruction –

April 9, 2012

Science Council of Japan
Committee on Supporting Reconstruction
after the Great East Japan Earthquake

Preface

As the first activity to take place in the 22nd Term, Science Council of Japan (SCJ) established a Committee for Reconstruction Assistance after the Great East Japan Earthquake in October 2011, and then under the committee, three subcommittees to take charge of the following respective themes; “building disaster-resilient communities”, “the promotion of industry and employment”, and “counter-measures for radiation” were set up, which was then followed by deliberations. The wide-area disposal of the disaster waste was selected as the theme to be discussed directly by the Committee. The reasons for having selected the above mentioned themes were; expedite a formation of consensus on the community building in each area; secure a source of income in order to curb any population drain and alleviate concern over the reconstruction; demonstrate the prospect with resumption of employment as early as possible; and convey the message as to what needs to be done to ensure the safety of the victims of the nuclear plant accident of Tokyo Electric Power Co., Inc. (TEPCO) that may be worrying about radioactive contamination. Furthermore, we also recognized that there was an imminent demand for academic circles to identify that which was essential in putting the disposal of disaster waste back on track, particularly in Iwate and Miyagi Prefectures. We considered it very important for us to issue our views regarding these themes as early as possible so that they can be reflected in the reconstruction projects which will take place hereafter, and further to question ourselves what academic circles can do in connection with above themes.

We managed to compile a draft recommendation almost one year after the Great East Japan Earthquake took place. In light of the fact that this is the first recommendation for the 22nd Term SCJ, we took opinions of the Council Members and Members of SCJ regarding the draft recommendation into account before finalizing the recommendation, with revisions made using opinions collected, and which was then announced on the occasion of the 162nd General Assembly held in April. During the General Assembly, we were able to deliver the recommendation to the Prime Minister, Mr. Yoshihiko Noda, who has overall responsibility for the government’s reconstruction policy. We would like to express our deepest gratitude to the Prime Minister for having provided us with his precious time in the midst of his tight schedule.

During deliberations of the recommendations, we conducted hearings and field surveys, which were not just limited to the collection of materials and information. We also received particularly kind cooperation from concerned parties in Iwate, Miyagi, and Fukushima Prefectures on various situations. In addition, we were able to request information on respective reconstruction efforts being made from the persons concerned in government

ministries and agencies, economic organizations and others, all of which proved to be very informative. A great number of researchers, regardless of being inside or outside SCJ, provided their professional knowledge and expertise as well. We would like to reiterate here our appreciation for their cooperation and support. As the Chairperson of the Committee on Supporting Reconstruction after the Great East Japan Earthquake, I would also like to extend my appreciation to all the members of the individual commissions that so eagerly participated in the deliberation process, which turned out to be such short but intensive piece of work, and the office staff who supported the series of deliberations. Without their help, it would have been impossible to have compiled the recommendations regarding these above themes in such a short period of time.

However, merely issuing the recommendation does not mean the task has been completed. It can only generate results if it is applied in actual policies and countermeasures at the sites concerned. For which purpose, SCJ would like to make greater efforts to provide a full accounting of these proposals to all parties concerned in thereby ensuring they can be fully understood and utilized. Furthermore, we would also like to accurately communicate the contents to anyone who cares about the situation outside Japan, in academic circles and the governments of the applicable countries. In addition, SCJ would also like to express our sincere intensions to continue to engage in reconstruction assistance in thereby fulfilling our role as academic circles, and in view of the many challenges that still remain.

April 2012

President of Science Council of Japan

Chairperson of Committee on Supporting Reconstruction after the Great East Japan Earthquake

Takashi Onishi

Structure of this document

Recommendations from Science Council of Japan (SCJ)
– with Confident Steps towards Reconstruction –

April 10, 2012

Science Council of Japan

Committee on Supporting Reconstruction after the Great East Japan Earthquake

Recommendations from Science Council of Japan (SCJ) – with Confident Steps towards Reconstruction –

– Recommendations by Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan –

- In the 22nd Term (October 2011 - September 2014), the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established, with three subcommittees (Sub-Committee on Building Disaster-Resilient Communities, Sub-Committee on the Promotion of Industry and Employment, and Sub-committee on Counter-measures for Radiation) then being set up under the committee (deliberations, hearings, field surveys, and working groups)
- The committee and three subcommittees then issued five proposals (hearings of internal opinions were also implemented) (Reported at the General Assembly of Science Council of Japan that was held on Monday April 9, 2012)

List of recommendations:

Recommendations from Science Council of Japan (SCJ) – with Confident Steps towards Reconstruction –
(Recommendations by Committee on Supporting Reconstruction after the Great East Japan Earthquake: Compilation of the following recommendations (1)-(4))

(1) Building Tsunami-proof Communities – Showing How Tohoku Reconstruction Makes Use of Nature –
(Recommendations by the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake)

(2) Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas – Towards the Promotion of Industry and Employment to Support Victims in Disaster-Stricken Areas –
(Recommendations by the Sub-Committee on the Promotion of Industry and Employment, Committee on Supporting Reconstruction after the Great East Japan Earthquake)

(3) A New Step towards Counter-measures for Radiation – Towards Science-based Policy Action –
(Recommendations by the Sub-committee on Counter-measures for Radiation, Committee on Supporting Reconstruction after the Great East Japan Earthquake)

(4) On Cross-regional Processing of Disaster Wastes
(Recommendations by Committee on Supporting Reconstruction after the Great East Japan Earthquake)

(1) Building Tsunami-proof Communities
Sub-Committee on Building Disaster-Resilient Communities

1. With the reconstruction after the Great East Japan Earthquake (Tsunami-stricken areas), securing of living environment, industrial reconstruction in the most suitable locations, mental health care and health management for the victims, and utilization of the disaster experience in other areas.
2. Promote reconstruction based on the idea of "community building that mitigates disaster effects" and which integrates; disaster prevention facilities + community building in safe locations + escape routes/evacuation areas. Rebuilding of public/public interest facilities such as schools and welfare facilities in safe locations shall be at the forefront of reconstruction efforts.
3. Recommendations from 8 points of view
   - [1] Creation of disaster-resilient national land (creation of a "Disaster Mitigation Agency" in the future, and national land use in withdrawing from disaster-hazard areas)
   - [2] Building sustainable reconstructed communities (relocation to higher grounds, community building around schools, and wide-area sustainability)
   - [3] Measures toward greater utilization of information (enhancement of reliability of information communication networks, and provision of information to ensure rational behavior)
   - [4] Ideal medical care/nursing/welfare in the disaster-stricken areas (with a focus on relief for groups that are vulnerable to disasters, and mental health care)
   - [5] Establishment of victim support system and personnel training (needs maps of disaster victims, and disaster-care professionals)
   - [6] Preventive measures to mitigate disasters resulting from the potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis
   - [7] Organization and dissemination of disaster records (collaboration with National Diet Library)
   - [8] Role of government publicity and media organizations (appropriate news coverage, and cool-headed news reports and comments)

(2) Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas
Sub-Committee on the Promotion of Industry and Employment

Recommendation 1. Alleviation of labor market mismatches

Change the certification criteria of private training institutions with the job-seeker support system from a nationally uniform system to the rate of improvement in employment by area and gender

Recommendation 2. Reconstruction of local industries in the disaster-stricken areas

- Enhancement of reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises
  - Extension of carry-over of subsidies associated with elevation works until March 2016
  - Creation of funds to allow a yearly provision of funds in accordance with the degree of progress of projects
- Smoother promotion of reconstruction
  - Elimination of overlapping debt: rental of production facilities by state government and municipalities
  - Expanded application of special depreciation for disaster alternative assets to gratuitously transferred assets

Recommendation 3. Revitalizing areas through business start-ups via the initiative of residents

Creation of "reconstruction non-profits"

- Specified non-profit corporation model

  Facilitate attraction of investment for reconstruction support via the stock (equity) mode

  Favorable tax treatment, etc. on investment, but with no dividend payments
- Public interest corporation model

  Utilization of the deemed contribution system

  Provision of a framework by addition, etc. to "Appended Table (relating to Article 2) of the Act on Authorization of Public Interest Incorporated Associations and Public Interest Incorporated Foundation" regarding reconstruction non-profits

(3) A New Step towards Counter-measures for Radiation 1
Sub-committee on Counter-measures for Radiation

Outline of ways of thinking

[1] Total emitted amount of radiation resulting from the nuclear power plant accident that then led to radiation exposure

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[2] Distribution of total emitted amount of radioactive materials to the environment

- Estimated distribution and measured distribution in the sea, atmosphere, soil, and rivers
- Nuclear species and decay
- Projected transition of contamination with future environmental circulation and concentrations taken into account

etc.

[3] Comprehensive identification of exposure routes to humans

- Form of exposure (relatively high level of radiation over a short period after the accident vs. low level radiation over mid- to long-periods)
- Routes of exposure (external exposure vs. internal exposure)
- Exposure dose by location/period
- Exposure time

etc.

[4] Estimation of exposure doses to date, and assumed exposure doses hereafter

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[5] Assessment of effects on human health

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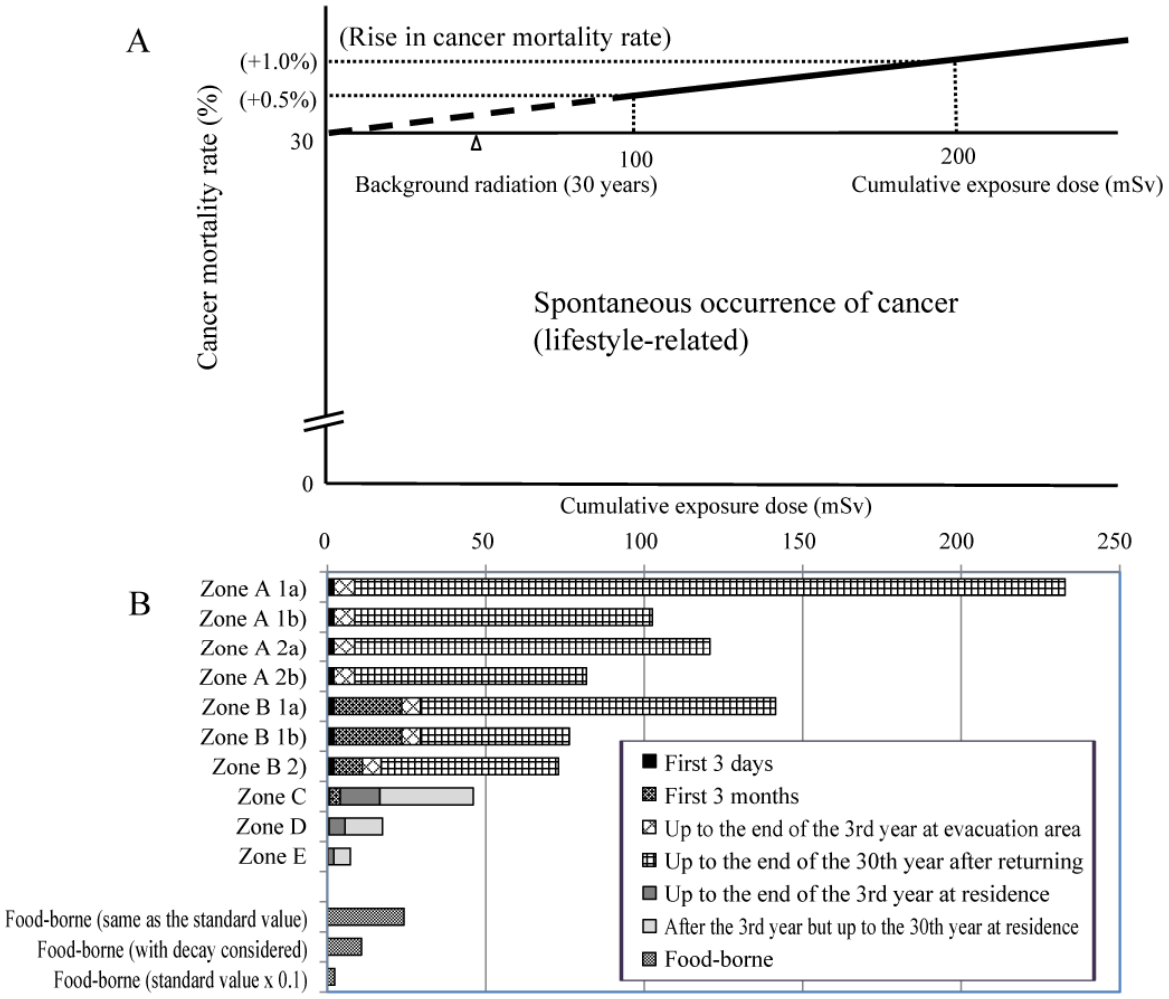
[6] Recommendations in preventing any health damage to the fullest extent possible (concrete measures and estimation of effects)

- Decontamination
- Inspection of water and foods
- Early detection of any abnormalities by monitoring people's health and provision of appropriate medical care etc.



Scenarios used
Zone A 1a) No decontamination after returning at 20 mSv/y
1b) Annual decontamination of 20% constantly for 5 years after returning at 20 mSv/y
2a) Annual decontamination of 20% constantly for 5 years after returning at 10 mSv/y
2b) Annual decontamination of 10% constantly for 5 years after returning at 10 mSv/y
Zone B 1a) Evacuation after 3 months at residence, but no decontamination after returning at 10 mSv/y
1b) Evacuation after 3 months at residence, and an annual decontamination of 20% constantly for 5 years after returning at 10 mSv/y
2) Evacuation after 1 month at residence, but no decontamination after returning at 5 mSv/y
Zone C 50% reduction in radiation dose as of March 2014 from September 2011 (5 mSv/y), and including the effects of decomposition
Zone D 50% reduction in radiation dose as of March 2014 from September 2011 (2 mSv/y), and including the effects of decomposition
Zone E 5 mSv/y as of September 2011, but no decontamination

(3) A New Step towards Counter-measures for Radiation 2
Sub-committee on Counter-measures for Radiation

Alleviation of effect on public health resulting from the Fukushima Daiichi Nuclear Power Plant accident

- Recommendation1. Constant estimation of exposure doses and medical checkups/ examinations of residents
- Recommendation 2. Establishment of decontamination targets including the post-return of residents and management of decontamination work
- Recommendation 3. Implementation of epidemiological research and integrated comprehension with other basic research, and then reflection of the results in the health management of residents

Assessment of the present situation with and future of damage caused by radiation and more accurate estimation of health effects

- Recommendation 4. Establishment of a cross-disciplinary research system to identify the overall picture related to assessment of radioactive health effects
- Recommendation 5. Establishment of an open to the public system that enables prompt and steady data collection, and provision of data in the standard form
- Recommendation 6. Disclosure of uncertainty information regarding base figures in assessing the radioactive health effects, and accuracy control of the measurements/estimated results based on uncertainty information

(4) On Cross-regional Processing of Disaster Wastes
Reuse for disaster-prevention facilities, and wide-area disposal of safe waste

Recommendation 1: Renewal of processing plan based on accurate identification of the actual situation and priority reuse within the prefecture

- Disaster-stricken municipalities shall,
  - Step 1. Identify the composition of the disaster wastes and reuse them as much as possible
  - Step 2. Renew the processing plan from the stance of disposing/incinerating the residue or implementing cross-regional processing
- The government shall strengthen technical advice and financial support in order to support formulation of the plan and its implementation

Recommendation 2: Technical and financial support for reuse of the disaster wastes

- The government shall provide financial support for additional expenses for removing impurities, etc.
- The government shall make the efforts to enhance sorting technologies, etc. in order to increase the amount of reusable disaster wastes

Recommendation 3: Implement safe cross-regional processing based on laws and guidelines and in accordance with agreements between the receiving areas and disaster-stricken areas

- In satisfying the processing/disposal standards based on laws and guidelines, the disaster wastes (in Iwate and Miyagi Prefectures) will not cause any health hazards and either processing within the prefectures or cross-regional processing is possible
- In promoting cross-regional processing, the government shall provide coordination in thereby satisfying both the requests of the disaster-stricken areas and conditions of the receiving areas

Recommendation 4: Secure reassurance through information disclosure and risk communication

- The government and municipalities shall constantly confirm whether content of hazardous materials such as radioactive materials is below the safety standards or not both before delivery and after processing, and disclose that data
- The government shall provide support in enabling municipalities to provide sufficient risk communication to residents (complete disclosure of any relevant information such as processes for establishing standards, technical and financial support regarding the measurements of the contents, and guaranteeing opportunities for process verification by neutral experts, etc.)

“Recommendations from Science Council of Japan (SCJ)
– with Confident Steps towards Reconstruction –” (Summary)

1 Purpose of recommendation

Realize concerted commitments of academic circles in various fields to provide the knowledge and expertise very much demanded by the victims and residents of the disaster-stricken areas as well as the Japanese people in general regarding various issues involved in the reconstruction from the aftermath of the Great East Japan Earthquake, and thereby provide such information in the most practical manner.

2 Necessity of recommendation

The Great East Japan Earthquake did not only result in unprecedented human/physical damage quantitatively, but it also had significant features qualitatively. Namely, compound damage from the catastrophic quake, the subsequent Tsunami and the Fukushima Daiichi Nuclear Power Plant accident; the magnitude extended into urban districts, industrial sites and municipalities, and hence there were many districts where people lost both their residences/workplaces and along with use of their land; concern exists over the threat of a health hazard to a large number of people being posed by the nuclear power plant accident; the presence of excessive amounts of disaster wastes in contrast to the limited managerial capacities of the disaster-stricken areas that could hinder efforts to reconstruct the cities and result in the problem of fire and unsanitary conditions, etc.

The issue of reconstruction is consequently rather complex. The communities that need to be restored must be “disaster-resilient” in a multifaceted way, and be coupled with a smooth progress with processing of the disaster wastes, etc. In addition, people cannot make a living unless industries that can sustain the disaster-stricken areas steadily take root, with job opportunities then being ensured by those industries. Furthermore, with respect to those concerned about being exposed to radiation by the nuclear power plant accident, an imminent issue has also arisen to establish a long-term health management system and decontamination measures in areas where radioactive materials were deposited.

The necessary knowledge on the issues involved in reconstruction therefore needs to be provided in a practical manner by mobilizing various fields of academic circles (science/technologies), which is precisely the duty of Science Council of Japan (SCJ).

The 21st Term SCJ first committed itself soon after the occurrence of the great earthquake by setting up the Great East Japan Earthquake Task Force, issuing urgent recommendations on seven consecutive occasions, and so on. At the inception of the 22nd Term SCJ in October

2011, the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to succeed the Great East Japan Earthquake Task Force. Under this Committee, the Sub-Committee on Building Disaster-Resilient Communities, the Sub-Committee on the Promotion of Industry and Employment, and the Sub-Committee on Counter-measures for Radiation were set up, and then intensive respective deliberations took place. The disaster waste issues were directly discussed by the Committee. The recommendations then compiled can be summarized as set out below.

1. Recommendations from Science Council of Japan (SCJ) – with Confident Steps towards Reconstruction –
   (Recommendations by Committee on Supporting Reconstruction after the Great East Japan Earthquake: Compilation of the following recommendations 2.-5.)
2. Building Tsunami-proof Communities – Showing How Tohoku Reconstruction Makes Use of Nature –
   (Recommendations by the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake)
3. Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas – Towards the Promotion of Industry and Employment to Support Victims in Disaster-Stricken Areas –
   (Recommendations by the Sub-Committee on the Promotion of Industry and Employment, Committee on Supporting Reconstruction after the Great East Japan)
4. A New Step towards Counter-measures for Radiation – Towards Science-based Policy Action –
   (Recommendations by the Sub-Committee on Counter-measures for Radiation, Committee on Supporting Reconstruction after the Great East Japan)
5. On Cross-regional Processing of Disaster Wastes
   (Recommendations by the Committee on Supporting Reconstruction after the Great East Japan Earthquake)

3 Contents of recommendations

(1) Building Tsunami-proof Communities

[1] Creation of disaster-resilient national land (as a measure that needs to be implemented in short- to medium term perspectives) – Creation of a “Disaster Mitigation Agency”; National Land Use Plan for withdrawing from disaster-hazard areas and corresponding guidance measures; Respect for the recuperative power of nature; Structural reinforcement of buildings/facilities; Strengthening of the software side of

countermeasures; Backing up to capital/key functions.

[2] Building sustainable reconstructed communities (in anticipation of the declining/aging population) – Formulation of action plans for sustainable reconstruction; Establishment of community-based "reconstructed community building organizations"; Planning of regional reconstruction strategies that center around public-benefit facilities, including day-care centers, kindergartens, schools, and welfare facilities for the elderly, etc.; Coordination of coastal area land use from a broad-based perspective of the wider area; Formation of "Natural Symbiosis Cities based on the Watershed Landscape"; Development of renewable energy policies.

[3] Measures toward greater utilization of information – Securing means of conveying information on preparing for disasters and establishing judgment/action guidelines; Promotion of information collection/accumulation and subsequent data integration; Implementation of measures that ensure the safe keeping of social information assets; Promotion of training/placement of information professionals.

[4] Ideal medical care/nursing/welfare in the disaster-stricken areas – Formation of health, medical care, and welfare organization networks that can provide flexible responses when urgently needed; Establishment of support measures for groups that are vulnerable to disasters; Preparation and enrichment of mental health cares.

[5] Establishment of victim support system and personnel training – Preparation of needs maps concerning the relief of victims and information gathering; Creation of nation-wide networks by municipalities, private organizations, and academic societies, etc.; Training of disaster-care professionals who can take the initiative in providing disaster support and promoting relevant research.

[6] Preventive measures to mitigate disasters resulting from the potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis – Formation of disaster risk conscious national land structures; Reinforcement of the measures with regard to the software side; Promotion of research on disasters.

[7] Organization and dissemination of disaster records – Promotion of creation of an "archive" concerning the Great East Japan Earthquake.

[8] Role of government publicity and media organizations – Appropriate news coverage in response to the temporal stages of disasters; Cool-headed news reports and comments based on the sharing of accurate information and sources.

(2) Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas

[1] Alleviation of labor market mismatches – Improvement of job-seeker support system that is compatible with the actual labor market situation (Area/attribute based employment targets; Cooperation with other employment restoration promotion projects; Alleviation at household level); Cooperation with “From Welfare to Employment”; Ensuring sufficient staffing at public employment security offices (Hello Works).

[2] Reconstruction of local industries in the disaster-stricken areas – Improvement of “reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises” (Subsidy for individual enterprises as well; Carry-over of subsidies until March 2016; Simplification/flexibility of procedures, etc.; Yearly payment; Priority by unit of basic municipalities); Smoother promotion of reconstruction (Strengthening of inter-ministerial cooperation/collaborations; One-stop services by basic municipalities; Rental of production facilities by the government and municipalities; Expansion of special depreciation for disaster alternative assets; Support for long-term “temporary housing” projects in Fukushima Prefecture; Training of personnel to engage in life-prolonging repair of infrastructures.

[3] Revitalizing areas through business start-ups via the initiative of residents – Establishing Reconstruction Non-profits – Encouragement for creation of a variety of “reconstruction non-profits” (tentative name) via the initiative of local residents; Points of emphasis with reconstruction non-profits as social corporations; Necessary legislative measures in the event reconstruction non-profits should be modeled after public interest corporations (Include object of reconstruction in business category of public interest corporation; Discuss the “Act on Authorization of Public Benefit of Reconstruction Non-profits” using the medium- and long-term perspective).

(3) A New Step towards Counter-measures for Radiation

[1] Alleviation of effect on public health – Establishment of a regional medical care system that enables constant estimation of exposure doses, thyroid ultrasound examinations/blood tests as well as appropriate and prompt treatment; Establishment of decontamination targets including the post-return of residents and management of decontamination works; Spontaneous reflection of results of appropriate epidemiological research in the health management of residents.

[2] Assessment of the present situation with and future of damage caused by radiation and more accurate estimation of health effects – Establishment of a cross-disciplinary

research system through collaboration between the government and academic circles; Establishment of a system for prompt and steady data collection and a system that provides the data in the form that allows researchers to use/analyze it; Information on the "uncertainty" that is required with the various results of measurements/estimations (This is also the case with accuracy control or improvement).

[3] Future issues for study in relation to countermeasures against radioactivity – Improve modeling and, data assimilation technology in relation to the emission/diffusion/exposure/health effects: Reinforcement of academic reasoning related to assessment of radioactive health effects; Transition from countermeasures/standards setting at an early stage based on precautionary principle to setting of countermeasures/standards based on academic reasoning and cost-benefit analysis with a medium- to long-term perspective; Ways to make risk communication between academic circles and society.

(4) On Cross-regional Processing of Disaster Wastes (with regard to the disaster-stricken areas in Iwate and Miyagi Prefectures)

[1] Waste processing plan that in principle makes reuse and disposition within the regions – Accurate identification of the composition of the disaster wastes and the volume within disaster-stricken municipalities; Renewal of processing plan; Technical advices and financial support from the government.

[2] Financial support for removing impurities and enhanced reuse technology – Use of the disaster wastes in the development of bases for disaster prevention forests and higher grounds; Increase of reuse.

[3] Environmental arrangement of cross-regional processing such as in coordinating requests from the disaster-stricken areas and conditions of the receiving areas – In satisfying the processing/disposition standards that are based on the Act on Special Measures, the disaster wastes produced in Iwate and Miyagi Prefectures will not cause any health hazards and either processing within the prefectures or cross-regional processing is possible; Arrangement in accordance with the different standards and depending on the processing methods.

[4] Constant confirmation of radioactive/hazardous materials and disclosure of data – Verification throughout pre-delivery/post-processing; Support for risk communication to residents by municipalities; Guaranteed opportunity for process verification by neutral experts.

Recommendations

Recommendations from Science Council of Japan (SCJ) – with Confident Steps towards Reconstruction –

April 9, 2012

Science Council of Japan

Committee on Supporting Reconstruction
after the Great East Japan Earthquake

Table of contents

I. Background and composition of the recommendations

1 The Great East Japan Earthquake and restoration/reconstruction efforts

(1) Various reconstruction issues and the necessity for recommendations from Science Council of Japan

The Great East Japan Earthquake that occurred on March 11, 2011 off the Pacific Ocean of the Tohoku Region was the 4th largest earthquake recorded in human history, with a moment magnitude of 9.0. It was a very complex disaster because of an accident that occurred at the Fukushima Daiichi (No. 1) Nuclear Power Station of Tokyo Electric Power Co., Inc. (TEPCO) which was triggered by a total loss of power after seven Tsunamis extending from 30 minutes to 6 hours after the earthquake occurred.

An outline of the damage (nationwide) of the Great East Japan is as follows.

- Total deaths: 15,852
- Total missing persons: 3,268 (as of the end of February 2012)
- Completely destroyed houses: 128,753
- Partially destroyed houses: 245,383
- Number of evacuees: 343,000
- Number of temporary housing units (including leased): 130 thousand
- Total cost of the resulting damage: 16.9 trillion yen (Cabinet Office)
  (Total cost of the damage resulting from the Great Hanshin-Awaji Earthquake: 9.6 trillion yen (National Land Agency))

The human damage and property damage resulting from the Tsunamis were both unfathomable, while the disaster also deprived the disaster victims/disaster-stricken areas of both their residences and places to work. Despite having severe psychological trauma in addition to having suffered damage to their property and had their lives inconvenienced by having to live at temporary housing the victims are still proceeding with restoration/reconstruction activities in thereby realizing a permanently safe society. When reconstructed they must be “communities resilient to disasters” in a multi-faceted sense. In addition, people cannot make a living unless industries that can sustain the disaster-stricken areas steadily take root, with job opportunities then being ensured by those industries. Furthermore, many people have been forced to evacuate for an extended period of time due to the nuclear power plant accident, thus establishing a long-term health management system for those who fear having been exposed and decontamination measures in the areas where radioactive materials were deposited are posed as imminent issues.

These various reconstruction challenges thus require the specific provision of

desperately needed knowledge to the victims through mobilization in the various fields of science, which is precisely the duty of Science Council of Japan (SCJ). As described later the 21st Term SCJ committed itself soon after the occurrence of the great earthquake by setting up the Great East Japan Earthquake Task Force, issuing urgent recommendations on seven consecutive occasions, and so on. At the inception of the 22nd Term SCJ in October 2011 the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to succeed the Great East Japan Earthquake Task Force. On November 16 the Sub-Committee on Building Disaster-Resilient Communities, the Sub-Committee on the Promotion of Industry and Employment, and the Sub-Committee on Counter-measures for Radiation were set up, and then intensive respective deliberations took place. These recommendations are the compiled results of their deliberations.

(2) Restoration/reconstruction

In response to this unprecedented large scale disaster the government and Diet have already secured a reconstruction budget of a total of 15.1 trillion yen, which consists of a 1st supplementary budget in early May (4.0 trillion yen), 2nd supplementary budget in July (1.9 trillion yen), and 3rd supplementary budget in November (9.2 trillion yen). The total reconstruction budget is estimated to be 19 trillion yen over five years and 23 trillion yen over 10 years, and which will be financed by a special reconstruction taxation of 10.5 trillion yen[1] and non-tax revenues, being in addition to reconstruction bonds of 12.5 trillion yen. It is of vital importance to the sustainability of our economy and public finance, and not just limited to the disaster-stricken areas, that the enormous reconstruction budget should be appropriately allocated in thereby creating jobs and thus incomes.

Furthermore, new reconstruction laws, including the Basic Act on Great East Japan Earthquake Reconstruction, the Special Reconstruction Zone Act, the Act for Establishment of the Reconstruction Agency, and the Act on Establishment of Regions Resistant to Tsunamis have been enacted, with the reconstruction system thereby taking shape.

In contrast, and with the disaster-stricken areas, reconstruction plans had already been formulated by December 2011 for the major disaster-stricken prefectures of Iwate, Miyagi, and Fukushima. The disaster-stricken municipalities extend across 11 prefectures and a total of 222 municipalities nationwide (districts subject to being special reconstruction districts).

[1] Based on the Act on Special Measures for Securing Financial Resources Necessary for Reconstruction that was enacted on November 30, 2011, it will be financed by 7.5 trillion yen via an increment in income tax of 2.1% starting from January 2013 for a period of 25 years, 0.6 trillion yen via an additional 1,000 yen from residential tax for a period of 10 years, and 2.4 trillion yen via a freeze on tax cuts for corporate income tax for 3 years that is being planned for from April next year.

Reconstruction plans have already been formulated for the approximately 40 municipalities along the Pacific coast of East Japan that were particularly damaged. The abovementioned reconstruction plans are more advanced in that they require a greater level of safety in anticipation of repeat Tsunamis rather than just restoring the areas to their original condition.

Nevertheless, quite a few areas are yet to have commenced upon land elevation work that is essential in their restoration, or even any actual reconstruction. Basically the present situation is at the most difficult time and labor consuming phase, with the consensus of residents in the disaster-stricken areas concerning the foundation of each reconstruction plan needing to be reached, and the plan materialized in combination with the state budget as well as the system. However, their populations tended to have been declining in excess of the national average even before the disaster. It should also not be overlooked that in the last year a substantial population drain that was much larger than the decrease in population over the previous five years occurred has taken place because of the disaster, thereby placing the communities in an extremely severe socio-economic situation.

Acceleration of the reconstruction efforts at this stage in the appropriate order of priority should therefore prove significant in determining the future state of our country as a whole, along with the disaster-stricken areas.

2 Engagements of SCJ to date and responses (related recommendations of the 21st Term)

In response to the Great East Japan Earthquake the 21st Term SCJ held an urgent meeting on March 18, 2011. Confirmation took place at the urgent meeting that SCJ would be responsible for providing society with methods of utilizing science and technology to create a new Japanese society that can be succeeded to by the next generation without any undue worries. It was also determined that SCJ should provide advice and cooperate in all efforts made in the restoration/reconstruction from the Great East Japan Earthquake, and also to receive information and proposals from scientists and engineers from the rest of the world, not merely Japan, and then compile them in an appropriate manner for effective dissemination. The Great East Japan Earthquake Task Force was set up on March 23 to fulfill that purpose.

The Great East Japan Earthquake Task Force issued the 1st to 7th emergency recommendations regarding the preparation of a comprehensive system to use in assisting victims and reconstructing the disaster-stricken areas, measures to use with the disaster wastes, and the importance of the stance of gender equality, etc. <1-6, 9>. In particular our recommendation on “pairing support” based on the idea of horizontal cooperation between municipalities <1>, recommendations regarding a large scale survey on radiation doses by a number of measurement professionals <2>, recommendations regarding the use of domestic robot technology <5>, etc. have been reflected in specific collaborations between municipalities, government policies, and activities in the disaster-stricken areas, etc.

In addition the “Subcommittee on Grand Reconstruction Design for the Disaster-Stricken Areas”, the “Subcommittee on Options with Energy Policies”, and the “Subcommittee on Influence on Health and Protection against Radioactivity” were set up under the Task Force, with plans and specific measures then being proposed to the government and related organizations regarding the restoration/reconstruction that were underway. A research report on the direction of Japan’s future energy policies was also presented to the society in order to stimulate national debate. This has contributed to various internal discussions taking place at the governmental level <7, 8, 10, 11>.

Furthermore, research and deliberations have also taken place within each department and committee of the respective fields, with recommendations such as measures to protect children from radiation exposure due to the nuclear power plant accident <12>, measures for restoring the marine products industry <13>, and employment support/industrial reconstruction measures <14>, etc. then being made in cooperation with the Great East Japan Earthquake Task Force. The Task Force has constantly deliberated upon some of the content of those recommendations.

Information has also been disseminated to both the people and researchers, including

publishing “For a Better Understanding of Measures for Radiation Protection” (SCJ President’s Comment) <15> as an explanatory activity to a wide range of people and by holding open symposiums with themes such as the social responsibility of scientists with regard to the Fukushima Daiichi Nuclear Power Plant accident and the media coverage of the Great East Japan Earthquake, etc. (refer to <Background Information 2>). SCJ President’s Comments have been constantly posted on the website of the Reconstruction Headquarters in Response to the Great East Japan Earthquake of the government.

With regard to dissemination of information overseas a report on the nuclear power plant <16> was provided to overseas academic circles, although the available information was limited, and urgent recommendations promptly translated into English for disclosure on the English website of SCJ. In response to this both sympathy and support has been expressed by the academic circles of respective countries. The academy of France (Academie des Sciences) in particular organized special committees that involve fields of earthquakes, Tsunamis, radiation, and medical care, and which had compiled a report in English entitled “Solidarity Japan” by the end of June. A representative of the academy then visited Japan to deliver the report to the SCJ President Hirowatari (21st Term).

After reviewing all these activities SCJ issued a Statement of the Executive Board of SCJ “Reconstruction from the Great East Japan Earthquake and Responsibility of Science Council of Japan” <17> (refer to <Background Information 2> for the Report on the Great East Japan Earthquake from the 21st Term SCJ).

3 Efforts and Course of Deliberations of the 22nd Term SCJ

The 22nd Term SCJ commenced in October 2011. One of the first committees to be established was the Committee on Supporting Reconstruction after the Great East Japan Earthquake, which had been held over from the previous Term, to deliberate on various matters and in support of the reconstruction from the Great East Japan Earthquake. Under this Committee three Sub-Committees, namely the “Sub-Committee on Building Disaster-Resilient Communities”, which discusses ways of building communities in the disaster-stricken areas, the “Sub-Committee on the Promotion of Industry and Employment”, which discusses ideal support for reconstructing industries and employment, and the “Sub-committee on Counter-measures for Radiation”, which discusses measures to use in the regions, mainly Fukushima Prefecture, that received radiation damage due to the Fukushima Daiichi Nuclear Power Plant accident, were then established to hold intensive deliberations toward the end of the first year after the earthquake disaster in March 2012 and recommend measures that the government, etc. should be prompt in taking. The structure of and course of the deliberations that were held by the Committee and the Sub-Committees are as provided in <Members of the Committee on Supporting Reconstruction after the Great East Japan Earthquake> and <Background Information 1>.

These recommendations are summarized results that were compiled from the recommendations of the three Sub-Committees. Refer to the recommendations made by the respective Sub-Committees for the background and course of the discussions that led to the content of the respective recommendations. In compiling these recommendations a period for listening to the opinions of all the Council Members/ Members was established. Although the period was insufficiently long 73 comments were collected for use in the (proposed) recommendations. These recommendations were the compiled results after having examined all the comments and making necessary modifications. The reason the opinions of all the Council Members/ Members were listened to while the period was insufficiently long was that the deliberations had taken place at various other opportunities within SCJ but outside the Committee/Sub-Committees. They are provided in <Background Information 3>.

In addition to the deliberations of the three Sub-Committees the Committee on Supporting Reconstruction after the Great East Japan Earthquake deliberated on the theme of “On Cross-regional Processing of Disaster Wastes” from the point of view of facilitating the processing of disaster wastes would also promote reconstruction. Recommendations were made on proceeding with the cross-regional processing where necessary but while also placing the highest priority on reuse within the prefectures.

II. Recommendations

4 Recommendations on building disaster-resilient communities

More than a year has passed since the Great East Japan Earthquake and reconstruction efforts are now fully in progress in the disaster-stricken areas. The disaster-stricken municipalities extend over 11 prefectures and a total of 222 municipalities nationwide (districts subject to being special reconstruction districts). Reconstruction plans have already been formulated for the approximately 40 municipalities along the Pacific coast of East Japan that were particularly damaged. The municipalities selected 40 appropriate businesses (core businesses) that could be utilized in the reconstruction efforts according to the situation with the disasters and reconstruction plans, and implemented them along with additional businesses that would promote their effectiveness. Efforts to build safer communities have therefore been commenced upon.

Reconstruction from the Great East Japan Earthquake, however, involves particular difficulties when compared to previous disasters. Restoring the Tsunami-stricken areas, in particular, to their original state does not eliminate the risk of them being struck by further Tsunamis again in the future, and thus the issue involves how to reconstruct them while also securing their future safety. Proceeding with community building for reconstruction based on the idea of disaster mitigation in thus protecting human lives and reducing property damage through disaster prevention facilities such as breakwaters and seawalls, etc., community building in safe locations, and evacuation is therefore important. These recommendations are being made from the following seven points of view and in consideration of issues in the present stage of reconstruction from the disaster.

(1) Creation of disaster-resilient national land

The following recommendations are being made as measures to be implemented over the short-term, and with the re-organization of national land infrastructures with improved resilience to disasters and the necessity of distribution and backing up of the capital functions and private central management functions that are concentrated in Tokyo all taken into account.

[1] Creation of a Disaster Mitigation Agency – At the stage when the completion of the reconstruction from the Great East Japan Earthquake is in sight the Reconstruction Agency shall be reorganized into a Disaster Mitigation Agency and function as a permanent control center for consistent disaster/damage estimations, disaster mitigation measures, and disaster reconstructions.

[2] National Land Use Plan for withdrawing from disaster-hazard areas and corresponding guidance measures – In regions at significant risk, as identified through estimating the disaster/damage, rules for limiting residential land use or taking safety measures with buildings shall be established.

[3] Respect for the recuperative power of nature – With national land management, and in consideration of the majority of domestic areas being based on natural land use, various national activities in maintaining natural areas shall be encouraged in thereby gaining greater understanding of natural processes and attaching greater importance to its ideal use with respect for the recuperative power of nature.

[4] Structural reinforcement of buildings/facilities – Civil engineering structures, including breakwaters, seawalls, levees, dams, railroads, roads, and port facilities, etc., shall be reinforced to the necessary level. The earthquake-proof safety of large-scale factory facilities, including petroleum plants and power generation facilities, etc., shall be improved upon.

The earthquake resistance of buildings shall be further improved in large cities with concentrated populations in increasing the number of buildings in which people can seek refuge in a disaster.

[5] Strengthening of the software side of countermeasures – Efforts shall be made in the software side of countermeasures, including evacuation drills, establishment of fire brigades, and emergency earthquake alarms, etc.

[6] Backing up of the capital/key functions – The functions of the central management functions of the government and economic activities shall be backed up in areas that are not at risk of simultaneous disasters, thereby distributing the risk of them being lost.

(2) Building sustainable reconstructed communities

The disaster-stricken areas are socially vulnerable, such as having declining/aging populations, etc. At present the “Basic Reconstruction Plan” formulated by each municipality is based on the idea of maintaining the status quo, although with this actuality having been recognized, and thus involves a variety of issues. The following recommendations are therefore being made.

[1] Formulation of action plans for sustainable reconstruction – A third party organization consisting of community building experts, etc. shall be promptly established to inspect the “Basic Reconstruction Plan” of municipalities from a long-term, broad-based point of view, and create concrete action plans toward “sustainable reconstruction”.

[2] Establishment of community-based "reconstructed community building organizations" – Community-based careful "reconstructed community building organizations" need to be set up in rapidly reconstructing the disaster victims' daily lives. In order to achieve this, a system that can be used to secure financial resources and dispatch human resources shall be established. In addition to active inclusion of females at disaster prevention/reconstruction meetings, etc., consideration shall be given to the point of view of gender equality being reflected in the formulation of disaster prevention/reconstruction plans, etc.

[3] Planning of regional reconstruction strategies that center around public and public-benefit facilities, including day-care centers, kindergartens, schools, and welfare facilities for the elderly, etc. – Regional reconstruction strategies that center around public and public-benefit facilities, including day-care centers, kindergartens, schools, public halls, and welfare facilities for the elderly, etc., and step-wise reconstruction strategies that take the reconstruction of communities into consideration shall be planned.

[4] Coordination of coastal area land use from a broad-based perspective of the wider area – In the destroyed coastal areas, administrations, people, and NPOs shall cooperate in formulating broad-based coastal area plans that not only enable the restoration of residential/production bases but also the restoration of the natural environment and improvement of biodiversity from a broad-based perspective of the wider area.

[5] Formation of "Natural Symbiosis Cities based on the Watershed Landscape" – The traditional relationship of the circulation of watershed areas in remote mountains, country side forests, towns, fields, and beaches shall be reviewed from the point of view of new energy strategies and the sustained maintenance of fishing grounds as a common resource, and "Natural Symbiosis Cities based on the Watershed Landscape" formed.

[6] Development of renewable energy policies – The coastal areas and country side forest areas located to the rear of the disaster-stricken areas shall be positioned as development bases for renewable energy, and establishment of self-sufficient distributed systems shall be part of the reconstructed community building process.

(3) Measures toward greater utilization of information

The following recommendations are being made from the perspective of information utilization and broadcasts and with respect to a more disaster-resilient society.

[1] Securing means of conveying information on preparing for disasters and

establishing judgment/action guidelines – Technical issues related to the reliability and stability of emergency communications in the case of disasters shall be resolved, and a system for rapidly disseminating accurate disaster forecast information through the utilization of television, radio, broadcasts within the jurisdiction of municipalities, cellular phones, and the internet shall be created. In addition, policies for making judgments and performing activities of individuals shall be established.

[2] Promotion of information collection/accumulation on disasters and subsequent data integration – Various information that ought to be permanently stored and made available to experts for analysis, such as information on the voluntary evacuees and the radiation doses due to the Fukushima Daiichi Nuclear Power Plant accident, etc., should be integrated and then disclosed to the public, and therefore standard data formats and guidelines on visualization shall be established for its utilization.

[3] Implementation of measures that ensure the safe keeping of social information assets – In preparing for wide-area disasters the establishment of a system for backing up social information assets such as administrative documents and medical care/nursing information shall be established, and discussions shall promptly take place on the introduction of a wide area medical cooperative system, a system to accumulate health information/dispensing information, etc., and electronic medical records.

[4] Promotion of training/placement of information professionals – Human resources that are capable of making practical responses through utilization of their knowledge on information management shall be trained and placed for continuous information framework operations and to support information utilization by residents.

(4) Ideal medical care/nursing/welfare in the disaster-stricken areas

The following recommendations are being made in consideration of not only the importance of how to handle medical care/nursing and social welfare in the case of disasters but also the fact that disasters can seriously affect the vulnerable people, in particular the elderly, females, children, and persons with disabilities, etc.

[1] Formation of health, medical care, and welfare organization networks in regions that can provide flexible responses when urgently needed – Regional health, medical, and welfare institutions shall establish well-acquainted relationships in ordinary times, and measures such as establishment of cross-institutional bases and ideal cooperation, information provision, and information sharing, etc. be discussed.

[2] Establishment of support measures for groups that are vulnerable to disasters – A sense of all being “in the same boat” shall constantly be developed in communities, and

a cooperation system between medical professionals and local residents, including welfare volunteers and neighborhood self-governing bodies, etc. established.

[3] Preparation and enrichment of mental health care – Provision of mental health care by mental health care expert teams consisting of infant education counselors, school nurses, clinical developmental psychologists, and clinical psychologists, etc. for children of infant and school age shall be promoted. Creation of a “foster parent system” for orphaned children and a “community evacuation system” to safe areas for families, communities, and persons with mental disorders in cooperation between the government and municipalities shall be discussed. In addition, responding to (prevention/early diagnosis of) mental disorders triggered by stress due to unemployment or changes in their residential environment is important with the younger age group through to the middle age group. These are urgently needed from the point of view of respecting human life.

(5) Establishment of victim support system and personnel training

The following recommendations are being made on developing a system for promoting care measures according to the level of stress that the disaster victims suffered.

[1] Preparation of needs maps concerning the relief of victims and information gathering – Needs map that collate the individual needs of the disaster victims shall be prepared, and information collection “stations” for ensuring support is provided according to those needs established.

[2] Creation of nation-wide networks by municipalities, private organizations, and academic societies, etc. – Nationwide networks shall to be established in advance by municipalities, private organizations, and academic societies, etc. in thereby ensuring timely support is provided to the people in the disaster-stricken areas or supporters when needed.

[3] Training of disaster-care professionals who can take the initiative in providing disaster support and promoting relevant research – Environments for accumulating experience from past disaster support and studying disaster care shall be established, and training of disaster care experts conducted at graduate schools who can lead in disaster support and play the role of being global leaders who are also capable of conducting education and research activities.

(6) Preventive measures to mitigate disasters resulting from the potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis

The following recommendations are being made with the aim of rational use of national land that takes large-scale disaster risks such as earthquakes and Tsunamis, etc. into account.

[1] Formation of disaster risk conscious national land structures – These recommendations are being made on correcting the excessive concentration of industrial/economic activities in Tokyo and other Pacific Rim areas and revitalizing cities and industries in the Japan Sea Rim areas. Depopulating areas shall lead to more compact cities, thereby making disaster prevention/mitigation measures more efficient. Core infrastructures such as railroad and road networks, etc. shall not only support economic activities in ordinary times but also have sufficient redundancy to cope with predicted disasters and avoid any delay in emergency activities.

[2] Reinforcement of disaster mitigation measures from the software side – While encompassing improved earthquake resistance of civil engineering structures and building structures, the software side of disaster mitigation measures shall be further strengthened, including community building that takes escapes into account, evacuation drills in ordinary times, establishment of an alarm system for when disasters occur, and disaster prevention education for the people, etc.

[3] Promotion of research on disasters – The identification of the mechanism of large-scale earthquakes/Tsunamis and studies on disaster histories shall be promoted through conducting interdisciplinary research on archived documents, Tsunami deposits, and coastal topographies, and then the results disclosed to the public in an understandable manner.

(7) Organization and dissemination of disaster records

In order to retain memories of the lost past, record the disaster-stricken “present”, and create/recode the “future” toward reconstruction, SCJ established a Subcommittee on IT Media Social Infrastructure and Media Archive of Disasters, and with discussions being on-going. The importance of the creation and succession of disaster records was pointed out in the “Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake” made by the government, and hence a number of measures are being implemented in cooperation between the government and the private sector. SCJ is making the following recommendations.

[1] Promotion of creation of an “archive” concerning the Great East Japan Earthquake – Technologies for storing various information/media shall be developed, and the Great

East Japan Earthquake archive that is of international and cross-generational value established and promoted in cooperation with the relevant ministries/agencies and the National Diet Library, etc.

(8) Role of government publicity and media organizations

[1] Appropriate news coverage in response to the temporal stages of disasters – The respective media organizations should cooperate in establishing a system to use in integrating/sharing lifeline information that helps secures the “safety” (safety of lives) of disaster victims across the entire disaster-stricken areas in the initial stage immediately after a disaster.

[2] Cool-headed news reports and comments based on the sharing of accurate information and sources – Efforts should be made to avoid competing in gaining scoops or sensational articles/headlines and instead ensuring that accurate information and sources are shared with all types of media and cool-headed news and comments reported using that information.

5 Recommendations on industrial reconstruction and employment support

Ensuring reconstruction takes place in the respective areas requires that industries that can sustain the disaster-stricken areas steadily take root and with job opportunities then being ensured by those industries, and in thereby ensuring the persistent achievement of stable lives for the disaster victims and residents in the disaster-stricken areas. Because of this point of view the following recommendations are being made with analysis of the employment and industrial situation in the disaster-stricken areas and the need for employment support and industrial promotion taken into consideration.

(1) Alleviation of labor market mismatches

[1] Improvement of job-seeker support system that is compatible with the actual labor market situation

a. Area/attribute based employment targets: An incentive system in which the disaster victims in the areas where finding employment is difficult are provided with training implemented by private training institutions and with larger amounts of subsidies being granted when they are employed shall be introduced. In addition, employment improvement rate targets by attribute and area shall be established as requirements when applying for vocational training.

b. Cooperation with other employment restoration promotion projects: Those that received training through the job-seeker support system shall be actively employed as a requirement of employment creation via employment restoration promotion projects, etc.

c. Alleviation at household level:

The limitation of one person per household receiving vocational training shall be removed, and the conditions for receiving benefits altered to include spouses and children/parents within the same household who do not work for more than a specific number of hours, etc.

[2] Cooperation with "From Welfare to Employment": In order to make "From Welfare to Employment" support projects function in the disaster-stricken areas a careful individual support system shall be established/enhanced, including securing staff members such as support navigators, etc. In addition, the wisdom of the private sector shall also be utilized to the fullest extent possible, for example in creating employment in cooperation between various economic organizations and the municipalities of the disaster-stricken areas, etc.

[3] Ensuring sufficient staffing of Hello Works: In order to alleviate labor market mismatches through developing potential job offers an adequate number of staff members shall be secured at Hello Works.

(2) Reconstruction of local industries in the disaster-stricken areas

[1] Improvement of "reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises"

a. The system shall be operated in such as way as to allow enterprises that are essential to the local economy to be individually subject to subsidies

b. Carry-over of subsidies, which take the degree of the progress of elevation work into account, shall be allowed until the end of March 2016

c. The application period shall be made sufficiently long, the procedures, etc. more simple and flexible, and payments made each fiscal year according to the progress of the projects, while based on the judgment of the municipalities concerned

d. In the process of adopting subsidized projects priority shall be placed on subsidies/financing at the unit of a basic municipality

[2] Smoother promotion of reconstruction

a. Inter-ministerial cooperation shall be strengthened in preventing abuse of the "vertically segmented administration" system

b. Basic municipalities, etc. shall be utilized in thereby enabling them to play the role of being one-stop service centers

c. A system in which the government and municipalities, etc. rent production facilities shall be created in thereby eliminating "overlapping debt"

d. Special depreciation for disaster alternative assets shall be expanded so as to enable its application to gratuitously transferred assets

e. A system that supports long-term "temporary housing" projects and business restarts shall be created in Fukushima Prefecture

[3] Training of personnel to engage in life-prolonging repair of infrastructures

With municipality level life-prolonging repairs, local small- and medium-sized enterprises shall play the leading role in emergency repairs and inspections/maintenance through effective utilization of the "life-prolonging project subsidy system" that commenced in FY 2007.

(3) Revitalizing areas through business start-ups via the initiative of residents - Establishing Reconstruction Non-profits

[1] Enabling the establishment of various "reconstruction non-profits" (tentative name) via the initiative of residents.

[2] Reconstruction non-profits modeled after social corporations (start-up businesses) shall

receive favorable tax treatment, etc. with investments but no dividend payments, be allowed to transfer shares and redeem shares at the time of a corporate dissolution, but have the decision making rights separated from the invested amount, etc.

[3] A framework shall be provided for reconstruction non-profits modeled after public interest corporations by adding the new item of a “business that promotes reconstruction in the disaster-stricken areas”, etc. or including reconstruction non-profits as being a business that falls under the provision of “In addition to each of the foregoing items, business provided for in Cabinet Order as one relating to the public interest” in item 23 in Appended Table of the Act on Authorization of Public Interest Incorporated Associations and Public Interest Incorporated Foundation.

[4] The establishment of standards for public interest corporation authorization that suit the characteristics of the individual reconstruction non-profits, which differ to other public interest corporations, and the “Act on Authorization of Public Benefit of Reconstruction Non-profits” with the aim of facilitating its authorization shall be discussed from a medium-term perspective.

6 Recommendations on radiation measures

Based on the exposure doses discussed and health effects estimated for the different exposure routes the Sub-Committee on Counter-measures for Radiation has the following six recommendations ((1)[1]-[3] and (2)[1]-[3]) in minimizing adverse health effects and improving the accuracy of future assessments of health effects due to radiation exposure.

(1) Alleviation of effect on public health resulting from the Fukushima Daiichi Nuclear Power Plant accident

[1] The government/municipalities shall continue to estimate exposure doses and provide medical checkups/examinations to residents in thereby protecting the health of those already exposed to radiation, and children and infants in particular. For this purpose the government/municipalities shall establish a system that can be used to provide thyroid ultrasound examinations and blood tests, along with a regional medical system that enables residents to receive appropriate and prompt treatment in the case of any health abnormalities being detected.

[2] The government/municipalities shall implement appropriate measures such as establishing decontamination targets, including the post-return of residents and management of decontamination work, etc., in order to prevent cumulative exposure doses from reaching the level that could pose a negative health effect because of potential further exposure due to their return/decontamination work.

[3] Academic circles in Japan shall plan appropriate epidemiological research on estimating the radiation dose-response curve with respect to the carcinogenic rate and cancer mortality rate, implement it in cooperation with the government/municipalities, promote an integrated understanding with other basic research, and promptly reflect the results in the health management of the residents.

(2) Assessment of the present situation with and future of damage caused by radiation and more accurate estimation of health effects

[1] The government and academic circles in Japan are being requested to cooperate in establishing a cross-disciplinary research system that can be used to identify the overall picture related to the assessment of radioactive health effects and in thereby more accurately identifying the actual situation with radiation contamination and health effects associated with the Fukushima Daiichi Nuclear Power Plant accident and thus more appropriate implementation of decontamination and health effect prevention measures.

[2] The government shall establish a system that enables the prompt and steady collection of the data required in looking back on the accident and data which will have a significant effect on the accuracy of health effect estimates, and also a public system for providing standardized data in a form that most readily allows researchers to use/analyze it.

[3] Institutions/researchers engaged in radiation-related measurements or model-based estimations are expected to disclose the results of the various measurements/estimations that will be used as base figures in assessing radioactive health effects together with uncertainty information. In addition, accuracy control or improvement of the measurement/estimated results based on uncertainty information needs to be planned and implemented.

(3) Future issues regarding radioactive measures

In addition to the previous six recommendations four issues that still need to be resolved by academic circles, in particular, are as described below.

[1] Improvement of modeling and data assimilation technologies in relation to emission/diffusion/exposure/health effects

Improvement of the precision of atmospheric/oceanic diffusion simulations conducted in cooperation with researchers in various fields needs to be continued in the future. Improved simulations are needed, in particular more precise numerical models and research on data assimilation methods, etc. However, thorough understanding of the deposition/transfer of radioactive materials scattered over wide areas, exposure routes, and health effects will require specialized knowledge involving both radiation protection and earth sciences.

[2] Reinforcement of academic reasoning related to assessment of radioactive health effects and the approach

The frequency of cancer due to low dose radiation is far lower than the spontaneous occurrence of cancer, and thus significant uncertainty can be observed in the results of epidemiologic studies. Clarifying the mechanism via biological studies that cover the statistical limitations of epidemiologic studies is also a future issue. In addition, the risk of cancer with children is of high public interest and also a cause of public anxiety, thus leading to risk assessment research, etc. being expected to take place.

[3] A transition from countermeasures/standards setting at an early stage based on a precautionary principle to the setting of medium- to long-term countermeasures/standards based on academic reasoning and cost-benefit analysis

It was once again clarified after the accident that no scientific discussions or

examinations had taken place on the evidence which should rationally be used to make political decisions when scientific causal relationships and facts cannot be clearly identified. The ideal political decision making process that takes human values into account in cost-benefit analysis with these important issues, for which effectively referable precedents have rarely been available throughout human history, needs to be discussed by SCJ across the fields of humanities and science.

[4] Ways to make risk communication between academic circles and society

The issue raised here is an extremely important issue for scientists: how to provide risk information that is based on scientific knowledge to society. In addition, the scope and definition of objective “scientific facts” being unclear and the appropriate scientific data collection methods not having been established increased confusion with information. Sufficient discussions will need to take place in the future on exactly how information can be appropriately provided when many people are worried but the risk involved was yet to have been sufficiently scientifically verified at that point.

7 Recommendations on cross-regional processing of disaster wastes

(1) Background to the recommendations

The Great East Japan Earthquake resulted in a large amount of disaster wastes due to the large scale subsequent Tsunamis. As of March 12, 2012, the amount was estimated to be 4.76 million tons in Iwate Prefecture, 15.69 million tons in Miyagi Prefecture, and 2.08 million tons in Fukushima Prefecture, or a total of 22.53 million tons in the three prefectures which were the major disaster-stricken areas. The goal was set of completing the processing/disposal of the disaster debris by the end of March 2014. However, at present only 7.1% or 1.60 million tons of the disaster wastes have been processed/disposed of.

The disaster wastes should be, in principle, processed within the prefectures through reuse, including using them in disaster prevention facilities in the disaster-stricken areas, etc., but proceeding with cross-regional processing will be an issue with processing the wastes on schedule. The present government policy is to proceed with cross-regional processing of the disaster wastes in Iwate and Miyagi Prefectures, but limiting it to those in which the concentration of radioactive materials has been verified to be sufficiently low.

These recommendations therefore discuss ways of processing the disaster wastes in Iwate and Miyagi Prefectures. These recommendations then 1) examine a method of cross-regional processing from the point of view of safety and verifying whether it is a safe or not, 2) point out matters requiring special attention with monitoring, provision of information, and explanations in thereby obtaining sufficient understanding from the disaster-stricken areas, the municipalities involved in cross-regional processing, and the residents, and 3) then make the necessary recommendations.

(2) Present situation and issues

At present a standard value for the concentration of radioactive cesium in the disaster wastes to be processed by municipalities has been set in the guidelines for promoting cross-regional processing of disaster wastes, etc., and as long as workers work in conditions that remain under the standard value their additional annual exposure dose is not expected to exceed the standard value provided by the ICRP. In addition, with sufficient care, for example not engaging in excavations, etc., the additional annual exposure dose of the general public can be retained at less than 1/100 of the exposure dose from background radiation that people are normally exposed to. The exposure dose of residents living in the neighborhood of furnaces through inhaling dust and the exposure dose through intake of agricultural products, stock farm products, and cultured fish from the neighborhood are

estimated to be less than 1/10,000.

In addition, the monitoring methods/procedures used to measure the concentration of radioactive material established by the Ministry of the Environment are in line with the cautious approach of verifying it not only at the time of shipment but also at the time of receipt. The processing of the disaster wastes is considered to not adversely affect people's health as long as it is carried out in accordance with the present procedures.

The processing of the disaster wastes will, however, require significant consideration with respect to eliminating the worries of the residents of the recipient municipalities about both health effects from the radioactive materials and the basic principles of managing radioactive materials to a sufficient extent. The processing of the disaster wastes will also significantly affect municipalities concerned in all the aspects of the cost, people's health, and employment, etc. Enabling the disaster-stricken municipalities and recipient municipalities to reach an agreement in a convincing manner and then proceed with the cross-regional processing will therefore require consideration being given to [1] seriously respecting the general rule of processing the wastes within the prefecture concerned, [2] making the effort to precisely identify the amount of the disaster wastes, [3] ensuring accountability via information being thoroughly disclosed to the residents of the recipient municipalities, and [4] constant monitoring of possible radioactive material leaks.

(3) Recommendations

Recommendation 1:

The disaster-stricken municipalities should precisely identify the composition and amount of the disaster wastes, reuse them as much as possible within the region, and then renew their disposal plans from the stance of disposing/incinerating the residue or implementing cross-regional processing. The government should strengthen their technical advice and financial support in thereby supporting formulation of plans and their implementation.

Recommendation 2:

The government should provide financial support for the additional expense of removing impurities, etc. when using the disaster wastes in the development of bases for disaster-prevention forests and higher ground that function as tidal protection, and make the effort to enhance sorting technologies, etc. in thereby increasing the amount of reusable disaster wastes.

Recommendation 3:

The processing/disposal standards, which are based on the Act on Special Measures concerning the Handling of Contamination by Radioactive Materials and Guidelines on the Promotion of cross-regional processing of disaster wastes, are satisfied by the concentration of radioactive materials contained in the disaster wastes produced in Iwate and Miyagi Prefectures and which is sufficiently low that it will not pose any adverse health hazard in many cases, and thus either processing within the prefecture concerned or cross-regional processing is possible. The standards, however, do differ depending on the processing methods used such as whether the disaster wastes get reused or not. In proceeding with cross-processing, therefore, the government will need to develop an environment in which cross-regional processing can smoothly progress through making arrangements that ensure requests of the disaster-stricken regions match the conditions of the recipient regions with regard to the type of disaster wastes and the concentration of radioactive materials.

Recommendation 4:

In processing with the disposal of the disaster wastes, and regardless of whether the processing takes place within the prefecture or is cross-regional processing, the government and municipalities should constantly confirm that the content of radioactive substances and other hazardous substances is below the safety standards both before delivery and after disposal, and then ensure to disclose that data. In enabling municipalities to provide sufficient risk communication to residents the government should 1) completely disclose all relevant information, including the processes used to establish standards, etc., 2) provide technical and financial support with regard to measuring the content, including radiation dose measurements, etc., and 3) guarantee opportunities for process verification by neutral experts, etc.

<Reference>

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<2> Science Council of Japan, Great East Japan Earthquake Task Force, The 2nd emergency recommendation regarding the response to the Great East Japan Earthquake “Regarding the necessity of the investigation of radiation levels after the accident of the Fukushima Daiichi Nuclear Power Plant”, April 4, 2011.

<3> Science Council of Japan, Great East Japan Earthquake Task Force, The 3rd emergency recommendation regarding the response to the Great East Japan Earthquake “For the relief of victims of the Great East Japan Earthquake and the recovery of the disaster-stricken areas”, April 5, 2011.

<4> Science Council of Japan, Great East Japan Earthquake Task Force, The 4th emergency recommendation regarding the response to the Great East Japan Earthquake “Urgent proposal related to measures for earthquake disaster waste and prevention of environmental impact”, April 5, 2011.

<5> Science Council of Japan, Great East Japan Earthquake Task Force, The 5th emergency recommendation regarding the response to the Great East Japan Earthquake “Utilization of robot technology for the accident of the Fukushima Daiichi Nuclear Power Plant”, April 13, 2011.

<6> Science Council of Japan, Great East Japan Earthquake Task Force, The 6th emergency recommendation regarding the response to the Great East Japan Earthquake “Perspective of gender equality with regard to relief, support, and restoration”, April 15, 2011.

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[2] *: The original was written in Japanese and SCJ provides informal English translation for non-Japanese readers.

policies in Japan – Six scenarios concerning sources of electricity –", June 24, 2011. *

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<14> Science Council of Japan, Great East Japan Earthquake Task Force; Section I, Subcommittee on Discussion of New Japanese Society after 3.11, Recommendation of "Employment support and industrial regeneration support in reconstruction from the Great East Japan Earthquake", September 21, 2011. *

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<16> Science Council of Japan, Great East Japan Earthquake Taskforce, "Report to the Foreign Academies from Science Council of Japan on the Fukushima Daiichi Nuclear Power Plant Accident", May, 2nd, 2011.

<17> Science Council of Japan, Statement of the Executive Committee of Science Council of Japan, “Reconstruction from the Great East Japan Earthquake and Responsibility of Science Council of Japan”, September 22, 2011. *
http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-21-kanji-3.pdf

<Members of the Committee on Supporting Reconstruction after the Great East Japan Earthquake>

These recommendations compile and publish the results of deliberations of the Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan.

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	Tomohiro Okada	Member	Professor, Graduate School of Economics, Kyoto University
	Yuji Genda	Member	Professor, Institute of Social Science, The University of Tokyo

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Committee on Supporting Reconstruction after the Great East Japan Earthquake

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Secretary	Yoshiharu Yonekura	Council Member (Section 2)	President, National Institute of Radiological Sciences
Secretary	Hiroe Tsubaki	Member	Professor and Director, Risk Analysis Research Center, Vice Director General, The Institute of Statistical Mathematics, Research Organization of Information and Systems
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	Shigeo Kodama	Member	Professor, Graduate School of Education, University of Tokyo

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<Background Information 1> Progress of deliberations of the Committee on Supporting Reconstruction after the Great East Japan Earthquake

Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

October 5 Executive Committee (138th) of SCJ
Establishment of the Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

October 28 Committee on Supporting Reconstruction after the Great East Japan Earthquake (1st)
○ Future course of action

2012

February 20 Committee on Supporting Reconstruction after the Great East Japan Earthquake (2nd)
○ Report of status of deliberations of each Sub-Committee, etc.

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)
○ Report and deliberations on (proposed) Recommendations of each Sub-Committee

March 26 – April 1
Call for opinions on (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)
○ Report and deliberations on (proposed) Recommendations of each Sub-Committee

Sub-Committee on Building Disaster-Resilient Communities,
Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ

Establishment of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 27 Sub-Committee on Building Disaster-Resilient Communities (1st)

○ Deliberation matters, future course of action

2012

January 13 Sub-Committee on Building Disaster-Resilient Communities (2nd)

○ Issues with building reconstructed communities, symposium series "Protecting life and land from large-scale disasters", etc.

February 3 Sub-Committee on Building Disaster-Resilient Communities (3rd)

○ Summarizing policy, etc. of the Sub-Committee on Building Disaster-Resilient Communities

March 2 Sub-Committee on Building Disaster-Resilient Communities (4th)

○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations on (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities "Building Tsunami-proof Communities – Showing How Tohoku Reconstruction

Makes Use of Nature –”

Sub-Committee on the Promotion of Industry and Employment,
Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ

Establishment of the Sub-Committee on the Promotion of Industry and Employment, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 8 Sub-Committee on the Promotion of Industry and Employment (1st)

○ Deliberation matters, future course of action

2012

January 10 Sub-Committee on the Promotion of Industry and Employment (2nd)

○ Job-seekers support system, etc.

February 21 Sub-Committee on the Promotion of Industry and Employment (3rd)

○ Reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises, etc.

February 22/23

Field survey in Sendai City and Kesennuma City, Miyagi Prefecture by the Sub-Committee on the Promotion of Industry and Employment

March 4 Enlarged executive meeting (1st) of the Sub-Committee on the Promotion of Industry and Employment

○ Draft recommendations

March 8 Sub-Committee on the Promotion of Industry and Employment (4th)

○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on the Promotion of Industry and Employment

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-Committee on the Promotion of Industry and Employment from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on the Promotion of Industry and Employment "Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas – Towards the Promotion of Industry and Employment to Support Victims in Disaster-Stricken Areas –"

Sub-Committee on Counter-measures for Radiation,
Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ

Establishment of the Sub-committee on Counter-measures for Radiation Contamination, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 8 Sub-committee on Counter-measures for Radiation Contamination (1st)

○ Basic ideas, information sources of radiation contamination and exposure, etc.

December 28 Sub-committee on Counter-measures for Radiation Contamination (2nd)

○ Overall perspective, data map (1st draft), data sources, etc.

2012

January 8 Executive meeting of the Sub-committee on Counter-measures for Radiation Contamination (1st)

○ Main ideas of the draft recommendations, etc.

January 16 Sub-committee on Counter-measures for Radiation Contamination (3rd)

○ Simulation model, health effects due to radiation, future deliberations, etc.

January 19/20

Field survey in Fukushima City, Mianamisoma City, and Soma City, Fukushima Prefecture by the Sub-committee on Counter-measures for Radiation Contamination

February 12 Executive meeting of the Sub-committee on Counter-measures for Radiation Contamination (2nd)

○ Main ideas of the draft recommendations, etc.

February 17 Sub-committee on Counter-measures for Radiation Contamination (4th)

○ Future deliberations, etc.

March 7 Sub-committee on Counter-measures for Radiation Contamination (5th)

○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

- Approval of a proposal to change the title of the Sub-committee on Counter-measures for Radiation Contamination to “Sub-committee on Counter-measures for Radiation”
- Report and deliberations of (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations on (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation “A New Step towards Counter-measures for Radiation – Towards Science-based Policy Action –”

<Background Information 2> Recommendations, etc. made by Science Council of Japan (SCJ) and Responses to Recommendations, etc.

Published date	Content of recommendations, etc.	Responses to recommendations, etc.
March 18, 2011	Statement of the Executive Committee of "Disaster in Northeast Japan and Nuclear Emergency" SCJ recommended to humbly admit fragility of the current socio-economic systems of Japan, which became obvious by the present disaster, looks for measures of improvement seriously, and act with sense of responsibility to explain how to use science and technology in building a new society in Japan that can be handed over with confidence to the future generation.	
March 25, 2011	The first emergency recommendation In consideration of the recommendations made at an enlarged executive meeting of Section III, recommendations were made to a) respond to the worries and doubts of the Japanese people, deepen their understanding of the situation, and immediately prepare the ground for proper actions, b) implementation of "pairing support" from the standpoint of the horizontal collaboration of local governments, c) immediately prepare a system where appropriate experts can provide supplemental explanations, d) immediately establish a centralized and sustainable system for environmental monitoring conducted outside of the nuclear power plant premises and for evaluation of this data, and e) endeavor to foster the trust of the people and deliver scientific information to the international community.	Pairing support in particular has already been introduced in member prefectures of the Union of Kansai Governments and designated cities in Kinki area (March 28, 2011 in Sankei Shimbun), and the Japanese Association of Nursing Programs in University (horizontal support between universities) and enterprises have been conducting activities that are consistent with the purpose of the recommendations. In addition, scientific information has been provided overseas since May.
April 4, 2011	The 2nd emergency recommendation of "Regarding the necessity of the investigation of radiation levels after the accident of the Fukushima Daiichi Nuclear Power Plant" Recommendations were made that: A large-scale investigation by many measurement professionals is necessary, and immediate implementation is desired with the cooperation of universities etc.; Items that need to be measured include surface contamination on the ground, concentration levels of radiation in the air, radiation dose rate of the ground, and exposure dose of the residents.	The purpose of the emergency recommendations was reflected in the "Environment Monitoring Plan" (April 22, 2011 by the Nuclear Emergency Response Headquarters) and "Policies regarding Interim Measures for Nuclear Disaster Victims" (May 17, 2011 by the said Headquarters). In addition, research funds for the time being were secured in accordance with the "Implementation Policy of the Project of FY2011 Strategic Funds for the Promotion of Science and Technology 'Promotion of Flexible Responses to Important Policy Issues and Research on Policy Making of the Council for Science and Technology Policies'" and radiation measurements, mainly conducted by the Ministry of Education, Culture, Sports, Science and Technology, commenced. In creating the measurement maps cooperation has been received to date from the "Conference on the Preparation of Distribution Map of Radiation Doses, etc." established within the Ministry of Education, Culture, Sports, Science and Technology and with the aim of holding technological discussions.
April 5, 2011	The 3rd emergency recommendation of "For the relief of victims of the Great East Japan Earthquake and the recovery of the disaster-stricken areas" In consideration of proposals in Section I the following recommendations were made: ・ Establish a comprehensive system for the relief of victims and recovery of disaster-stricken areas ・ Conduct full-scale and immediate relief activities for the victims (Necessity of relevant legal measures; Necessity of financial and economic measures; Support for the livelihoods of evacuees; Keeping the identity of the victimized community under the evacuation measures; Welfare, health, medical support for elderly and disabled people; Immediate support for the child victims; Establishment of human support system; Support for the psychological and physiological recovery of the victims; Special measures for information transmission to language challenged people; Support for the university education and research in the damage-stricken regions by cooperation between universities)	The Reconstruction Agency was newly established as a unified organizational system of the government. In addition, enactment of the reconstruction related laws, the 1st through to 4th supplementary budgets of FY 2011, and FY 2012 budget (under deliberation) are making progress, and thus a major part of the recommendations are being implemented. In contrast to this, however, no progress has been observed in the establishment of a Tohoku regional council, the provision of information based on scientific judgments and political responsibility, and the dissemination of publicly reliable information, etc.

	・ Efforts for the restoration of the disaster-stricken areas (Land improvement of the disaster-stricken areas; Securing temporary housing; Securing employment in disaster areas; Horizontal and vertical support for the victims and stricken municipalities; Restoration of education in disaster areas; Fundamental principles for the regional restoration; A proposal for the regional restoration; Proposal for the establishment of a Tohoku regional council for disaster prevention and risk management land) ・ Supporting the evacuees from the accident of the Fukushima Daiichi Nuclear Power Plant and handling of the accident (Supporting the evacuees; Measures dealing with the radioactive contamination and damage compensation; Ensuring the safety of the workers at the nuclear power plant; Transmission of information based on scientific judgment and political responsibility and presentation of the standards of action; Necessity of transmitting internationally reliable information; General inspection of the nuclear power plant; Establishment of safe disposal system of the radioactive waste; General gathering of scientists to plan accident recovery processes and presentation of the processes)	
April 5, 2011	The 4th emergency recommendation of "Urgent proposal related to measures for earthquake disaster waste and prevention of environmental impact" With recommendations made by the Committee on Environmental Sciences and the Committee on Civil Engineering/Architecture taken into consideration and reflecting comments made by the Japan Society of Material Cycles and Waste Management, the Japan Society of Civil Engineers, and the Japan Society on Water Environment, recommendations were made to a) conduct emergency waste disposal keeping the public hygiene and proper handling of hazardous waste as high priorities, b) provisionally designate places to deposit waste, considering the water environment and separate it by type in a uniform manner, c) consider ways of recycling that can supply resources for the recovery and restoration processes, and d) promote regional employment and a wide-range of cooperation for the disaster waste recycling.	Little cooperation and support has been obtained from municipalities nationwide with the disposal of the debris, which has thus been significantly obstructing the progress of the restoration/reformation. In addition, discussion of interim storage facilities for disaster wastes contaminated by radioactive materials is making progress, but discussion of the final disposal sites has yet to take place.
April 13, 2011	The 5th emergency recommendation of "Utilization of robot technology for the accident of the Fukushima Daiichi Nuclear Power Plant" Recommendations made by the Committee on Mechanical Engineering were taken into consideration with the recommendation that was made that the central government should act urgently in encouraging the continuous utilization of robot technologies that can be adapted to the situation of the plant by organizing a joint team comprised of the electric power company in charge of the actual site operation, fire departments, Japan Self-Defense Forces, the ministries concerned, robot specialists, and nuclear power plant and radiation specialists, giving this team requisite authority, and having it collaborate with the technical support team consisting of domestic and foreign universities, laboratories, and companies involved in robotics that has already started working.	The disaster response robot Quince, which was developed as a NEDO project, was improved by Chiba University and Tohoku University, and is used at the Fukushima Daiichi Nuclear Power Plant to measure the radiation doses, etc. (at present in Units 2 and 3). No joint team has been established to date.
April 15, 2011	The 6th emergency recommendation of "Perspective of gender equality with regard to relief, support, and restoration" With proposals made by the Committee on Human Security and Gender, the Subcommittee on Gender Equality of the Committee for Scientific Community, and the Subcommittee for Gender Studies of the Committee on Sociology/Social Welfare taken into consideration recommendations were made that a) the central and local governments, political parties, and private organizations shall be thoroughly observe gender equality in their organizations that decide on relief, support, and restoration works, b) care for the care givers such as	

	medical staff, nursing staff, day care staff, teachers, and government workers who are working night and day must be provided, c) information shall be collected and provided with as much care as possible, d) utilization of females in Self-Defense Forces or female security guards shall take place, e) investigations shall be held with the aim of contributing to the realization of gender equality in participation in the process of restoration.	
May 2, 2011	Report on the present situation with the Fukushima Daiichi Nuclear Power Plant accident to overseas academic circles by SCJ The present situation with the Fukushima Daiichi Nuclear Power Plant accident and the future issues have been provisionally compiled and disclosed as a report to academic circles in respective countries.	There have been a number of responses from overseas academic circles.
June 8, 2011	Recommendation of "Reconstruction of the disaster-stricken areas of the Great East Japan Earthquake – Reconstruction goals and seven principles –" The goal of "reconstruction that helps develop people's lives and hopes" and seven principles of "public responsibility with regard to nuclear power plant issues and prompt promotion of international responses", "establishment of the right to life, as by the Constitution of Japan", "formulation of plans via the initiative of municipalities and residents", "reconstruction of safe coastal areas where human life can be protected", "recovery of industrial bases and development of renewable energy sources", "Natural Symbiosis Cities based on the Watershed Landscape", and "financial resource security based on the solidarity of the people and fair burden sharing" were proposed by the Subcommittee on Grand Reconstruction Design for the Disaster-Stricken Areas of the Great East Japan Earthquake Task Force.	Web news (the outlook of the 1st session of the Subcommittee, an interview with the chairperson) was broadcast on April 28. In addition, a number of SCJ Council Members and Members, including the members of this Subcommittee, are involved in the formulation of reconstruction plans for the municipalities, with the seven principles therefore being used as reference material during its course.
June 24, .2011	Recommendation of "Toward selection of future energy policies in Japan – Six scenarios concerning sources of electricity –" The Subcommittee for Options with Energy Policies of the Great East Japan Earthquake Task Force presented six scenarios regarding future energy policies in Japan. A. Immediately cease all nuclear power generation and gradually shift to electricity being generated through renewable energy sources while using thermal power generation as the alternative for the time being. B. Aim for in around five years the achievement of 30% of electricity being covered by renewable energy sources and greater energy efficiency as substitutes for nuclear power generation. During the course of the above improving the safety of nuclear power generation shall be pursued. C. Aim for in around 20 years the achievement of 30% of electricity being covered by renewable energy sources and greater energy efficiency as substitutes for nuclear power generation. During the course of the above improving the safety of nuclear power generation shall be pursued. D. Sequentially cease operation of all nuclear reactors that have reached their maximum useful life-span over the next 30 years. Within this time span achieve 30% of electricity being covered by renewable energy sources and greater energy efficiency as substitutes for nuclear power generation. During the course of the above improving the safety of nuclear power generation shall be pursued. E. While pursuing greater safety, replace nuclear reactors that have reached their maximum useful life-span in maintaining the level of electricity provided via nuclear power, and at the same time promoting use of more renewable energy sources. F. While pursuing greater safety, position nuclear power generation as the main low-carbon future energy source.	Following the Fukushima Daiichi Nuclear Power Plant accident discussions on different electricity sources have taken place from various stances and information supporting those respective stances then disclosed. In this respect SCJ cool-headedly discussing electricity sources and providing materials to the government and the general public for discussing electricity sources had a great impact, with many requests for informative material being made by the mass-media, etc. In contrast to this, however, the results of estimations being discussed, etc. were also published in newspapers that resulted in the public/government being misled, and which has thus been an issue with disclosing conference materials. In addition, when the recommendations were made the basic documents were not well-ordered and therefore not attached to the recommendations, and there has been a comment (SciencePortal review) that more detailed discussion information should also be disclosed. Web news (an outlook of the 1st session of the Subcommittee, an interview with the chairperson) was also broadcast on April 28.

August 3, 2011	The 7th emergency recommendation of "Scientific Survey and Analysis of Movement of Radioactive Substances over a Wide Area" Proposals made by the Subcommittee on investigation of Fukushima Daiichi Nuclear Plant Accidents of the Committee on Comprehensive Synthetic Engineering were taken into consideration and it was noted that the government in cooperation with academic institutions must scientifically ascertain the movements of radioactive substances, and then recommendations made on a) investigations of the environment including the ocean over a wide area, b) establishment of a plan to carry out such investigations for the necessary length of time, c) long term continuous elucidation of the movements of radioactive substances over a wide area, and d) collection of the results of various investigations up to the present and the results of ongoing and future investigations into a database with a uniform format, and making this database available to researchers around the world.	The recommendations were then reflected in concrete policies, including wide area airborne monitoring, etc. Data has been disclosed in PDF format, with disclosure in the Excel format also being under way. The uniform format issue is yet to be solved (the format of data provided by the Ministry of Education, Culture, Sports, Science and Technology is inconsistent with that provided by the Ministry of Agriculture, Forestry and Fisheries),
September 21, 2011	Recommendation of "Employment support and industrial regeneration support in reconstruction from the Great East Japan Earthquake" Proposals of the Subcommittee for Discussion of New Japanese Society after 3.11 of Section I were taken into consideration and recommendations made on employment creation measures via the reconstruction work, introduction of a new vocational training system for unemployed disaster victims, industrial regeneration support measures, enhanced employment support measures, support for self-employed disaster victims, and support for victims of the nuclear power plant accident.	This was covered in a news report via the SciencePortal of the Japan Science and Technology Agency. During the 22nd Term the Sub-Committee on the Promotion of Industry and Employment of the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to further deepen these recommendations.
September 22, 2011	Statement of the Executive Committee of "Reconstruction from the Great East Japan Earthquake and Responsibility of Science Council of Japan" Because of the principle of independently fulfilling its own duties, SCJ shall more carefully discuss the methods and principles used in forming integrated knowledge from scientific communities, make the effort to establish a more trusting relationship with the government, and proceed with activities involving the provision of advice/recommendations to the government in thereby helping to resolve the difficulties people face. The government is also requested to discuss the position of scientific advice with the abovementioned roles of SCJ taken into account. The concept of "science for society" is considered to require not only scientists providing proven knowledge to society but also sharing the issues involved with the people and thus jointly pursuing solutions through communication while scientists provide the most complete scientific knowledge possible to society.	
September 22, 2011	Report of "Investigative Report on Options with Energy Policies" After taking "Toward selection of future energy policies in Japan – Six scenarios concerning sources of electricity –", which was published on June 24, into consideration important points when selecting energy sources and considerations and discussions of the six scenarios were presented with the aim of enabling the people and policy makers to broadly consider the scenarios and share problems and issues.	Discussion points were sorted and a variety of evidence presented concerning the recommendations in "Toward selection of future energy policies in Japan – Six scenarios concerning sources of electricity –" in this report, and which was then covered in a news report via the SciencePortal of the Japan Science and Technology Agency. In addition, the abovementioned report was not oriented in any single direction, and instead clarified various discussion points and points of view to keep in mind when discussing energy supplies, while also drawing a clear distinction with a discussion of a long-term energy policy that took place within the government.

September 27, 2011	Recommendation of "Protecting children from the Great East Japan Earthquake and the subsequent nuclear power plant accident" The Great East Japan Earthquake and the radiation exposure due to the subsequent Fukushima Daiichi Nuclear Power Plant accident significantly affected not only children in the disaster-stricken areas but indeed throughout Japan, and therefore recommendations were made regarding six concrete measures that are considered necessary in improving their mental and physical health and enabling their sound development.	This was also covered in a news report via the SciencePortal of the Japan Science and Technology Agency. Follow-up studies on their health are already in progress in Fukushima Prefecture, but full-scale cooperation has not been obtained from the prefectural residents.
September 30, 2011	Recommendation of "Reconstruction of a new generation fisheries industry after the Great East Japan Earthquake" In consideration of the disaster-stricken areas being a concentrated fisheries industry area and thus essential in securing food the safety of Japan, and in order to provide long-term guidelines for the creative reconstruction of the fisheries industry as well as the reconstruction of fishing villages as places to live (local communities), recommendations were made on a) the prompt resolution of the nuclear power plant accident and restoration of trust in the safety of marine products, b) restoration/reconstruction from the point of view of securing food safety, c) implementation of comprehensive fisheries industry restoration policies, d) coastal environment preservation and regeneration of fishing grounds, and e) the rebuilding of local communities.	Related measures were reflected in the FY 2011 supplementary budgets, etc. In addition, concrete recommendations, which take the opinions of the disaster-stricken areas into consideration, are also being discussed by the Sub-Committee on the Promotion of Industry and Employment of the Committee on Supporting Reconstruction after the Great East Japan Earthquake during the 22nd Term.
September 30, 2011	Recommendation of "Reconstruction of the disaster-stricken areas of the Great East Japan Earthquake – Reconstruction goals and seven principles –" (2nd recommendation) The "Reconstruction goals and seven principles", which were published on June 8, were taken into consideration in compiling recommendations that were in accordance with the up-to-date situation. Concrete recommendations were made in particular regarding the decontamination of radioactive materials, establishment of the right to life, prompt formulation of reconstruction plans, development of renewable energy sources, maintenance/regeneration of the cultural landscape, and securing financial resources, etc.	Further concrete recommendations are being discussed by the Sub-Committee on Building Disaster-Resilient Communities of the Committee on Supporting Reconstruction after the Great East Japan Earthquake during the 22nd Term.

March 18, 2011	Emergency meeting on "What we can do at present?"
April 25, 2011	Opinions on prior stem cell collection from the emergency nuclear workers at the Fukushima Daiichi Nuclear Power Plant
April 26, 2011	Academic forum on "Toward Reconstruction of the Great East Japan Earthquake"
May 21, 2011	Academic forum on "The Great East Japan Earthquake and the Mass-Media"
June 6, 2011	Open symposium on "Emergency meeting: Toward restoration/reconstruction of damaged natural history collections and museums – What can the academic community do to help"
June 11, 2011	Academic forum on "6.11 Symposium on "Disaster/Reconstruction and Gender Equality""
June 26, 2011	Open symposium on "What young researchers think the future after the earthquake disaster will be – What can the academic community do to do help"
June 26, 2011	Open symposium on "Forum: Effects of the Great East Japan Earthquake on the ecological system and biodiversity – How serious were the effects, what should we be thinking toward reconstruction –"
July 1, 2011	Emergency lecture meeting on "Appropriate fear of radiation"
July 23, 2011	Open symposium on "The Great East Japan Earthquake – Nursing science academy activities required today and in the future –"
August 19, 2011	Open symposium on "Disaster prevention and geographical education – Utilizing the lessons learned from the Great East Japan Earthquake"
September 18, 2011	Open symposium on "Social responsibility of scientists with regard to the nuclear power plant disaster – Science and beyond science"

<Background Information 3> Specialty Committees, etc. related to the Great East Japan Earthquake (As of March 12, 2012)

1. Subcommittees, etc. involved in surveys/deliberations related to the Great East Japan Earthquake and based on the title and survey/deliberation items provided for in the Administrative Policies of Specialty Committees (decided on September 1, 2011 by the 133rd Executive Board of SCJ; final revision on February 20, 2012 by the 146th Executive Board of SCJ)

○ Subcommittee on Identifying the Damage to Structures Resulting from the Great East Japan Earthquake and the Path to Rebuilding Japanese Society, Committee on Sociology/Social Welfare

○ Subcommittee on "Building a Safe Society after the Great East Japan Earthquake and the Law", Committee on Law

○ Joint-Subcommittee on Food Issues with the Great East Japan Earthquake, Committee on Agriculture, Committee on Food Science, and Committee on Health/Human Life Science

○ Subcommittee on IT Media Social Infrastructure and Media Archive on Disasters, Committee on Informatics

○ Subcommittee on Low-Carbon Architecture and City Management, Committee on Civil Engineering/Architecture

○ Subcommittee on Responding to the Great East Japan Earthquake in Mechanical Engineering Field, Committee on Mechanical Engineering

○ Subcommittee on Investigation of Fukushima Daiichi Nuclear Power Plant Accident, Committee on Comprehensive Synthetic Engineering

○ Working Group on Survey of Environmental Pollution Resulting from the Nuclear Power Plant Accident, Subcommittee on Investigation of Fukushima Daiichi Nuclear Power Plant Accident, Committee on Comprehensive Synthetic Engineering

2. In addition to Specialty Committees

○ Subcommittee on Examining Science and Society after the Accident at the Fukushima Nuclear Power Plant, Section I

○ Committee on Examining a Scientific Survey of the Great East Japan Earthquake

3. Subcommittees, etc. involved in surveys/deliberations relating to the Great East Japan Earthquake as provided for in their Proposal for Establishment

○ Subcommittee on Humanities of Co-existence and Dialogue, Committee on Philosophy
○ Subcommittee on Safe Society and Information Technology, Committee on Informatics

4. Subcommittees, etc. whose deliberation items are considered to be related to the Great East Japan Earthquake and as provided for in the Administrative Policies of Specialty Committees

(From the point of view of risk management)
○ Subcommittee on "Scientific Study of Risk", Committee on Business Administration
○ Joint-Subcommittee on Environmental Risk, Committee on Health/Human Life Science and Committee on Ecology and Environmental Science
○ Working Group on Earthquake Disaster Risk Management, Joint-Subcommittee on WFEO, Committee on Comprehensive Synthetic Engineering and Committee on Civil Engineering/Architecture

(From the point of view of earthquake disasters)
○ Subcommittee on Large-scale Earthquake Disasters, Committee on Civil Engineering/Architecture
○ Working Group on Policy Reviews, Subcommittee on Large-scale Earthquake Disasters, Committee on Civil Engineering/Architecture

(From the point of view of using radiation/radioactivity)
○ Joint-Subcommittee on Discussing Issues with Using Radiation and Radioactivity, Committee on Basic Medicine and Committee on Comprehensive Synthetic Engineering
○ Working Group on Discussing Research Reactors, Joint-Subcommittee on Discussing Issues with Using Radiation and Radioactivity, Committee on Basic Medicine and Committee on Comprehensive Synthetic Engineering
○ Subcommittee on Radiation and Clinical Examinations, Committee on Clinical Medicine

(From the point of view of food safety)
○ Joint-Subcommittee on Food Safety, Committee on Agriculture, Committee on Food Science, and Committee on Health/Human Life Science
○ Subcommittee on Fisheries Science, Committee on Food Science
○ Subcommittee on Animal Husbandry, Committee on Food Science

(From the point of view of decontamination)
○ Subcommittee on Soil Science, Committee on Agriculture

○ Committee on Forestry

○ Subcommittee on Conservation and Restoration of Natural Environment, Committee on Ecology and Environmental Science

(From the point of view of child safety)

○ Joint-Subcommittee on Child Rearing Environments, Committee on Psychology/Education, Committee on Clinical Medicine, Committee on Health/Human Life Science, Committee on Ecology and Environmental Science, and Committee on Civil Engineering/Architecture

5. SCJ-organized symposiums related to the Great East Japan Earthquake

2011

Nov. 11 Tohoku District Conference, Public lecture meeting, ”Reconstruction from the Great East Japan Earthquake and science technology”

Nov. 26 Public symposium “Roles and responsibilities of scientists with regard to the Fukushima Daiichi Nuclear Power Plant accident”

Dec. 6 Public symposium “Protecting life and land from large-scale disasters – Message from 24 Societies”; Part 1 “Hazards (seismic motion, Tsunamis, etc.) and scale to be considered in the future”

2012

Jan. 18 Public symposium “Protecting life and land from large-scale disasters – Message from 24 Societies”; Part 2 “How to review the national land policy on the premise of the occurrence of large-scale disasters”

Jan. 22 Public symposium, “Message to Japan and the world – Social Welfare and Sociology after 3.11 Great East Japan Earthquake and the Fukushima Daiichi Nuclear Power Plant accident”

Feb. 11 Academic forum, “Ways to reduce large-scale disasters and realization of a sustainable society based on lessons learned from the Great East Japan Earthquake”

Feb. 29 Public symposium, “Protecting life and land from large-scale disasters – Message from 24 Societies”; Part 3 “How to realize a disaster mitigating society”

Mar. 14 Public symposium, “Soil science of decontamination – from woods, rice fields, and fields to kitchen gardens –”

Mar. 15 Public symposium, “One year after the Great East Japan Earthquake – Toward reconstruction of a sustainable society”

Recommendations

Building Tsunami-proof Communities – Showing How Tohoku Reconstruction Makes Use of Nature –

April 9, 2012

Science Council of Japan

Committee on Supporting Reconstruction
after the Great East Japan Earthquake

Sub-Committee on Building Disaster-Resilient Communities

These recommendations compile and publish the results of deliberations of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan.

Sub-Committee on Building Disaster-Resilient Communities,
Committee on Supporting Reconstruction after the Great East Japan Earthquake

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	Hiroshi Marui	Council Member (Section 1)	Professor, The Graduate School of Humanities and Sociology, University of Tokyo
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Summary

1 Background of the Recommendations

The Great East Japan Earthquake that occurred on March 11, 2011 off the Pacific Ocean of the Tohoku Region was the 4th largest earthquake recorded in human history. It was a very complex disaster because of an accident that occurred at the Fukushima Daiichi (No. 1) Nuclear Power Station of Tokyo Electric Power Co., Inc. (TEPCO) which was triggered by a total loss of power after seven Tsunamis extending from 30 minutes to 6 hours after the earthquake occurred, thereby resulting in serious amounts of damage.

The human damage and property damage resulting from the Tsunami disaster were both unfathomable, while the disaster also deprived the disaster victims/disaster-stricken areas of both their residences and places to work. Despite having the severe psychological trauma and had their lives inconvenienced by having to live at temporary housing the victims are still proceeding with restoration/reconstruction activities in thereby realizing a permanently safe society. When reconstructed they must be “disaster-resilient” in a multi-faceted sense. In addition, people cannot make a living unless industries that can sustain the disaster-stricken areas steadily take root, with job opportunities then being ensured by those industries. Furthermore, and with regard to the nuclear power plant accident, completion of its final disposition may require a time span of more than one generation. Many people have been forced to evacuate for an extended period of time, thus establishing a long-term health management system for those who fear having been exposed and decontamination measures in the areas where radioactive materials were deposited are posed as imminent issues.

These various reconstruction challenges thus require the specific provision of desperately needed knowledge to the victims through mobilization in the various fields of science, which is precisely the duty of Science Council of Japan (SCJ). The 21st Term SCJ made the commitment soon after the occurrence of the great earthquake by setting up the Great East Japan Earthquake Task Force, issuing urgent recommendations on seven consecutive occasions, and so on. At the inception of the 22nd Term SCJ in October 2011 the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to succeed the Great East Japan Earthquake Task Force. On November 16, the Sub-Committee on Building Disaster-Resilient Communities, the Sub-Committee on the Promotion of Industry and Employment, and the Sub-Committee on Counter-measures for Radiation were set up under the said Committee.

The Sub-Committee on Building Disaster-Resilient Communities recommends building communities wherein the effects on residents and local communities, etc. can be reduced to the

fullest extent possible even with the occurrence of natural disasters of the same or a greater level as this one. In addition, the Sub-Committee aimed to make the recommendations helpful to areas other than those stricken by this disaster in thus taking the necessary measures against disasters that are predicted to occur in the near future.

2 Present situation and issues

More than a year has passed since the Great East Japan Earthquake, with efforts toward reconstruction fully progressing in the disaster-stricken areas. The disaster-stricken municipalities extend over 11 prefectures and a total of 222 municipalities nationwide (districts subject to being special reconstruction districts). Reconstruction plans have already been formulated for the approximately 40 municipalities along the Pacific coast of East Japan that were particularly damaged. The municipalities selected 40 appropriate businesses (core businesses) that could be utilized in the reconstruction efforts according to the situation with the disasters and reconstruction plans, and implemented them along with additional businesses that would promote their effectiveness. Efforts to build safer communities have therefore been commenced upon. However, the actual situation with the reconstruction is that it is still at the stage of desk work involving the accuracy of the plans being improved and agreements reached, and with a large number of issues still remaining to be resolved. These recommendations were compiled after discussing the policies that should be enhanced for the moment and from the following seven points of view.

- Creation of disaster-resilient national land
- Building sustainable reconstructed communities
- Measures toward greater utilization of information
- Ideal medical care and nursing
- Mental health care
- Preventive measures to mitigate disasters resulting from potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis
- Organization and dissemination of disaster records

3 Content of the Recommendations

(1) Creation of disaster-resilient national land

The following recommendations are being made as measures to be implemented over the short-term, and with the re-organization of national land infrastructures with improved

resilience to disasters and the necessity of distribution and backing up of the capital functions and private central management functions that are concentrated in Tokyo all taken into account.

[1] Creation of a Disaster Mitigation Agency to succeed the Reconstruction Agency as a permanent agency

[2] National Land Use Plan for withdrawing from disaster-hazard areas and corresponding guidance measures

[3] National land management that respects the recuperative power of nature

[4] Structural reinforcement of buildings/facilities and enhancement of disaster evacuation facilities

[5] Strengthening of the software side of countermeasures, including evacuation drills, establishment of fire brigades, and emergency earthquake alarms, etc.

[6] Backing up of the capital/key functions in thereby ensuring continued government functions in the case of disasters (BCP)

(2) Building sustainable reconstructed communities

The disaster-stricken areas have social vulnerabilities such as declining/aging populations, etc. At present the “Basic Reconstruction Plan” formulated by each municipality is based on the idea of maintaining the status quo, despite this actuality having been recognized, and thus involves a variety of issues. The following recommendations are therefore being made.

[1] Formulation of action plans for sustainable reconstruction from a long-term broad perspective

[2] Establishment of community-based “reconstructed community building organizations”

[3] Planning of regional reconstruction strategies that center around public-benefit facilities, including day-care centers, kindergartens, schools, and welfare facilities for the elderly, etc.

[4] Coordination of coastal area land use from a broad-based perspective of the over wider area with a focus on natural land use

[5] Re-establishment of “Natural Symbiosis Cities based on the Watershed Landscape” that span coastal areas through to communities, country side forests, and remote mountains

(3) Measures toward greater utilization of information

The following recommendations are being made from the perspective of information and communication and broadcasting with respect to a more disaster-resilient society.

[1] Securing means of conveying information on preparing for disasters and establishing judgment/action guidelines

[2] Promotion of information collection/accumulation and subsequent integration of data

[3] Promotion of measures that ensure the safe keeping of social information assets, including governmental/medical information, etc.

[4] Promotion of training/placement of information professionals

(4) Ideal medical care/nursing/welfare in the disaster-stricken areas

The following recommendations are being made in consideration of not only the importance of how medical care/nursing and social welfare is handled in the case of disasters but also the fact that disasters can seriously affect the vulnerable in particular.

[1] Formation of health, medical care, and welfare organization networks in regions that can provide flexible responses when urgently needed

[2] Establishment of support measures for groups that are vulnerable to disasters

[3] Preparation and enrichment of mental health care

(5) Establishment of victim support system and personnel training

The following recommendations are being made to promote care for the earthquake disaster victims in a comprehensive manner.

[1] Preparation of needs maps concerning the relief of victims and information gathering

[2] Building of nation-wide disaster support networks by municipalities, private organizations, and academic societies, etc.

[3] Training of disaster-care professionals who can take the initiative in providing disaster support and promoting relevant research

(6) Preventive measures to mitigate disasters resulting from the potential Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis

The following recommendations are being made with the aim of rational use of national land that takes large-scale disaster risks such as earthquakes and Tsunamis, etc. into account.

[1] Formation of disaster risk conscious national land structures

[2] Reinforcement of disaster mitigation measures with regard to the software side

[3] Promotion of research on disasters

(7) Organization and dissemination of disaster records

The following recommendations are being made to restore memories of the lost past, record the disaster-stricken “present”, and create/recode the “future” toward reconstruction.

[1] Promotion of creation of an “archive” concerning the Great East Japan Earthquake

(8) Role of government publicity and media organizations

[1] Appropriate news coverage in response to the temporal stages of disasters

[2] Cool-headed news reports and comments based on the sharing of accurate information and sources

Table of contents

1 Introduction

A year has passed since the Great East Japan Earthquake of March 11, 2011. However, the removal of debris has been slow and the situation not very improved upon to date. As we face the reality that the restoration, which is a prerequisite for reconstruction/regeneration, itself is not progressing as expected we are reminded again of how serious and complicated the unprecedented damage caused by this great earthquake actually was.

Although a full scale comparative study remains a future issue some forms of restoration networks, with the large city of Osaka having played a core role, are considered to have functioned to a significant extent in the case of the Great Hanshin-Awaji Earthquake. In contrast to this, Sendai City, the largest city in the Tohoku Region, was also greatly damaged in the Great East Japan Earthquake. Furthermore, the disaster-stricken areas involve very wide areas and individual problems exist with the situation with damage, etc. in the respective regions, thus making the establishment of restoration/regeneration networks very difficult. In addition, the difference in population dynamics is also significant. The population was rising in both Japan and Hyogo Prefecture/Kobe City at the time of the Great Hanshin-Awaji Earthquake. The population of Kobe City declined by approximately 100,000 persons immediately after the earthquake, but then turned to a rising trend around October the same year, and subsequently returned to the same level as before the earthquake (1,520,000 persons) in 2004 (Kobe city statistics). In contrast to this, and with respect to the various disaster-stricken areas in the Tohoku Region, the population of Iwate/Fukushima Prefectures was already declining during the latter 1990s, and with the total population of those prefectures and Miyagi Prefecture having declined by 2.2% in the latter 2000s (the population of Sendai City has been on a rising trend after the population census).

The number of residents that will have to leave their hometowns to find business or employment opportunities is expected to further increase. In that sense not only simply restoring but also formulating drastic community building plans that provide sound future visions and take the particularities of the respective regions into account is indeed an urgent issue.

The great earthquake has led to a drastic review being required of the conventional ways of science and technology in Japan, or the way politics, economics, and administrations are tied to the advancement of science and technology. Conventional science and technology has basically lacked a sense of respect for the blessings and disasters of nature by simply regarding nature to be subject to human whims.

In ancient Greece human beings were regarded as part of the microcosm in a macrocosm, and their relationship was considered to be integrated. The word “technology” derives from

“techne”, which means human beings attempting to imitate the laws of nature. In addition, in ancient India a reciprocal relationship was assumed to exist between human beings and the greatness of nature (gods maintaining its order), with the rituals of making offerings to the gods being regarded to be a form of technology that priests thoroughly developed to obtain the blessings of nature. Modern Western scientific thought and the industrial revolution, however, have rejected the idea of human beings and nature needing to be an integral part of each other.

The word “sustainability” is growing more and more important as something that urges drastic reconsideration of how technology and human society interact with each other. The phrase “sustainable development” first appeared on the center stage of international society at an Earth Summit held in Rio de Janeiro in 1992. The word “sustainable” and its noun form “sustainability”, in particular, have been in frequent use since then.

During the course of human history the striving to maintain past traditions/cultures has consistently battled with the striving to break with past traditions in thereby creating a new world. Why has sustainability become such a current issue? Modern civilizations have long faced the oncoming crises of population explosions, energy problems, and global environmental destruction that have resulted from modern Western scientific thought and the industrial revolution. Emphasis on the pursuit of material wealth has consistently been placed on innovative knowledge and technology developments rather than succeeding the past, internal self-examinations, and mental cultivation. The fact that we now face a grave situation that requires braking or a course correction in some sense is considered to have been condensed into the issue of sustainability.

Scientific knowledge and technological innovations have taken place through repeated subdivisions and advances, but what is now required is for the barriers of expertise to be crossed in thereby tracking the whereabouts of the crises modern civilization faces and to then aim for sound development through clarifying the divisions of roles with consideration given to the characteristics and limitations of the respective fields.

The above points of view were taken into account when compiling these recommendations on the creation of national land, community building, information infrastructures, medical care and nursing, children being especially vulnerable to disasters, preventive disaster mitigation measures, and the creation and succession of disaster records with regard to the ideal ways of “building disaster-resilient communities” with reconstruction after the Great East Japan Earthquake.

2 The Great East Japan Earthquake and restoration/reconstruction efforts based on the idea of disaster mitigation

More than a year has passed since the Great East Japan Earthquake and reconstruction efforts are now fully in progress in the disaster-stricken areas. Reconstruction plans had already been formulated by December 2011 for the major disaster-stricken prefectures of Iwate, Miyagi, and Fukushima of the disaster-stricken areas. The disaster-stricken municipalities extend over 11 prefectures and a total of 222 municipalities nationwide (districts subject to being special reconstruction districts). Reconstruction plans have already been formulated for the approximately 40 municipalities along the Pacific coast of East Japan that were particularly damaged.

With regard to community building the municipalities selected the most appropriate of 40 businesses (core businesses) that could be utilized in the reconstruction efforts according to the situation with the disasters and reconstruction plans, and implemented them along with additional businesses that would promote their effectiveness. Efforts to build safer communities have therefore been commenced upon <1>.

Reconstruction from this disaster, however, involves particular difficulties when compared to previous earthquake disasters. Restoring the Tsunami-stricken areas, in particular, to their original state does not eliminate the risk of them being struck by further Tsunamis again in the future, and thus the issue involves how to reconstruct them while also securing their future safety. With the disaster-stricken areas, therefore, efforts are being made to reach agreements with the areas concerned as early as possible in thereby proceeding to deal with businesses in promoting reconstruction based on the “idea of disaster mitigation”, as described below.

The idea of “disaster mitigation” emphasized in the course of reconstruction from the Great East Japan Earthquake is being based on the empirical knowledge that the scale of low-frequency large-scale disasters cannot be predicted in advance while the damage resulting from them also cannot be prevented <2>. For use in the high-frequency ordinary disasters “disaster prevention” facilities shall be established, and residential spaces for people located with their utmost safety taken into account. And with low-frequency large-scale disasters people’s safety shall be secured by enabling them to “escape” through securing multi-stage escape routes and evacuation areas in advance, while industrial facilities, etc. shall be established in lowlands with their favorable conditions for being major traffic points and with safety supplemented via use of Tsunami evacuation facilities, etc. These measures constitute the major framework of this idea. Reconstruction of the respective areas needs to be promoted in a concrete manner and be based on the idea that disaster mitigation is appropriate for use in reconstructing regions at risk of the recurrence of large-scale Tsunamis.

At the same time, however, the necessity for medium- to long-term “preventive disaster mitigation” must not be overlooked. The economic and social development of Japan in the 20th century involved scientific and technological progress being used to leverage its economic strength with industries and with the population being concentrated along the Pacific belt zone. However, the rate of food self-sufficiency in Japan is at the lowest level of major industrial countries <3>, and with the rate of timber self-sufficiency also remaining at a low level <4>. In many regions of Japan people lived a life in a good balance with nature for a long time, but which was, however, destroyed by the economic and social development that took place in the 20th century. The Pacific belt zone, however, is also a region in which large-scale earthquakes or Tsunamis have been predicted to occur in the near future. Correcting that excessive concentration and optimizing and allowing for a more moderate distribution and eliminating any redundancy in nation building is thus essential in medium- to long-term disaster mitigation, and which is referred to as “preventive disaster mitigation” in these recommendations.

In areas that suffered radiation contamination due to the Fukushima Daiichi Nuclear Power Plant accident, however, sufficient scientific knowledge that integrates past experience on the effects of radiation on the human body or livestock/agricultural products, etc. should be conveyed to the disaster victims, and then measures that sufficiently take into consideration the wishes of those victims then taken. This should of course result in the government and TEPCO responding to the people that have been forced to rebuild their lives in different areas different in a responsible manner.

3 Issues with building disaster-resilient communities

(1) Issues with creating disaster-resilient national land

The forces of nature are referred to as “natural hazards", and cities, communities, civil engineering structures, and buildings constructed by humans collectively referred to as a “built environment”. People proceed with economic activities and live in this environment, and a “disaster” occurs when the forces of nature strike human-made objects while the objects are not sufficiently resilient to. If they are sufficiently resilient enough when compared to the forces of nature concerned disasters typically do not occur. The creation of “communities resilient to the forces of nature” and thus preventing large disasters from occurring to the furthest extent possible must therefore be the overall goal with the national land and reconstruction efforts.

However, the level of the forces of nature also changes due to climatic changes, and hence disasters cannot completely be eliminated with respect to man-made objects. This was one of the most important lessons we learned from the Great East Japan Earthquake. This then makes the creation of disaster mitigation national land that can protect human lives and keep property damage to a minimum level, even when a disaster odes occur, necessary. As we are currently approaching being a society with a declining population, in particular, the issues must include reducing the use of areas that are at risk of significant damage in the case of disasters, concentrating the use of national land in safer areas, and implementing national land management that makes full use of the recuperative power of nature. Past disaster experience has clarified that the occurrence of disasters not only results in the loss of many human lives but also costs a vast amount for the subsequent restoration/reconstruction. The fact that the cost of disaster prevention measures taken in advance is significantly less therefore should be kept in mind.

(2) Issues with safe and secure land use

Safe and secure disaster-resilient land use will be the basis of the reconstruction plans. The methods of and issues with the creation of reconstructed communities will significantly vary due to the differences in the topographical conditions of the disaster-stricken areas concerned. In addition, the problem of a declining/aging population had already manifested itself in these areas before the earthquake disaster, and with it being a major issue with the feasibility of building sustainable communities there.

[1] Issues with rias coast areas

The Sanriku rias coast areas have experienced the Meiji Sanriku Earthquake Tsunami

(1896), the Showa Sanriku Earthquake Tsunami (1933), and Chile Earthquake (1960), along with four large-scale Tsunamis including the last one, over an approximately 100 year time span. The creation of disaster mitigation conscious multi-layer protection based communities is therefore being emphasized in the reconstruction plans. Concrete measures include the development of disaster prevention facilities such as breakwaters, seawalls, and floodgates, etc., the relocation of existing city areas to higher ground, the elevation and heightening of buildings, and the development of escape routes. The way these measures will be combined will differ depending on the topography, level of damage, and the size of the villages/city areas, but disaster prevention facilities must be developed to a level that ensures protection from the relatively frequent Tsunamis. The situation with land use policies, which utilize Tsunami simulations as reference material, is such that 1) residential land use is prohibited but industrial land use allowed in areas with significant flood height level predictions in the case of a large-scale Tsunami of the size of the Great East Japan Earthquake, although at low-frequency, 2) residential land use is also allowed in areas where no inundations are predicted, and 3) some municipalities allow residential land use after establishing certain regulations while others do not in areas between these extremes.

Reconstruction is making the transition from the planning stage to the concrete business planning stage, with issues at the present stage being as follows.

First, even the Tsunamis occurring at relatively high-frequency are predicted to have significant heights along the Sanriku coast, thus development of prevention facilities such as breakwaters, seawalls, and floodgates, etc. of a significant scale are being planned to cope with the situation. Design issues do exist, however, with how to ensure these large-scale structures remain in harmony with the scenic coastal views, along with maintenance/management issues, after their development takes place.

Secondly, in many cases the disaster victim households wish to relocate their residences to higher ground. This trend is particularly prevalent in the large-scale city areas that were seriously damaged. However, quite a few areas cannot secure sufficient candidate high grounds for relocation to due to their topography. With these areas, therefore, the reconstruction needs to take place on elevated city areas after gaining trust in and reaching an agreement on the safety of the elevated city areas.

Thirdly, there are many relatively small-scale villages, mainly fishing ports, where a declining/aging population can, without exception, be expected to further progress in the future. Collective relocations are currently available to five or more households, and thus many very small-scale relocations to higher ground can take place in a distributed manner,

but which may possibly result in isolation or villages being lost to the relocated areas. Consolidation of small-scale collective relocations therefore remains an issue.

Fourthly, the land use plans for flood prone areas in which industrial land use is being mainly planned require the development of coast protection facilities such as seawalls, etc. as a precondition in thereby ensuring their safety, but from the point of view of industrial reconstruction the situation does not allow for any delay in the completion of those facilities. Construction of temporary facilities has already been commenced upon and the temporary facilities are expected to lead to permanent reconstruction of city areas in a seamless manner and with a certain level of safety being secured.

[2] Issues with alluvial plain areas

In contrast to the above high land areas are not available to escape to on the alluvial plain that extends from the central to southern parts of Miyagi Prefecture. Records only exist for the Jogan-Sanriku Tsunami (869) and Keicho-Sanriku Tsunami (1611), with no large-scale Tsunamis having struck this area in modern history. No reconstruction plans have previously been formulated, with this therefore being the first time. Various ideas are being incorporated into the plans depending on the municipality concerned. The issues involved in them are as follows.

First, land use for disaster mitigation will depend on the location of second-line levees[3] constructed by elevating existing roads. The location and structure of the second-line levees were not necessarily selected from a logical point of view with respect to Tsunami disaster protection, and thus no firm grounds exist for their effectiveness at present.

Secondly, the ground may sink in many areas that are no longer available for residential use because of the second-line levees, and therefore the situation makes appropriate land use difficult, excluding, however, as coastal Tsunami protection forests.

Thirdly, the areas subject to being the destination of collective relocations will be multiply protected by seawalls, Tsunami protection forests, and second-line levees. However, the concrete selection of areas for collective relocations requires that the complicated situation with land-ownership be resolved, and also the difficulty with obtaining appropriate land.

Fourthly, all the municipalities will propose a plan on using the whole coast line for

[3] Second levees constructed behind (inside) the levees. Also referred to as reserve levees or secondary levees. Second-line levees have the role of preventing the flood inundation from expanding and retaining the damage to a minimum level in cases where the first levees (main levees) fail.

disaster protection, nature conservation, and recreation, but their appropriate security and placement across wide areas cannot be guaranteed due to a lack of wide-area plans.

Fifthly, a large number of the historic sites exist in countryside forests, which are located between hilly areas and alluvial plain areas, with policies having been set to mostly preserve their present status. Artificial forests and copses in these areas could be a center for biomass energy production, but the issue remains on how to connect it with measures to supply renewable energy sources.

(3) Issues with securing human resources to engage in reconstruction

The main entities that will engage in the reconstruction are municipalities. However, the human resources of municipalities required in that reconstruction are lacking.

As described above almost all the disaster-stricken municipalities have completed the formulation of reconstruction plans, and thus the reconstruction is proceeding to the final stage of planning various businesses that will then realize the content of those plans. However, the number of businesses involved is enormous. When limited to the hardware side of infrastructure development the number of households that are planning to move to higher ground or inland areas, which are to be the main locations for residential reconstruction, is estimated to be approximately at least 22,000 across approximately 250 areas in the three prefectures of Iwate, Miyagi, and Fukushima <5>. Use as disaster prevention collective relocation promotion projects can be assumed with most of them. Other relevant projects include land readjustment projects, city area elevation projects, road development projects, and park development projects. In addition, the reconstruction of public and welfare facilities, including disaster-stricken schools, hospitals, public halls, gymnasiums, and municipal office buildings, etc., is also needed. Some projects, such as building seawalls, are mainly being implemented by prefectures, while other projects, such as railroad building, are mainly being implemented by the private sector.

Residential reconstruction projects will require far more careful responses in reaching agreements with the land owners and residents than in the past. In some locations where agreements have already been reached some of the disaster victims were left behind, and thus at the business stage responding to those residents is also considered to be necessary. Agreements being reached are based on mutual trust, thus making the existence of municipal officials who can make adjustments over the long-term essential.

Other infrastructure development projects will require officials with specialized knowledge in placing orders for design/construction and holding discussions between the relevant administrative entities, etc.

In addition to infrastructure development projects officials with specialized knowledge will also be needed with respect to the software side of business areas, including living support at temporary housing, welfare and education, and industrial reconstruction, etc., in thereby the reconstruction makes progress. Furthermore, recommendations and issues from the point of view of the people that are rebuilding their lives need to be arranged, which will require the establishment of a concrete system that enables the people concerned to participate in new community building from the conceptual stage.

The administrative scale of the disaster-stricken municipalities, excluding designated cities and core cities, is rather small, and therefore officials with that know-how are lacking in number. In addition, municipal halls were damaged and many officials were also Tsunami victims in some areas.

In order to that the reconstruction proceeds smoothly in the future the number of municipal officials and experts that support these officials will have to be increased. An increased number of dispatch officials from the government and prefectures and the continued long-term dispatch of officials in municipalities where a horizontal support relationship between municipalities is established can be expected to occur. With regard to the dispatch of experts to support officials, further support from the Urban Renaissance Agency and an increased number of dispatch experts from the private sector, mainly private consultants, etc. that have established a mutually trustful relationship with the administrations within a year of the occurrence of the disaster, can also be expected.

(4) Issues with information utilization in building disaster-resilient communities

In addition to public broadcast media such as television and radio, etc. and broadcasts within the jurisdiction of municipalities, etc., the establishment of a system for rapidly disseminating accurate disaster information to individuals through utilization of cellular phones and the internet should be discussed. Emergency earthquake alarms and Tsunami warnings, etc. are currently disseminated through cellular phones. In addition to that, however, the rapid transmission of necessary information in cases requiring evacuation should also be discussed. In addition, resolving communication related technical issues, including securing the reliability of emergency communications in the case of disasters, stabilization of contact means through telephones and cellular phones, etc., is urgently needed. Avoiding congestion with communications is a technical issue but is also caused in part by the activities of individuals using nonessential and non-urgent communications, and thus better social understanding of information technologies is required.

Information on what occurred is invaluable in the case of disasters. The collection and

accumulation of accurate information is also essential in the reconstruction of the disaster-stricken areas. Furthermore, information at the time of a disaster can provide effective guidelines for measures taken in the future, thus making continued collection and accumulation of information very important to society. Information collection from voluntary evacuees of the Great East Japan Earthquake needs to be carried out in a systematic manner. It can be considered essential basic data for the reconstruction, thus making the integration of the various information and management of it an urgent matter. The radiation doses due to the Fukushima Daiichi Nuclear Power Plant accident is important data for future disaster prevention measures, and thus should be permanently stored and made available to experts for analysis.

In addition, administrative agencies in the disaster-stricken areas of the Great East Japan Earthquake have faced difficulty in verifying the safety of and relieving residents, searching for missing people, securing evacuation areas, and carrying out various administrative procedures, etc. due to the loss of administrative documents. Furthermore, paper media medical records were damaged at medical institutions, thereby significantly impacting medical services for the disaster victims. Establishment of a cooperative framework for medical/nursing information and the introduction of wide area medical cooperation via telemedicine, etc., which is a system used to accumulate health information/dispensing information, etc., and electronic medical records are needed.

(5) Issues with ideal medical care/nursing/welfare in the disaster-stricken areas

With respect to what type of and how medical and welfare professionals should provide help in preparing for disasters, protecting human lives, and supporting their physical/mental health and life, the following common factors that can lead to effective support have been identified from the problems that actually arose at the disaster sites and the achievements of disaster support activities by experts to date.

First, disaster support proceeds more smoothly via consistent daily relationships.

Secondly, supporters are expected to be able identify the actual situation, that are chancing every moment while information is limited, identify usable local resources, and exhibit their coordinating functions.

Thirdly, in addition to cooperation between medical and welfare experts a cooperative system for use between experts and the general population also needs to be established.

Fourthly, effective long-term support by experts in the disaster-stricken areas cannot be ensured without the support of external experts.

In addition, issues arising from the point of view of the support systems are as follows.

First, efforts have been made to provide support to the elderly from an early stage, but support for infants is lagging. Providing care for children that lost their parents and families is thus an urgent matter. A support system made up of mental health care expert teams and consisting of infant education counselors, clinical developmental psychologists, clinical psychologists, and school nurses, etc. will need to be established.

Secondly, volunteer support must fit the situation in the disaster-stricken area and the needs of the disaster victims. Continuous effective long-term support requires the relationship between the roles of the disaster victims, communities, administrations, and volunteers to be regularly reviewed according to the temporal stage of the disaster.

Thirdly, the situation and needs of both the victims at evacuation shelters and those remaining in their residences must be identified before formulating careful reconstruction support measures.

(6) Issues with medium- to long-term support for child victims

When considering the victims' lives a year after the earthquake disaster, the secondary damage resulting from emergency evacuations, for example mothers and infants being separated from their fathers and husbands and living in the neighboring prefectures or Tokyo, should not be overlooked. The stress due to family separation is very high with not only adults but also infants. Because of the situation in that children were unable to play outside with their friends nor play with sand adults grew very anxious, the day care staff engaged in day care and education grew stressed out due to overwork, the development of children was delayed, and the rate of the development of their height and weight declined to 1/4 of the year prior to the earthquake disaster (report made by pediatric hospital in Fukushima). Children were considered to be suffering a type of "Psycho-Social Dwarfism[4]" because of the stress they were under.

With junior and senior high school students that were separated from their families and friends and transferred to schools in urban areas the cases of cases of their non-attendance at school increased despite a learning environment being secured due to a sense of isolation and differences in school cultures, interpersonal relationships, and communication styles. Some adults committed suicide due to loneliness after losing their children/spouses <6>. It should be kept in mind that people cannot live alone and must be protected by their families and community ties.

[4] An extreme delay in development when compared to the average development at a specific age due to psychological or social reasons, including 1) smaller body size, 2) language or intellectual delays, or 3) juvenile form (looking much younger).

An important theme is therefore helping infants and children, including junior/senior high school students, regain the situation where they can live with their families and settle down to learning and building a future. Measures that combine securing residences for families to live in and employment for the parents need to be taken in thereby helping them to regain a family life. In doing so efforts should be made to avoid separating family members and allow them live within the communities. Securing healthy lifestyles for the children, who will be the leaders of the communities in the future, and enabling them to play and study at school without any undue worry is also expected.

In addition, at present, or one year after the earthquake disaster, not only children but also adults are increasingly being tormented by exhaustion, helplessness, and desolation, feelings they did not notice in their life after their nerves had been so strained immediately after the earthquake disaster. Because of these circumstances ties between people that are created in their daily lives, at work, and in their communities need to be the basis of their mental support. The role of third parties, including NPO support groups and clinical psychologists, etc., in supplementing the abovementioned ties is also becoming increasingly important. “Life Line” has accomplished certain achievements via its accumulated know-how through telephone mental health counseling. In addition to dispatching supporters to the disaster-stricken areas mental health care can also be provided from outside through utilizing telephones, etc., and hence applying this to disaster-stricken area support is worth discussing. With regard to the mental health care of the disaster victims the fact that personnel closely listening to the feelings of individuals led to the healing of the disaster victims was pointed out from experience gained after the Great Hanshin-Awaji Earthquake. The importance of engaging in the relief activity of closely listening to the feelings of the disaster victims still remains after the current disaster. However, because this disaster was of an unimaginable scale securing a sufficient number of volunteers to engage in this activity has been difficult. In addition, and due to the lack of a system to use in gathering information on the people, areas, and evacuation shelters requiring support, the worry is that the people, areas, and evacuation shelters actually in need have not been provided with support. “Life Line” has accomplished certain achievements via its accumulated know-how through telephone mental health counseling, and thus these activities can be expected to be further disseminated.

This earthquake disaster caused ASD (Acute Stress Disorder) not only in the disaster-stricken areas but also in children and families in other areas nationwide because of mass media reports. Special TV programs that validate the course of reconstruction a year after 3.11 are therefore being broadcast. There have also been cases of PTSD

(Post-Traumatic Stress Disorder) caused by video clips used during TV program announcements <7>. In the Tsunami-stricken areas, in particular, PTSD from the experience of watching their families and friends being swallowed by the water while still alive has been unprecedentedly severe. For this reason quite a few people currently have relapsed PTSD, a year after the earthquake disaster. Improving that symptom will require the establishment of an everyday routine life rhythm, and thus for children that are still infants establishing a relationships with certain adults (fosterers) should be given higher priority than sending a large number of volunteers.

(7) Issues with preventive disaster mitigation measures (to cope with Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis)

The 20th Century involved not only significant scientific and technological progress but also constant wars that were meaningless and tragic to humans. Humans landed on the moon, built mega-cities, developed high-speed computers, and acquired nuclear energy. Countries around the world gained wealth and commerce prospered, with the entire earth now acting in unison. In contrast to this, however, people's activities that were in balance with nature, which was cultivated throughout our long history in not only many countries in the world but also many regions in Japan, were destroyed.

Earthquakes such as the Showa Tonankai Earthquake and Showa Nankai Earthquake, etc. caused great damage to the Japanese Islands around the end of the Pacific War, but for 60 years after these events, and until March 11, 2011, Japan was considered to have been lucky and without having suffered any significant earthquake damage. People may have become rather optimistic during this period. People are being busy making ends meet and living with worries such as their parents' health, their future, and the education of their children, etc. Under such circumstances coping in advance with large-scale earthquakes/Tsunamis, which only actually tend to occur every 100 to several 100 years and really quite rarely, in thereby endeavoring to prevent/mitigate disasters is very difficult. This applies not only to individuals but also to enterprises, municipalities, the government, and other organizations.

For example, there is a possibility that a large-scale earthquake will occur directly beneath Tokyo, with the total amount of subsequent damage being estimated to cost around 112 trillion yen. However, this does not include damage to skyscrapers or the Shinkansen system, and when they are included the amount is said to be 1.5 times the national budget. Even with this having been announced no significant changes seem to have occurred in people's daily activities. The estimated total amount of damage from Tokai/Tonankai/Nankai

Trough earthquakes and Tsunamis has not been published, but unfortunately significant damage resulting in the near future can easily be predicted. As a preventive measure to mitigate disasters correcting excessive concentrations of and optimizing and allowing for a more moderate distribution and redundancy in our nation building is required.

(8) Issues with organization and dissemination of disaster records

Amassing all available memories, records, cases, and knowledge concerning the Great East Japan Earthquake for use in creating a Great East Japan Earthquake archive that can then be shared with both domestic/overseas people and future generations is essential. The memories, records, cases, and knowledge on disasters, from historical disasters through to the Great East Japan Earthquake, collected from various points of views, needs to be used in cross-sectional research mainly in the disaster-stricken areas of this earthquake disaster in thereby promoting clarification of the actual situation with the Great East Japan Earthquake and provision of knowledge that can then be used to contribute to the reconstruction. These efforts are expected to facilitate developments in the field of study of countermeasures against and management of low-frequency large-scale disasters and be utilized in measures for the Tokai/Tonankai/Nankai Trough earthquakes, whose occurrence is of future concern.

4 Recommendations with building disaster-resilient communities

(1) Creation of disaster-resilient national land

The point of view of making use of the lessons learned in the Great East Japan Earthquake in creating disaster-resilient national land has also been addressed in the recommendations of “Towards Reconstruction - Hope beyond the Disaster” made by the Reconstruction Design Council in response to the Great East Japan Earthquake (June 2011) <2>, “Recommendations on Creating Disaster-Resilient National Land” made by the National Land Development Council (July 2011) <8>, and “Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake” made by the government (July 2011) <9>, with the necessity of redeveloping the national land infrastructure in thus making it more resilient to disasters, etc. already having been pointed out. In addition, despite concrete measures having been commenced upon with some facilities, including the strengthening of disaster prevention measures through the reinforcement of seawalls at nuclear power plants nationwide, etc., the people’s trust in safety having been secured is far from being adequate.

The vulnerability of the capital functions and private central management functions that are concentrated in Tokyo as well as the necessity of redistributing those functions and backing them up have also been pointed out, and measures already implemented in thereby covering part of those points. With regard to Tsunami disasters the “Act on Establishment of Regions Resistant to Tsunamis” (Act No. 123 of December 14, 2011) was enacted in 2011 to allow regions at risk of Tsunami disasters to take preventive measures that include relocation of buildings to higher ground. However, many topics are still at the stage of being discussed or recommendations made, thus indicating the safety of national land has yet to have been secured. The following recommendations are therefore being made as measures to be taken over the short-term.

[1] Creation of a Disaster Mitigation Agency

Municipalities and managers of major facilities shall estimate the disasters/damage that could be caused by large-scale storms and floods, including river floods, Tsunamis, high tides, and mudslides, etc., and proceed with focused disaster mitigation measures after having thoroughly overviewed them. At the stage when the completion of the reconstruction from the Great East Japan Earthquake is in sight the Reconstruction Agency shall be reorganized into a Disaster Mitigation Agency and function as a permanent control center for consistent disaster/damage estimations, disaster mitigation measures, and disaster reconstruction after a disaster.

[2] National Land Use Plan for withdrawing from disaster-hazard areas and corresponding guidance measures

In regions at significant risk, as identified through estimating the disaster/damage, rules for limiting residential land use or taking safety measures with buildings shall be established. As a core measure that ensures safer community building the relocation of schools/hospitals/welfare facilities for the elderly, etc. to safer locations shall be obligated in thus centering cities/villages in safe locations.

[3] Respect for the recuperative power of nature

With national land management, and in consideration of the majority of domestic areas being based on natural land use, various national activities in maintaining natural areas shall be encouraged in thereby gaining greater understanding of natural processes and attaching greater importance to its ideal use with respect for the recuperative power of nature.

[4] Structural reinforcement of buildings/facilities

- Civil engineering structures, including breakwaters, seawalls, levees, dams, railroads, roads, and port facilities, etc., shall be reinforced to the necessary level. The earthquake-proof safety of large-scale factory facilities, including petroleum plants and power generation facilities, etc., shall be improved upon.
- The earthquake resistance of existing civil engineering structures and buildings with inadequate earthquake resistance shall be improved upon in thereby preventing them from collapsing.
- Efforts shall be made to improve the fire resistance of built-up wooden house areas.
- The earthquake resistance of buildings shall be further improved in large cities with concentrated populations in increasing the number of buildings in which people can seek refuge in a disaster.

[5] Strengthening of the software side of countermeasures

Efforts shall be made in the software side of countermeasures, including evacuation drills, establishment of fire brigades, and emergency earthquake alarms, etc.

[6] Backing up of the capital/key functions

The functions of the central management functions of the government and economic activities shall be backed up in areas that are not at risk of simultaneous disasters. Efforts

shall be made to transferring the capital functions from Tokyo, thereby reducing the concentration in Tokyo, and improving the safety of national land. Government facilities, enterprise activities, and important information shall have a reasonable level of redundancy, thereby distributing the risk of them being lost.

(2) Building sustainable reconstructed communities

The disaster-stricken areas are socially vulnerable, such as having declining/aging populations, etc. At present the “Basic Reconstruction Plan” formulated by each municipality is being based on the idea of maintaining the status quo, although with this actuality being recognized, and thus has given rise to a number of issues, including the individual relocation of many villages to higher ground, elevation of low laying areas, and development of second-line levees, etc. The following recommendations are therefore being made.

[1] Formulation of action plans for sustainable reconstruction

A third party organization consisting of community building experts, etc. shall be promptly established to inspect the “Basic Reconstruction Plan” of municipalities from a long-term, broad-based point of view, and create concrete action plans toward “sustainable reconstruction”.

[2] Establishment of community-based “reconstructed community building organizations”

The creation of residential and employment environments is important in rapidly reconstructing the disaster victims’ daily lives. These are mutually related and cannot be discussed separately. It is even more important that the disaster victims themselves play the major roles in building their reconstructed communities. From this point of view community-based careful “reconstructed community building organizations” need to be set up. Recommendations are therefore being made for the establishment of a system that can be used to secure financial resources and dispatch human resources.

[3] Planning of regional reconstruction strategies that center around public and public-benefit facilities, including day-care centers, kindergartens, schools, and welfare facilities for the elderly, etc.

Regional reconstruction strategies that center around public and public-benefit facilities, including day-care centers, kindergartens, schools, public halls, and welfare facilities for the elderly, etc., and step-wise reconstruction strategies that takes the

reconstruction of communities into consideration are essential. With this the provisional development of base areas that are centered around public and public-welfare facilities, which can play a core role in communities and to include day-care centers, kindergartens, schools, public halls, hospitals, and welfare facilities, etc., and with population accumulation areas such as public reconstruction housings, etc. being accommodated in their neighborhood should be considered. Making hospitals and welfare facilities for the elderly play a core role in the communities, in particular, is considered to be a good urban area development policy in thereby building communities that anticipate the super aging society. Furthermore, networking these base areas with public transportation means is desirable from the point of view of leading the new urban cities into becoming intensive urban structures, which is considered desirable with the declining/aging society, and which can also lead to the realization of sustainable urban cities.

[4] Coordination of coastal area land use from a broad-based perspective of the wider area

Land use of the destroyed coastal areas needs to be coordinated from a broad-based perspective of the wider area. These particular areas in fall within the Pacific Rim migratory-bird path. Measures that not only restore residential/production bases but also restore the great natural environments and improve the biodiversity are therefore necessary. For this reason recommendations are being made to formulate broad-based coastal area plans and create the driving entity in cooperation between administrations, people, and NPOs.

[5] Formation of "Natural Symbiosis Cities based on the Watershed Landscape"

The disaster-stricken areas have traditionally been formed based on the circulation of watershed areas in remote mountains, country side forests, towns, fields, and beaches. These recommendations are being made to review this relationship, which is disconnect at present, from the point of view of new energy strategies and the sustained maintenance of fishing grounds as a common resource, and make the formation of "Natural Symbiosis Cities based on the Watershed Landscape" a basis for the reconstruction land use plans.

[6] Development of renewable energy policies

These recommendations are being made to position the coastal areas and country side forest areas located to the rear of the disaster-stricken areas as development bases for renewable energy (solar, wind, micro-hydro, biomass, and geothermal) in thereby taking

the lead in the new direction of energy policies in Japan. In addition, establishment of self-sufficient distributed systems, including the introduction of smart grids in anticipation of the introduction of renewable energy, etc., shall be part of the reconstructed community building process.

(3) Measures toward greater utilization of information

[1] Securing means of conveying information on preparing for disasters and establishing judgment/action guidelines

In addition to public broadcasts such as television and radio, etc. and broadcasts within the jurisdiction of municipalities, etc., a system for rapidly disseminating accurate disaster foresight information to individuals through utilization of cellular phones and the internet needs to be created. In addition, resolving communication related technical issues, including securing the reliability of emergency communications in the case of disasters, stabilization of contact means through telephones and cellular phones, etc., is in urgent need. These recommendations are being made in enhancing efforts being made in building a more disaster-resilient society through securing the reliability of disaster foresight and evacuation information, securing a means of and eliminating any disparities in obtaining information, establishing policies for making judgments and performing activities of individuals, and promoting information literacy dissemination activities, etc.

[2] Promotion of information collection/accumulation on disasters and subsequent data integration

Information on a disasters can provide effective guidelines toward measures taken in the future, thus the continued collection and accumulation of information is very important to society. Collecting information on the voluntary evacuees of the Great East Japan Earthquake is essential basic data for use in the reconstruction, thus making the integration of the various information identified at each site and its management an urgent matter. In addition, the radiation doses due to the Fukushima Daiichi Nuclear Power Plant accident is very important data for use in future disaster prevention measures, and should be permanently stored and made available to experts for analysis.

These recommendations are therefore being made in that the government, municipalities, experts on radiation measurements and geographic information systems, etc. and people should cooperate in integrating the measurement data to be analyzed, organized, and then disclosed to the public as common data, and therefore standard data formats and guidelines on further visualization shall be established.

[3] Implementation of measures that ensure the safe keeping of social information assets

In addition to backing up administrative documents, which can be considered to be social information assets, in cooperation with neighboring municipalities the establishment of a back up system in preparing for wide-area disasters through utilizing up-to-date information technologies needs to be discussed together with its institutional aspects. In addition, these recommendations are being made to establish a cooperative framework of medical care/nursing information, the prompt introduction of a wide area medical cooperative system via telemedicine, etc., a system to accumulate health information/dispensing information, etc., and electronic medical records, and then making all those information asset protection measures a basis for disaster-resilient community building.

[4] Promotion of training/placement of information professionals

Building a disaster-resilient society requires human resources that can play a leading role in managing information for use in both organizational responses such as designing administrative information bases, etc. and developing the information literacy of residents. Human resources that are capable of making practical responses through utilization of their knowledge on information management are also expected to be able to resolve each of the abovementioned issues. Municipal officials and volunteers created temporary databases immediately after the Great East Japan Earthquake in response to the need for disaster victim assistance projects, but mutually linking them for reflection in the reconstruction projects will require utilization of the knowledge of technical professionals. The urgent need for that was pointed out at the time of the disaster, but continued information utilization can be disrupted during ordinary times due to the transfer of officials in charge of information systems, etc. In proceeding with disaster-resilient community building professionals to engage in information management within an information society should be trained and positioned for continuous information framework operations and to support information utilization by residents.

(4) Ideal medical care/nursing/welfare in the disaster-stricken areas

The following recommendations are being made in consideration of not only the importance of how to handle medical care/nursing and social welfare in the case of disasters but also the fact that disasters can seriously affect the vulnerable people in particular.

[1] Formation of health, medical care, and welfare organization networks in regions that can provide flexible responses when urgently needed

With regard to what types of support system can be established at the time of the disaster thinking about simulations in response to the potential situations in advance through utilizing regional characteristics (natural environment, type and position of various institutions, and human powers, etc.) with regional health, medical, and welfare institutions playing the main role is considered important. Measures that assume various disaster situations, including the establishment of cross-institutional bases and ideal cooperation, information provision, and information sharing, etc., will need to be discussed. Constantly making the effort to establish well-acquainted relationships with professionals involved in the various health, medical care, and welfare occupations with administrative participation in thus enabling them to take the leading roles and provide coordination in disasters is essential.

[2] Establishment of support measures for groups that are vulnerable to disasters (chronic disease patients, persons with disabilities, children, elderly (living along, or those with reduced daily living functions), and expectant and nursing mothers, etc.)

A cooperation system between medical/welfare professionals and local residents (welfare volunteers, neighborhood self-governing bodies, neighborhood associations, and volunteer organizations) needs to be established for the early commencement of and continued relief methods and aggravation prevention/health support activities for groups that are vulnerable to disasters. Constant identification of disaster-vulnerable groups in the regions will require building moderately linked communities in thereby developing a sense of all being “in the same boat”.

[3] Preparation and enrichment of mental health care

Wide-area mental health care measures according to the level of mental and physical stress need to be developed/improved. First, special care for children who have lost their parents/families or animals/goods that were very valuable to them needs to be provided. Secondly, mental health care by mental health care expert teams consisting of school nurses, infant education counselors, clinical developmental psychologists, clinical psychologists, and school psychologists (cooperation and collaboration) and future disaster prevention education need to be implemented at schools for children of infant and school age. Thirdly, recommendations are being made to develop

residential/educational/nurturing environments and provide financial support through creating a “foster parent system” for orphaned children and a “community evacuation system” for entire families and communities with the government and municipalities cooperating in securing receiving persons/areas.

In addition, preparing for emotional disorders (depression, bipolar disorder, and schizophrenia, etc.) that may be triggered by anxiety with young and middle-aged people that have lost their jobs and stress due to drastic changes in their residential environments with the elderly is important. From the point of view of respecting human life preventive mental health care and an early diagnosis system need to be promptly improved.

(5) Establishment of victim support system and personnel training

[1] Preparation of needs maps concerning the relief of victims and information gathering

Many volunteers were dispatched immediately after the earthquake disaster, but the levels of supporter dispatch varied because the needs of the disaster victims could not be identified. Supporters and an information network that enable both supporters and those in need of support to access supporters/support organizations need to be established. These recommendations are being made with regard to the establishment of information collection “stations” in thereby ensuring support is provided according to the needs through preparing needs map that collate the individual needs of the disaster victims.

[2] Creation of nation-wide networks by municipalities, private organizations, and academic societies, etc.

Nationwide networks need to be established in advance by municipalities, private organizations, and academic societies, etc. in thereby ensuring timely support is provided when needed and according to any changes in the status of the establishment of specialized support systems by external regions/institutions. Prior establishment of regional/institutional partnerships is also important. With constant relationships being established the division of roles/functions can take place more smoothly through identifying matters that need coping with by supporters in the disaster-stricken areas, matters that can be entrusted to external supporters, and matters that can more effectively carried out by external supporters, etc. depending on the content of support at the time of a disaster.

In addition, supporters in the disaster-stricken areas are victims themselves but are still helping others. External specialized support is essential in alleviating the physical and

mental exhaustion of supporters in the disaster-stricken areas and in thus restoring their mental stability. Availability of external specialized support for supporters in the disaster-stricken areas can therefore lead to continued effective and long-term support for people in those disaster-stricken areas.

[3] Training of disaster-care professionals who can take the initiative in providing disaster support and promoting relevant research

Research environments for studying disaster care need to be established in thereby accumulating experience from past disaster support and exploring methodologies for further effective support in an interdisciplinary manner. At the same time, these recommendations are being made to conduct training of disaster care experts at interdisciplinary graduate schools who will have practical skills and be the leaders in disaster support and play the role of being global leaders who are capable of conducting education and research activities on disaster support.

(6) Preventive disaster mitigation measures on the assumption of Tokai/Tonankai/Nankai Trough earthquakes and Tsunamis

The following recommendations are being made with the aim of rational use of national land that takes large-scale disaster risks such as earthquakes and Tsunamis, etc. into account.

[1] Formation of disaster risk conscious national land structures

These recommendations are being made on correcting the excessive concentration of industrial/economic activities in Tokyo and other Pacific Rim areas and revitalizing cities and industries in the Japan Sea Rim areas. Depopulating areas shall lead to more compact cities, thereby making disaster prevention/mitigation measures more efficient. Core infrastructures such as railroad and road networks, etc. shall not only support economic activities in ordinary times but also have sufficient redundancy to cope with predicted disasters and avoid any delay in emergency activities.

[2] Reinforcement of disaster mitigation measures from the software side

While encompassing improved earthquake resistance of civil engineering structures and building structures, these recommendations are being made with regard to the further strengthening of the software side of disaster mitigation measures, including community building that takes escape into account, evacuation drills in ordinary times, establishment of an alarm system for when disasters occur, and disaster prevention education for the people, etc.

[3] Promotion of research on disasters

These recommendations are being made on promoting the identification of the mechanism of large-scale earthquakes/Tsunamis and studies on disaster histories through conducting interdisciplinary research on archived documents, Tsunami deposits, and coastal topographies, and then disclosing the results to the public in an understandable manner.

(7) Organization and dissemination of disaster records

Archiving the records of the disaster-stricken “present”, the creation/records of the “future” toward reconstruction, documents for creating a new future through comparing the past as history with the present, records of support/cooperation provided by various regions in Japan and countries around the world, and documents on supporting the disaster-stricken areas and relationships within these areas all have the important meaning of restoring the memories of the lost past and proceeding with the reconstruction. Analyzing and evaluating these records and making use of them in the future reconstruction and disaster prevention/mitigation measures, etc. is an important issue that needs to be assigned to researchers in academic circles. The creation of archives therefore needs to be promoted also from the point of view of academic study.

The importance of the organization and dissemination of disaster records, as the creation and succession of disaster records, was pointed out in the “Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake” made by the government, and hence a number of measures are being implemented in cooperation between the government and the private sector.

In addition, this great earthquake occurred in a highly advanced information society and can be characterized with the existence of various digital information recorded in a variety of formats and from various points of views. Collecting and storing that information, including IT media, etc., is an important issue. SCJ has established a “Subcommittee on IT Media Social Infrastructure and Media Archive of Disasters”, with the discussions being on-going.

The Great East Japan Earthquake archive information distributed throughout respective areas, institutions, and individuals will need to be shared in the future, and this should eventually be positioned as an international challenge (across various nations, cultures, and languages). This will require facilitating identifying the records and connecting archives and promoting the establishment of archive systems, including a portal system that enables unified access to the information.

In addition, the archive itself connects the disaster-stricken areas with others, and therefore this should be implemented as a project between industry, the government, and academic circles, and its content should contribute to support for the disaster-stricken areas. Furthermore, inclusion of past histories and historic sites will add the meaning of being a cross-generational challenge (linking the gap between generations), thereby making it a basis for forming a society that will be succeeded to across generations and not forgotten. This will require its fixation as local knowledge and being shared among people.

The following recommendations are being made to restore memories of the lost past, recording the disaster-stricken “present”, and creating/recoding the “future” toward reconstruction. In addition, SCJ will also collect academic information on the great earthquake and discuss its storage.

[1] Promotion of creation of an “archive” concerning the Great East Japan Earthquake

The creation of a Great East Japan Earthquake archive shall be promoted basically through supporting the on-going archive creation efforts, facilitating shared use of them, and internationalization (international standards) in cooperation with the relevant ministries and agencies of the government, the National Diet Library, and other archive related institutions, etc. Establishment of a portal system, etc. that enables domestic and overseas access shall be promoted, and discussions shall take place on a legislative and systematic framework for collecting the information and its storage, etc.

In addition to IT media and various data on natural and social phenomenon, which recorded various aspects of the great earthquake, efforts shall be made to identify, collect, and store the variety of social infrastructure information that was not initially subjected to be archived. In doing so discussions shall take place on ICT elemental technologies, including the collection, registration, storage, and representation/analysis methods of the various types of information, etc., and issues with social disclosure and copyright, etc.

The archive will require the establishment of a system to use for its permanent storage and long-term operation, and therefore discussions shall take place in cooperation with the National Diet Library.

(8) Role of government publicity and media organizations

[1] Appropriate news coverage in response to the temporal stages of disasters

Appropriate news coverage in response to the temporal stages of disaster is expected. Priority should be placed on lifeline information in thereby securing “safety” (safety of lives) of the disaster victims also with media coverage in the initial stage immediately

after a disaster. In the case of large-scale disasters such as this one a single organization cannot cover the entire disaster-stricken areas and collect/integrate information. The respective media organizations are therefore very much expected to cooperate in establishing a system to use in integrating/cross-checking and sharing information across the entire disaster-stricken areas.

Establishing an integrated system of all media for promptly transmitting accurate information in cooperation with the administration and volunteers is essential in preventing irresponsible rumors, etc.

[2] Cool-headed news reports and comments based on the sharing of accurate information and sources

Rumors arouse the anxiety of not only the directly affected disaster victims but also the entire public. In the case of the nuclear power plant accident of concern the ways in which the risks associated with health hazards are assessed and disclosed to the public is important in preventing unnecessary confusion domestically. In this respect the respective media organizations are expected to make the effort to avoid competing in gaining scoops or sensational articles/headlines and instead ensuring that accurate information and sources are shared with all types of media and cool-headed news and comments reported using that information.

Research institutions should actively exert their functions as think tanks in ensuring accurate reports are made with science communicators maintaining close contact with the media. A certain amount of accumulated knowledge on risk recognition of people and ways to make communication based on it exists in the field of risk psychology. Assuming that a gap exists in risk recognition between experts on risk assessment and the general public active discussions should take place on ways to report matters in such a way as to minimize the damage caused by harmful rumors in cooperation between the government publicity, media, and research institutions. Accurate and neutral commentary articles on, for example, 1) what level of risk is predicted for the health effects from radiation exposure when compared to other risks (relative risk level), 2) the fact that the risk is continuous and therefore a dichotomy way of thinking such that the existence of health effects depends on whether the value is above or below a specific threshold value is meaningless, and 3) the relationship between the amount of food intake and the risk (radiation dose is shown in becquerel per 1 kg of food, but “consuming 1 kg of spinach” is very unlikely in normal cases), etc. are considered effective in reducing the damage caused by harmful rumors. In addition, actively presenting positive and negative responses

to commentary articles from non-expert general people via newspapers will improve the neutrality and reliability of the commentary.

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[5] *: The original was written in Japanese and SCJ provides informal English translation for non-Japanese readers.

<Background Information 1> Progress of deliberations of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ

Establishment of the Sub-Committee on Building Disaster-Resilient Communities, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 27 Sub-Committee on Building Disaster-Resilient Communities (1st)

- ○ Deliberation matters, future course of action

2012

January 13 Sub-Committee on Building Disaster-Resilient Communities (2nd)

- ○ Issues with building reconstructed communities, symposium series "Protecting life and land from large-scale disasters", etc.

February 3 Sub-Committee on Building Disaster-Resilient Communities (3rd)

- ○ Summarizing policy, etc. of the Sub-Committee on Building Disaster-Resilient Communities

March 2 Sub-Committee on Building Disaster-Resilient Communities (4th)

- ○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations on (proposed) Recommendations by the Sub-Committee on Building Disaster-Resilient Communities "Building

Tsunami-proof Communities – Showing How Tohoku Reconstruction Makes Use of Nature –”

Recommendations

Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas – Towards the Promotion of Industry and Employment to Support Victims in Disaster-Stricken Areas –

April 9, 2012

Science Council of Japan

Committee on Supporting Reconstruction after the Great East Japan Earthquake

Sub-Committee on the Promotion of Industry and Employment

These recommendations compile and publish the results of deliberations of the Sub-Committee on the Promotion of Industry and Employment, Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan.

Sub-Committee on the Promotion of Industry and Employment,
Committee on Supporting Reconstruction after the Great East Japan Earthquake

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The following cooperated in compiling these recommendations and figures/tables in the Appendix.

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Summary

1 Background to the recommendations

The Great East Japan Earthquake that occurred on March 11, 2011 off the Pacific Ocean of the Tohoku Region was the 4th largest earthquake recorded in human history. It was a very complex disaster because of an accident that occurred at the Fukushima Daiichi (No. 1) Nuclear Power Station of Tokyo Electric Power Co., Inc. (TEPCO) which was triggered by a total loss of power after seven Tsunamis extending from 30 minutes to 6 hours after the earthquake occurred, thereby resulting in unprecedented damage.

The human damage and property damage resulting from the Tsunamis were both unfathomable, while the disaster also deprived the disaster victims/disaster-stricken areas of both their residences and places to work. Despite having the severe psychological trauma and had their lives inconvenienced by having to live at temporary housing the victims are still proceeding with restoration/reconstruction activities in thereby realizing a permanently safe society. When reconstructed they must be “communities resilient to disasters” in a multi-faceted sense. In addition, people cannot make a living unless industries that can sustain the disaster-stricken areas steadily take root, with job opportunities then being ensured by those industries. Furthermore, and with regard to the nuclear power plant accident, completion of its final disposition may require a time span of more than one generation. Many people have been forced to evacuate for an extended period of time, thus establishing a long-term health management system for those who fear having been exposed and decontamination measures in the areas where radioactive materials were deposited are posed as imminent issues.

These various reconstruction challenges thus require the specific provision of desperately needed knowledge to the victims through mobilization in the various fields of science, which is precisely the duty of Science Council of Japan (SCJ). The 21st Term SCJ made the commitment soon after the occurrence of the great earthquake by setting up the Great East Japan Earthquake Task Force, issuing urgent recommendations on seven consecutive occasions, and so on. At the inception of the 22nd Term SCJ in October 2011 the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to succeed the Great East Japan Earthquake Task Force. On November 16, the Sub-Committee on Building Disaster-Resilient Communities, the Sub-Committee on the Promotion of Industry and Employment, and the Sub-Committee on Counter-measures for Radiation were set up under the said Committee.

The reconstruction budget has been estimated to be enormous. It is of drastic importance to the sustainability of both the economy and public finances, and not just limited to the

disaster-stricken areas, that the reconstruction budget should be appropriately allocated to creating jobs and thus incomes. Because of this point of view the Sub-Committee on the Promotion of Industry and Employment has analyzed the employment and industrial situation in the disaster-stricken areas and the need for employment support and industrial promotion and has identified the ideal way of both promoting industry and supporting employment in the disaster-stricken and other related areas.

2 Present situation and issues

The Great East Japan Earthquake did not only result in damage far more severe than the Great Hanshin-Awaji Earthquake quantitatively but it also had significant qualitative features. The unprecedented Tsunamis caused devastating damage to infrastructures related to fisheries and agriculture, including manufacturing, and deprived the disaster victims of both their residences and places to work. Securing residences and industrial reconstruction/promotion as well as the creation of new employment are therefore important issues with the reconstruction.

Because of the efforts made by various industries and stratums and the disaster victims themselves, in particular, the economy of the entire Tohoku Region has recovered to the same level as before the earthquake disaster. However, many issues still remain with the reconstruction of industries and lives in the disaster-stricken coastal areas, with “disparities in the reconstruction” with respect to the area, type of industry, age group, and gender being of concern. The Sub-Committee therefore studied the employment situation and industrial situation, which gets reflected in the former, by area, type of industry, and occupation in identifying the situation with disparities in the restoration/reconstruction. The reconstruction of industries and recovery in employment have been slower in the coastal areas and food manufacturing and marine product processing industries in particular, than with inland areas and the automobile and electronic parts/device manufacturing industries, respectively. In addition, while the construction industry is suffering from an increase in expenses due to both insufficient supervising engineers/skilled workers and materials, clerical and related job offers have been poor, with a particular scarcity of employment for females being indicated.

A special extension of the benefit period of employment insurance has been implemented in the disaster-stricken areas, but the percentage of those that could not gain employment by the time the benefit period ends has been increasing. Payments end for approximately 10,000 people at the end of April 2012. Measures will therefore have to be promptly taken in thereby responding to an increasing need for re-employment or alternative income. Meanwhile, a “job-seeker support system” was established in October 2011 to provide unemployed persons unable to receive employment insurance benefits with free vocational training and benefits.

This system needs to be effectively responsive to the employment and vocational training needs of the disaster victims/disaster-stricken areas, and hence these recommendations propose measures for effectively utilizing the system.

In addition, “reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises” are discussed as an industrial promotion measure. These are the first projects implemented using national funds, which has not occurred with previous large-scale disasters, and are highly regarded as they do encourage small- and medium-sized enterprises in the disaster-stricken areas and facilitate investment toward the restart of economic activities. Moreover, measures for further utilizing these projects in reconstructing industries and creating employment opportunities in coastal areas, in particular, are proposed.

3 Content of the recommendations

(1) Alleviation of labor market mismatches

[1] Improvement of job-seeker support system that is compatible with the actual labor market situation

a. Area/attribute based employment targets

An incentive system in which the disaster victims in the areas where finding employment is difficult are provided with training implemented by private training institutions and with larger amounts of subsidies being granted when they are employed shall be introduced. In addition, employment improvement rate targets by attribute and area shall be established as requirements when applying for vocational training.

b. Cooperation with other employment restoration promotion projects

Policies on actively employing those that received training through the job-seeker support system shall be presented as a requirement of employment creation via employment restoration promotion projects, etc. Efforts shall be made to secure human resources that meet the needs of both job-seekers and recruiting enterprises through appropriately combining various systems.

c. Alleviation at household level

The limitation of one person per household receiving vocational training shall be removed, and the conditions for receiving benefits altered to include spouses and children/parents within the same household who do not work for more than a specific number of hours, etc.

[2] Cooperation with "From Welfare to Employment"

In order to make public assistance a system that "is easy to use and which helps people to become independent" and "From Welfare to Employment" support projects function in the disaster-stricken areas a careful individual support system shall be established/enhanced, including securing staff members such as support navigators, etc. at Hello Works (public employment security offices), etc.

[3] Ensuring sufficient staffing of Hello Works

In order to alleviate labor market mismatches through developing potential job offers and ensuring smooth operation of the job-seeker support system an adequate number of staff members will need to be secured at Hello Works.

(2) Reconstruction of local industries in the disaster-stricken areas

[1] "Reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises"

The following recommendations are being made with regard to these projects.

- The system shall be operated in such as way as to allow enterprises that are essential to the local economy to be individually subject to subsidies
- Carry-over of subsidies associated with elevation works shall be allowed until the end of March 2016
- the application period shall be made sufficiently long, the procedures, etc. more simple and flexible, and payments made each fiscal year according to the progress of the projects
- Priority shall be placed on subsidies/financing at the unit of a basic municipality

[2] Smoother promotion of reconstruction

- Inter-ministerial cooperation shall be strengthened in preventing abuse of the "vertically segmented administration" system
- Basic municipalities, etc. shall be utilized in thereby enabling them to play the role of being one-stop service centers
- A system in which the government and municipalities, etc. rent production facilities shall be created in thereby eliminating "overlapping debt"
- Special depreciation for disaster alternative assets shall be expanded so as to enable its application to gratuitously transferred assets

- A system that supports long-term “temporary housing” projects and business restarts shall be created in Fukushima Prefecture

[3] Training of personnel to engage in life-prolonging repair of infrastructures

Life-prolonging repairs are also needed with respect to the roads, bridges, quay walls, and river floodgates, etc. that escaped damage. With municipality level life-prolonging repairs, in particular, local small- and medium-sized enterprises are expected to play the leading role in emergency repairs and inspections/maintenance.

(3) Revitalizing areas through business start-ups via the initiative of residents - Establishing Reconstruction Non-profits

Sound development of various “reconstruction non-profits” (tentative name) via the initiative of residents is expected in thereby enabling as many people as possible to gain employment and play a role in the reconstruction. Recommendations are therefore being made with regard to developing the necessary environments.

Various types of reconstruction non-profits are being considered. Points being emphasized in the event reconstruction non-profits are modeled after social corporations (start-up businesses) include favorable tax treatment, etc. with investments, but with no dividend payments, allowing transfer of shares and redemption of shares at the time of a corporate dissolution, and separating the decision making rights from the invested amount, etc.

In the event reconstruction non-profits are modeled after public interest corporations a framework shall be provided by adding the new item of a “business that promotes reconstruction in the disaster-stricken areas”, etc. or including reconstruction non-profits as a business provided for in other ordinances in item 23 in Appended Table of the Act on Authorization of Public Interest Incorporated Associations and Public Interest Incorporated Foundation. Furthermore, the establishment of standards for public interest corporation authorization that suit the characteristics of the individual reconstruction non-profits and the “Act on Authorization of Public Benefit of Reconstruction Non-profits” with the aim of facilitating its authorization shall be discussed from a medium-term perspective.

Table of contents

1 Introduction

The Great East Japan Earthquake that took place on March 11, 2011 resulted in the estimated damage of more than 19,000 deaths/missing persons, slightly less than 37,000 houses completely/partially destroyed, and with the amount of stock damage of slightly less than 17 trillion yen. All of which far exceeded the damage caused by the Great Hanshin-Awaji Earthquake that occurred 16 years earlier (Table 1 in the Appendix).

In addition to the significant level of damage caused quantitatively the Great East Japan Earthquake also had some significant qualitative features. The Tsunami damage was particularly severe. Infrastructures related to fisheries and agriculture, including manufacturing, in the coastal areas were all but completely destroyed (Table 2 in the Appendix), and with many people having lost both their residences and places to work. In the case of the Great Hanshin-Awaji Earthquake many people in the eastern part of Hyogo Prefecture, etc. commuted to Osaka, and hence many of those who lost their residences did not lost their places to work. In contrast to this, and in the case of the Great East Japan Earthquake, the percentage of self-employed persons engaged in a primary industry was high mainly in the coastal areas (Table 1 in the Appendix), while many employees also lived near their workplaces because of the difficulty of commuting from inland areas due to geographical reasons, thus resulting in the simultaneous loss of both their residence and place to work. Furthermore, the nuclear power plant accidents that caused the regional evacuation further exacerbated this trend.

Securing residences and industrial reconstruction/promotion as well as the creation of new employment are therefore very important to the disaster victims and residents in the disaster-stricken areas. In addition, the fact that the Tohoku Region, which includes three disaster-stricken prefectures, is ahead in experiencing the problem of the aging/declining population and reduced economic strength, and thus requires special attention (Table 3, Figure 2, and Table 4 in the Appendix).

Under these conditions the disaster victims and residents in the disaster-stricken areas, enterprises, municipalities, and the government have been making the effort in restoration/reconstruction over the year since the great earthquake disaster occurred. According to the Reconstruction Agency this has resulted in the removal of disaster waste (debris) having been completed in all municipalities by January 31, 2012 (excluding waste resulting from building demolition and caution zones, etc.). Infrastructures such as electricity, water supply, gas, and roads, etc., have been mostly restored, while the main line of the railroads has been restored to the normal level. Main public services, including communications, postal services, hospitals, and schools, etc., have, in general, also been restored <1>[6].

[6] However, some are lagging behind: with infrastructures the restoration rate of public quay walls is 73%, and with public services that of hospitals 81% <1>.

However, the reconstruction of local industries that are directly related to the reconstruction of the disaster victims' lives has been falling behind, and employment problems growing more serious. According to the "Trends with the Economy of Tohoku in 2011" (published on December 15, 2011) made by the Sendai Branch, Bank of Japan, "while many economic indices show that the economy of the entire Tohoku Region has recovered to the same level as before the earthquake disaster, although partly due to various special procurements in the course of reconstruction, the reconstruction work is still ongoing in the disaster-stricken areas along the Pacific coastal areas, and thus the scarring left by the earthquake disaster remains significant". It should be noted that the cut-off to the automobile and electronic parts supply chain in the Tohoku inland areas had already been resolved by summer, but economic activities in the Tsunami-affected areas and the neighborhood of the Fukushima Daiichi Nuclear Power Plant were significantly disrupted, thus resulting in a situation where a "shortage of labor and mass unemployment coexist with each other" <2>. The growing "disparities in reconstruction" among the disaster-stricken areas is therefore of concern.

Ensuring reconstruction takes place in the respective areas requires that industries that can sustain the disaster-stricken areas steadily take root and with job opportunities then being ensured by those industries, and in thereby ensuring the persistent achievement of stable lives for the disaster victims and residents in the disaster-stricken areas. In addition, the total reconstruction budget is estimated to be 19 trillion yen over 5 years and 23 trillion yen over 10 years, which will be financed by a special reconstruction taxation of 10.5 trillion yen[1] and non-tax revenues, being in addition to reconstruction bonds of 12.5 trillion yen. It is of drastic importance to the sustainability of both the economy and public finances, and not just limited to the disaster-stricken areas, that the enormous reconstruction budget should be appropriately allocated to creating jobs and thus incomes. Because of this point of view the Sub-Committee on the Promotion of Industry and Employment was established with the aim of analyzing the employment and industry situation in the disaster-stricken areas and employment support and industrial promotion needs, and identifying the ideal way of industrial promotion and employment support in the disaster-stricken and other related areas[7]. In these recommendations the present situation and issues with industries/employment in the disaster-stricken areas are organized in Chapter 2, and the present situation and issues with employment support measures then described in chapter 3. The present situation and issues with industrial promotion measures are presented in Chapter 4, and recommendations on creating "reconstruction non-profits" (tentative name) toward alleviation of labor market mismatches, reconstruction of local industries in the disaster-stricken areas, and revitalization of the areas through

[7] Refer to Recommendations by Committee on Supporting Reconstruction after the Great East Japan Earthquake for engagements of SCJ to date (related recommendations of the 21st Term).

business start-ups via the initiative of residents.

2 Present situation and issues with industries/employment in the disaster-stricken areas

(1) Employment situation remaining severe - labor market mismatches

First, although the employment situation in the three disaster-stricken prefectures seems to have been improving it was confirmed that the employment situation remains severe in the areas with significant earthquake/Tsunami damage, which is mainly the coastal areas. Many of the following statistics, however, were identified through public employment security offices (Hello Works), and hence do not reflect the situation with those who did not visit Hello Works. People most likely to visit Hello Works are considered to be employment insurance subscribers who are expected to be able to receive unemployment allowances. The unemployment situation with short-term/hour employees and self-employed persons is therefore rather difficult to understand.

Here, some of the indices that indicate that the employment situation has been improving are examined. Examining the situation with job offers, job-seekers, and employment, as provided in the March 2012 edition of the "Present Employment Situation in the Three Disaster-Stricken Prefectures (Monthly)" made by the Ministry of Health, Labour and Welfare, reveals the number of new job offers to have been increasing due to an increase in job offers related to reconstruction from the earthquake disaster and the restored production of manufacturing industries since the great earthquake disaster of March 11, 2011, and which totaled 45,752 with the three prefectures as of January 2012. In contrast to this the number of new job-seekers decreased after having reached a peak in April, remained stable in and after September, but the decreased again in December and January 2012, and was 29,430 in January <3>.

The number of persons newly employed gradually decreased after having reached a peak in June, then remained stable, and was 10,088 in January 2012. However, the number of persons newly employed exceeded that of the same month of the previous year for nine consecutive months and from May on. In addition, the number of persons newly employed via employment creation fund projects as of February 24, 2012 was 6,670 in Iwate Prefecture, 9,594 in Miyagi Prefecture, and 13,274 in Fukushima Prefecture, or a total of 29,538 with the three disaster-stricken prefectures <3>. Examining the employment rate (calculated by dividing the number of persons newly employed by the number of new job-seekers) of the three disaster-stricken prefectures reveals it to have been rising since May in all three of the disaster-stricken prefectures, and to have exceeded that of the same month of the previous year since June in all three of the disaster-stricken prefectures.

In addition, the effective job-offer to job-seeker ratio (seasonally adjusted figure) has also been rising for eight consecutive months since May, and was 0.75 in Iwate Prefecture, 0.82 in Miyagi Prefecture, and 0.74 in Fukushima Prefectures in January 2012 <3>. Examining the changes with general work (regular and temporary/seasonal work) and part-time work in the three

disaster-stricken prefectures reveals the effective job-offer to job-seeker ratio with part-time work to have exceeded that with general work, although both have been rising. The same trend was observed in all three of the disaster-stricken prefectures. The effective job-offer to job-seeker ratio for part-time work seems to have raised the overall effective job-offer to job-seeker ratio in the three disaster-stricken prefectures, but with general work it was not that low (Figure 3 in the Appendix).

As revealed above the employment situation in the three disaster-stricken areas seems to have been improving. However, the employment situation still remains severe in the areas with significant earthquake/Tsunami damage, which are mainly the coastal areas. The effective job-offer to job-seeker ratio (unadjusted figure) of Hello Work (public employment security office) reveals that whereas in Kitakami City it was 1.14, in Ninohe City it was 0.47, Miyako City 0.59, Kuji City 0.66, and Ofunato City 0.71 in Iwate Prefecture. With Miyagi Prefecture and Sendai City it was 1.10, but in Kesennuma City 0.47, Ogawara City 0.54, and Shiogama City 0.65 (the aspects in Fukushima Prefecture appear to be different as the effective job-offer to job-seeker ratio in Hamadori, where many areas were evacuated due to the Fukushima Daiichi Nuclear Power Plant accident, was higher than that in Nakadori and Aizu City) <4>, <5>, <6>.

Next, the situation with informal job offers to students set to graduate from senior high schools and universities is examined. Examining the situation with new graduates that had received informal job offers as of the end of January 2012, being based on a press release made by the Ministry of Health, Labour and Welfare on March 16, 2012, reveals the percentage of students set to graduate from senior high schools that received informal job offers to be 86.4% nationwide, 92.5% in Iwate Prefecture, 88.1% in Miyagi Prefecture, and 88.7% in Fukushima Prefecture, all of which had improved when compared to the same month the previous year. The improvement was more significant in the three disaster-stricken prefectures, and Miyagi Prefecture in particular, than that nationwide. Examining the situation in more detail as of the end of January 2012 using data provided by the respective Labour Bureaus reveals the number of those that received informal job offers to have increased in all three prefectures. By place of employment (within or outside the prefecture) the number of those that had received informal offers for jobs outside the prefecture had increased more significantly in all three prefectures. In Fukushima Prefecture in particular, the number of those that had received informal offers for jobs within the prefecture had decreased by 4.3% whereas that for jobs outside the prefecture had actually increased by 25.9%. The trend with high school graduates being employed outside the prefecture is therefore considered to be growing.

In contrast to this the percentage of students set to graduate from four-year universities that had received informal job offers as of February 1, 2012, being based on a press release made by

the Ministry of Health, Labour and Welfare on March 16, was 80.5% nationwide. By region in the Kanto Region it was 83.3%, whereas in Hokkaido/Tohoku Region it was 79.1%. According to the Iwate Labor Bureau in Iwate Prefecture as of the end of January 2012 it was 68.3%. However, the percentage of those that received offers for jobs within Iwate Prefecture had risen. In Miyagi Prefecture as of the end of November 2011, the number of those that had received offers to jobs within the prefecture had increased by 8.8% from the previous year, whereas that with those that received offers for jobs outside the prefecture had increased by 12.4%.

(2) Varied Industrial restoration/reconstruction

[1] Disparities in restoration/reconstruction and employment situation by industry

The significance of the impact of the earthquake disaster on industries can be observed via changes in the industrial production index. The industrial production index for the disaster-stricken areas (municipalities to which the Disaster Relief Act was applied pursuant to the "Application of the Disaster Relief Act concerning the Tohoku Region Pacific Offing Earthquake (11th report)" and "Application of the Disaster Relief Act concerning the Northern Nagano Earthquake (1st report)") had declined by 32.1% from the previous month in March when the earthquake took place. It then recovered to a certain level with a rise from the previous month of 3.6%, 19.5%, and 7.5% up until June, and then declined again in July but remained stable until December. It was still 7 points below the level before the earthquake disaster, thus indicating the continuing severe situation (Figure 4 in the Appendix).

The production level in Miyagi Prefecture, where the damage was the most severe, and in particular, had remained around 70% of that of before the earthquake disaster as of December 2011. By industry it had recovered to 80% with automobile (transportation equipment) manufacturing and 77% with electronic parts/device manufacturing, whereas it remained at 55.6% with food manufacturing <7>. Weight by industry (industrial production index based on 2005 standard) of manufacturing industries in Miyagi Prefecture was 19% with electronic parts/device manufacturing and 18% with food manufacturing, thus making recovery of the food manufacturing industry extremely important. The marine processing industry (seafood product manufacturing industry) accounted for 37% of the food manufacturing industry in Miyagi Prefecture <7>[8].

[8] The manufacturing industry gets further classified into 24 industries, and in which the food manufacturing industry gets further classified into 8 industries, including the seafood product manufacturing industry, etc. The seafood product manufacturing industry then gets classified into canned seafood and seaweed, seaweed product (except canned), fish paste product, salted-dried and salted product, frozen seafood product (unprocessed and packaged), frozen seafood product (processed and packaged), and miscellaneous seafood product manufacturing industries ("Japan Standard Industrial Classification" of the Ministry of Internal Affairs and Communications). In these recommendations the commonly used term of "marine product processing" is generically used.

Disparities in restoration/reconstruction were also reflected in the employment situation. By industry the number of new job offers in the disaster-stricken prefectures had increased by 121.6% (2,222 persons) from the same month the previous year in December with the "construction industry", although due to a large number of job offers having been made within that industry in association with earthquake disaster reconstruction projects since April (Figure 5 in the Appendix). The construction industry suffered a serious shortage of labor and a sharp increase in wages from failures/cancellations of bidding that took place one after another in Miyagi Prefecture, although mainly in Sendai City <7>. In addition, the influence of an increase in the number of job offers for "public duties and others" due to employment creation fund projects in April through to June is noticeable. The number of new job offers has been gradually recovering in manufacturing industries too since April, and had increased by 40.1% (965 persons) from the same month the previous year in December (Figure 5 in the Appendix).

By occupation the number of job offers was larger than the number of job-seekers with occupations that require qualifications or skills that are "specialized/technical", "welfare related", "construction and civil engineering", etc. However, the number of job offers was remarkably smaller than the number of job-seekers with "food manufacturing", "production/labor", and "clerical work" <1>.

[2] Delay in recovery of marine product processing and other industries

Focusing on the food manufacturing industry, which is one of the main industries in Miyagi Prefecture, the difference in the level of recovery of marine product processing and other industries, although depending on the fishing port, has resulted in employment mismatches being made in the respective regions. For example, within the jurisdiction of Hello Work Shiogama, Ishinomaki, and Kesennuma in Miyagi Prefecture the effective number of job offers within the "manufacturing industries" has been overwhelmingly insufficient in Ishinomaki and Kesennuma, whereas the effective number of job offers has been a lot larger in Shiogama (Figure 6 in the Appendix). The background to this is considered to be the fact that the number of fish landed had recovered to 109% of the level of before the earthquake disaster by December 2011 in Shiogama, whereas in Onagawa it was only 19%, in Ishinomaki 18%, and Kesennuma 39%. In addition, the estimated recovery by April was 40% in Ishinomaki whereas it was 30% in Kesennuma <8>. The delay in the recovery in Ishinomaki and Kesennuma was mainly due to the fact that the ground in areas where the marine product processing industry had been established had sunk, thus requiring elevation and infrastructure development <7>.

With the food manufacturing industry, which accounted for 18% of the economy of

Miyagi Prefecture, 25% of establishments were in Kesennuma or Ishinomaki <7>, and thus recovery of both these areas is very important to the economy of the prefecture. In Kesennuma, in particular, the food manufacturing industry accounted for nearly 70% of employees in the manufacturing industries (Table 5 in the Appendix). Marine product processing, including shark fin processing, etc., has been a major industry for Kesennuma <7>. However, more than 100 marine product processing plants that existed before the earthquake disaster were basically destroyed, and thus only around 1/4 of these plants had restarted operation by late February 2012 ("Asahi Shimbun", February 27, 2012). The number of fish landed in Kesennuma, mainly skipjack, Pacific saury, and tuna, before the earthquake disaster exceeded a value of 20 billion yen, which was larger than that of Ishinomaki at 16 billion yen and Shiogama at 9 billion yen. The delay in the recovery is therefore causing significant damage to the economy of the prefecture[9] <8>.

Furthermore, females accounted for 60% of the regular workers within the food manufacturing industry in Kesennuma, and the food manufacturing industry accounted for nearly 80% of female regular workers in the manufacturing industries. The destruction of the food manufacturing industry by the Tsunamis also therefore caused a loss of employment for females. Without progress being made in reemploying the females that have been important breadwinners for households the restoration/reconstruction of industries and households living in the regions where people lost both their residences and jobs is unlikely to be achieved.

[3] Shortage of human resources in construction/civil engineering work for reconstruction of infrastructures

In contrast to this, and with "construction/civil engineering", a shortage in the effective number of job-seekers was observed in Shiogama and Ishinomaki whereas a shortage in the number of job offerings can be observed in Kesennuma due to a delay in the restoration/reconstruction (Figure 6 in the Appendix). According to a balance sheet on job offers and job-seekers of January 2012, however, a shortage in the number of job-seekers with construction related work was also observed in Kesennuma, and with the effective job-offer to job-seeker ratios for the occupations of building frame construction and architects/civil engineers, etc. being high.

The current shortage of labor for the construction industry will require that special

[9] Of course this does not then mean that ports with low numbers of fish landed are unimportant. According to the report of "Content and Assessment of Multifaceted Functions of Fisheries Industry and Fishing Villages concerning Global Environment and Human Life" made by SCJ in response to a consultation made by the Minister of Agriculture, Forestry and Fisheries in 2003 the fisheries industry and fishing villages not only play a primary role in providing food/resources but also exert multifaceted functions, with their external economy therefore being considered very important.

attention be paid to the fact that there was difficulty securing skilled workers for the construction industry even before the earthquake disaster. More concretely, and due to a significant reduction in construction investment, mainly public investment, the aging of employees has been progressing (those aged 55 or older accounted for 33%) and the number of newly employed young people decreasing (approximately 1/5 of 1997) more rapidly in the construction industry nationwide than the average of all industries. The decrease in the number of newly employed young people was affected by working conditions/environment as well as the occupational image and insufficient welfare programs such as social insurance, etc. <9>.

In recent years both the number of establishments and employees in the construction industry have been decreasing, with the number of medium-sized construction enterprises (10 workers) having significantly decreased and the percentage of small-sized construction enterprises rising. This downsizing trend is said to have been particularly remarkable in local district areas <10>. According to the Economic Census (Establishment and Enterprise Census for data up to 2006) of the Ministry of Internal Affairs and Communications the number of establishments and employees in the construction industry nationwide decreased by 3.8% and 12.6%, respectively, during the period of between 2001 and 2009. In contrast to this the number of establishments in the construction industry had decreased by 11.2%, 6.7%, and 9.1% and the number of employees by 28.8%, 15.1%, and 20.8% in Iwate Prefecture, Miyagi Prefecture, and Fukushima Prefecture, respectively, during the same period <11>, <12>. The construction industry in the three disaster-stricken prefectures is therefore considered to be too weak to take the lead in the restoration/reconstruction in quite a few cases. While the shortage in the supply capacity is expected to improve in the construction industry in the disaster-stricken areas the construction investment in these areas may significantly drop after the restoration/reconstruction demand passes. The trend with hesitation to make new capital investments is considered unavoidable, and thus responding to this situation in anticipation of when the restoration/reconstruction demand passes is an issue. In addition to recovery of the marine product processing industry, industrial promotion/employment creation, including securing the sustainability of the construction industry, that conforms to the pace of regional reconstruction and the actual situation in the respective regions is expected.

(3) Special measures for employment insurance and issues after expiration

[1] Special measures for employment insurance

In the event of an absence from work for reasons not attributable to the employer, including destruction of facilities due to Tsunamis or earthquakes, etc., employers are not obliged to pay allowances to those dismissed, even if they have lost their places to work and

had their incomes stopped, which is in accordance with the Labor Standards Act (labor laws do not apply to self-employed persons from the first).

The employment adjustment subsidy system has conventionally been used as a system to control an increase in the number of persons separated from employment due to drastic changes in the economic environment. However, the employment adjustment subsidy is part of an insurance system jointly implemented by business operators to support management reorganizations in the event of absences from work for economic reasons. The problem has therefore arisen that employment adjustment subsidies do not apply to absences from work due to direct damage from disasters and not for economic reasons. This was also the case with this Tsunami/earthquake disaster, and similarly with the cases of the areas of establishments designated as caution zone dues to the nuclear power plant accident in Fukushima are not being subject to the subsidies.

After the Great East Japan Earthquake, being based on special measures for employment insurance associated with a designated disaster of extreme severity, victims unable to receive wages were provided with special payments of unemployment allowances. More concretely, those that were absent from work due to direct damage to establishments and not paid with wages but not separated from their employment were also made eligible to receive unemployment allowances. That is to say, under the special measures the requirements of "being separated from employment" was relaxed. The special measures resulted in people standing in long lines at Hello Works in the disaster-stricken areas for consecutive days from the end of March to the beginning of April to apply for unemployment allowances. In addition to the ordinary number of days for the payment of unemployment allowances based on the existing provisions measures to extend the payment period were also taken as a special case with individual extended benefits (60 days in principle), special extended benefits (additional 60 days), and wide-area extended benefits (additional 90 days) <13>.

More concretely examining the situation with the handling of unemployment insurance reveals that within the jurisdiction of the Miyagi Labour Bureau the number of persons who lost their employment insurance qualification (those separated from employment and thus employment insurance became no longer applicable to them) (total number during the period of between March 12, 2011 and February 19, 2012) to have increased by 32.7%, the number of cases of letters of resignation being issued to have increased by 43.4%, the number of cases of eligibility to receive allowances being decided to have increased by 60.5%, and the actual number of persons that received allowances to have increased by 94.0% from the same term the previous year. Furthermore, and within the jurisdiction of the Kesennuma Labour Bureau where the impact of the Tsunamis was significant, the number of persons that lost their

employment insurance qualification had increased by 240.4%, the number of cases of separation notices being issued had increased by 333.4%, the number of cases of eligibility to receive allowances being decided had increased by 522.7%, and the actual number of persons that received allowances had increased by 883.8%, thus indicating the seriousness of the situation <14>.

[2] Issues after expiration

It should be noted, however, that employment insurance does not apply to self-employed persons, etc. and may additionally not apply to some employees depending on their work hours, etc. In addition, and even in cases where employment insurance is applicable, quite a few persons are not eligible to receive unemployment allowances because of the insured period before their separation from employment was too short or for reasons such as lacking at present the "ability to be employed at anytime"[10].

Whereas the effective job-offer to job-seeker ratio has been rising since May 2011, the number of cases of applications for unemployment allowances (the number of cases of separation notices, etc. issued) reached 23,654 during the 11-month period of March 12, 2011 through to February 18, 2012 (1.4 times that of the same month the previous year). The actual number of persons that received unemployment allowances, including individual extended benefits, special extended benefits, and wide-area extended benefits, reached a peak in June at 81,179 (up 101.9% from the previous year), then continued to gradually decrease, but still remained at 62,528 in January (up 103.8% from the previous year) <3>. Of them the number of persons that received wide-area extended benefits reached 9,630 <13>.

Examining the percentage by gender of the actual number of persons that received unemployment allowances in the three disaster-stricken prefectures reveals it to have been 50.5% with males and 49.5% with females in March 2011, but the percentage with females has been increasing since April, and was 58.8% with females in January 2012, thus indicating the relatively difficult situation with employment for females <15> (Figure 7 in the Appendix). Examining the actual number of persons that received unemployment allowances in the coastal areas of Miyagi Prefecture where the damage was significant and based on the "main employment insurance related indices" of the Miyagi Labour Bureau reveals it to have had increased by 296.1% within the jurisdiction of Hello Work Ishinomaki and by 549.8% within the jurisdiction of Hello Work Kesennuma from the previous year in December 2011, thus

[10] People who fall under the following conditions are not eligible to receive unemployment allowances: 1) unable to be employed at present due to sickness or injury, 2) unable to be employed at present due to pregnancy, child birth, or child rearing, 3) retired after having reached the retirement age, etc. and intending to rest for a while, 4) unable to be employed at present because engaged in housework due to marriage, etc.

indicating the severity of the employment situation in those coastal areas.

As of January 20, 2012 the number of residents in the three disaster-stricken prefectures whose wide-area extended benefits were terminated was 1,039, of which the number of persons that gained employment was only about half at 522. In addition, the number of persons whose unemployment allowances had been terminated by February 17 was 3,510, but of which the number of persons that gained employment was less than 30% at 921. As described above the percentage of those whose unemployment allowances is terminated but do then not gain employment is rising. The number of persons whose unemployment allowances will be terminated by the end of April is estimated to reach 10,834 (including evacuees to other areas ("Asahi Shimbun", March 3, 2012). The reemployment or income needs of the disaster victims will therefore become even more significant.

(4) Effects on young people and children

The serious employment situation in the disaster-stricken areas has also affected the employment of young people. The employment situation with young people was worsening, particularly in the disaster-stricken areas, even before the Great East Japan Earthquake. For example, examining the percentage of new high school graduates that received informal job offers as of the end of January of the respective year for the whole of Miyagi Prefecture reveals it to have peaked in March 2008 at 82.8% (98.7% in Kesennuma) of graduates, then to have declined in March 2009 to 80.8% (97.8%) and in March 2010 to 68.8% (84.1%), and was 70.9% (79.2%) in March 2011, or immediately after the great earthquake disaster. In contrast to this the percentage of March 2012 graduates that had received informal job offers (as of the end of January 2012) within the whole of Miyagi Prefecture seems to have improved to 88.1% (92.9% in Kesennuma) at first glance. However, the number of persons seeking jobs within the prefecture had significantly decreased by -17.5% from the previous year for the whole of Miyagi Prefecture (-16.9% in Kesennuma), thus indicating an increasing dependence on employment outside the prefecture. The outflow of young people who will support the future economy in the disaster-stricken areas is therefore of concern <14>.

In addition, disparities in the socioeconomic status and mental health of the parent generation due to disparities in employment can significantly affect the happiness of not only the present generation but also their children. For example, the economic difficulties of parents can affect the percentage of students who go on to higher stages of education, thus imposing a long-term effect on their future scholastic abilities. The number of children that lost their father or mother due to the earthquake disaster was 1,295 (as of August 31, 2011). Economic difficulties, unstable employment, work conditions, and the child rearing burden are particularly severe with

single-parent families. Economic difficulties should not result in any cross-generation linkage.

For example, with FY 2011 graduates (as of February 6, 2012) the percentage of students who went on to universities, etc. (including correspondence courses of universities/junior colleges) had decreased from the previous year by -2.2% in Miyagi Prefecture and by -1.8% in Fukushima Prefecture, both of which were worse than the nationwide average of -0.4%, thus indicating the possibility of the severe situation with industry and employment in the disaster-stricken areas affecting the child generation <16>.

(5) Summary

As described above industrial reconstruction in the disaster-stricken areas of the Great East Japan Earthquake is still in progress and remains severe. The automobile and electronic parts/device manufacturing industries in inland areas of the three disaster-stricken prefectures were at risk of having no access to the supply chain at one time, but both are now on the way to reconstruction through effective use of “reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises”, along with support from various economic organizations and private enterprises. In contrast to this the food manufacturing industry in the coastal areas, and the marine product processing industry in particular, is at present unable to start full reconstruction until the elevation of fishing ports and peripheral areas takes place. The reconstruction of that industry and recovery of employment are thus lagging. Furthermore, a delay in progress can be observed with the construction industry, which plays a major role in the reconstruction, due to a shortage in supervising engineers/skilled workers and materials, and with an increase in expenses, job offers in clerical and related work being poor, and a scarcity of employment for females being indicated.

Special extension of the benefit period of the employment insurance has been implemented in the disaster-stricken areas, but the percentage of those that cannot gain employment by the time the benefit period ends is increasing (benefit period is expected to end for 10,000 people by the end of April). Measures must therefore promptly be taken without delay in thereby responding to the increasing need for re-employment or incomes. That is to say, there is a concern that without appropriate measures many people will leave the disaster-stricken areas due to a lack of employment, which is necessary in their daily lives, before reconstruction is fully making progress or “give up their businesses“ before restarting them at the completion of the elevation work. Even with the progress made in infrastructure development, including elevations, etc., reconstruction of the disaster-stricken areas cannot take place if people’s motivation is lost. The Sub-Committee therefore first

compiled recommendations on securing employment and supporting industries, and local industries such as the marine product processing industry in particular, in thereby coping with the present situation. The Sub-Committee sincerely hopes that the full reconstruction will progress in the disaster-stricken areas with these recommendations being utilized in the actual policies.

3 Present situation and issues with employment support measures

(1) Job-seeker support system expected to be utilized for employment in the disaster-stricken areas

After the earthquake disaster the number of new job offers in the construction industry in the three disaster-stricken prefectures has been increasing to the largest level seen in recent years. In addition, the need for welfare related jobs, including long-term care services, etc., is significant, while the number of new job offers in medical care and welfare has also been increasing in the disaster-stricken areas due to the aging population. Considering the situation expanding employment opportunities in the construction and welfare industries until the fisheries and marine product processing industries in the coastal areas get back on track is considered an effective employment measure for the moment. Utilization of the job-seeker support system†[11] is expected to help those that had been engaged in the fisheries and marine product processing industries acquire the necessary skills and lead to smooth employment for them.

(2) Present situation with job-seeker support system

The purpose of the job-seeker support system, which commenced on October 1, 2011, is to lead people to employment. Private training institutions to which vocational training is entrusted to are therefore required to have, as the conditions for their certification, at least one year of experience in training and employment achievements. Certification takes place in accordance with regional vocational training implementation plans which take growth fields and needs in local job offers into account. Special measures to relax certification conditions may be taken in such cases as in when recovering facilities damaged by the Great East Japan Earthquake has proved to be insufficient[12].

The system just commenced in October 2011, and therefore identification of employment achievements three to six months after the completion of the training courses will need more time. The situation with certification for training courses implemented during the period of between October 2011 and March 2012 (preliminary figures) is as follows (as of January 23, 2012, published by the Ministry of Health, Labour and Welfare) (Table 6 in the Appendix).

5,544 courses with a capacity of 117,655 persons were certified nationwide (excluding some applications under examination and additional applications), of which 1,570 basic courses with a capacity of 30,119 persons and 3,974 practical courses, which consist of more practice oriented

[11] Hereinafter refer to <Definition of terms> for words and phrases marked with †.
[12] Consultations with prefectural vocational training support centers in Iwate, Miyagi, or Fukushima Prefectures is required in these cases.

content, with a capacity of 87,536 have started.

However, prefectures with large cities have bigger capacities and larger number of courses nationwide, thus regional disparities exist with regard to opportunities to receive training. In addition, the Ministry of Health, Labour and Welfare has not taken any particular measures to intensively certify training institutions in areas facing severe employment situations, but emphasized that certification should persistently be judged according to the plans and achievements of individual institutions.

In the three disaster-stricken prefectures of Iwate, Miyagi, and Fukushima the number of courses started was 90, 140, and 123 (total of 353) with a capacity of 1,469, 2,895, and 2,284, respectively. In this connection the capacity of certified courses per 1,000 unemployed persons as of 2010, as calculated using the "Labour Force Survey" of the Ministry of Internal Affairs and Communications, was 35.2. Calculating this figure by prefecture reveals it to be 42.0, 41.4, and 43.1 in Iwate, Miyagi, and Fukushima Prefectures, respectively, all of which exceed the nationwide average.

Of approximately 3,500 persons for whom unemployment allowances of employment insurance were terminated by February 17, 2012, only around three persons in Fukushima Prefecture, 24 in Miyagi Prefecture, and eight in Iwate Prefecture have been estimated to have taken vocational training ("Asahi Shimbun", March 3, 2012). Conducting an evidence based policy assessment, for instance at the level of improvement observed in the regional unemployment rate in accordance with the situation with certification and use of the job-seeker support system , etc., will be important in the future.

(3) Issues with job-seeker support system

The job-seeker support system described above has the following issues.

First, no measures such as a subsidy system for the initial costs, etc. are being taken. The background to this is that in the case of conventional fund training[†] the institutions concerned were granted with a "new training creation subsidy" of one to three million yen to subsidize the initial cost of creating a new training course in addition to a "training subsidy", but no clear standards were established for the employment achievement rate of the trainees. Concern has existed therefore that institutions with insufficient training capabilities and which aimed to obtain the subsidies have also been certified. However, the problem exists that the response to that concern was in turn inhibiting the new entry of entrusted training institutions.

In addition, the level of strictness with the trainees also made this system difficult to use. Trainees that meet specific conditions are provided with a monthly "vocational training allowance" of 100,000 yen (or an amount calculated by multiplying 3,580 yen by the number of

days when less than 28 days) and “transportation expenses” (actual expenses but no more than 42,500 yen per month). The maximum period for receiving an allowance for taking vocational training is 12 months, but can be extended to 24 months if deemed necessary. However, the next allowances cannot be received for a duration of at least six years after the last date of receipt. In addition, the conditions for receiving the allowances† include “no other member in the household shall be receiving this allowance and taking vocational training” in addition to upper limits on household incomes and financial assets. Furthermore, the allowances will no longer be paid when the trainee has failed to visit Hello Works on a regular basis, and a penalty of a payment/restoration of three times the amount received is imposed in the case of dishonest receipt. As shown in these examples the system is quite strict. For the job-seeker support system a budgetary measure of 66.5 billion yen from the employment account was taken in FY 2011 and a budgetary request of 147.9 billion yen, more than twice the amount of FY 2011, made in FY 2012.

(4) Issues with the job-seeker support system in the disaster-stricken areas

The job-seeker support system was not introduced as a measure for reconstruction from the earthquake disaster, but is expected to be utilized in the disaster-stricken areas as described in (1) of this chapter. In order to enable its smooth operation, however, the following issues are expected to have to be resolved.

First, a shortage in certified training institutions in these areas should be noted. A declining/aging population is already progressing in the disaster-stricken areas, and hence it will be difficult for private training institutions to secure a certain number of trainees when they open training courses, and therefore the benefits are considered to be small when compared to the cost of their establishment (under the job-seeker support system the initial cost of creating a new training course is not subsidized). In addition, implementing vocational training for the operation of vehicle type construction machines, which has prospects for employment with debris disposal, etc., is difficult in coastal areas with its lack of flat land. The opportunities to take this training are more likely to be found in neighboring prefectural capitals or urban areas, including Morioka City, Sendai City, or Fukushima City, etc., but commuting from the coastal disaster-stricken areas to the training institutions in these areas could prove too difficult.

Allowing people in the disaster-stricken areas to collectively take training in urban areas will require support for residential environments for a certain period in addition to the payment of the 100,000 yen allowance. More concretely, measures to provide public accommodation facilities for use by those certified as disaster victims can be expected. The government has been requesting the utilization of employment promotion housing, public housing, and UR rental housing and the

voluntary provision of company housing through industry organizations as earthquake disaster measures. Further collaboration between these housing support measures and the job-seeker support system needs to be promoted. In addition, the job-seeker support system strongly involves Hello Works. Hello Works that have jurisdiction over the disaster-stricken areas and urban areas must therefore cooperate closely in thereby not causing any disruption to the provision of careful employment support.

The second issue concerns insufficient employment opportunities being secured in some regions. For example, in construction/civil engineering industries job offers are likely to be made for highly specialized and difficult occupations, and thus not just anyone can gain employment. Using schemes in that job offers for highly specialized and difficult occupations are made nationwide but with people from the hometown being utilized in other occupations, etc. is therefore needed.

The third issue concerns the necessity of cooperation with various employment measures that are implemented as reconstruction measures. For example, employment reconstruction promotion projects at a scale of 151 billion yen were introduced in the 3rd supplementary budget of FY 2011 to facilitate full employment reconstruction in the disaster-stricken areas. The reconstruction promotion projects have two projects available to businesses that create employment in the disaster-stricken areas, namely "business reconstruction type employment creation projects" and “lifelong commitment/full participation/generational succession type employment creation projects” <13>. The latter allows skills to be transferred from the elderly to young people, active utilization of females and persons with disabilities, etc., and a community based work life, and is thus expected to create employment through business independence in the future. Each of them provides support for up to three years or until FY 2015. In collaboration with the job-seeker support system, measures to actively employ those that have received training the through job-seeker support system must be taken as a requirement for more employment creation by employment restoration promotion projects, etc. In addition to the above the wisdom of the private sector should be utilized to the fullest extent possible such as in creating employment in cooperation between various economic organizations and municipalities of the disaster-stricken areas, etc.

4 Present situation and issues with industrial promotion measures

(1) Present situation with reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises

[1] History of reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises†

The areas that were the most severely damaged in the Great East Japan Earthquake were the Tsunami-affected areas and areas surrounding the Fukushima Daiichi Nuclear Power Plant (Figures 7 and 8 in the Appendix). Reconstruction support measures for local industries in these areas are very much being anticipated in thereby securing employment and thus income opportunities for the disaster victims and residents in the disaster-stricken areas. However, the situation significantly varies in the individual areas surrounding the nuclear power plant. The Tsunami-affected areas in the Sanriku coastal areas are discussed below.

The Sanriku coastal areas, although excluding some urban areas, had concentrations of industrial complexes for fisheries-marine product processing-marine product related manufacturing (shipbuilding, fishing nets/gear, marine product processing machinery/equipment, etc.) -distribution-wholesale and retail/restaurant-services related industries established by various economic agents from corporation management through to occupational. Kesennuma can be considered a typical such area.

Kesennuma City, in particular, was built around fisheries, mainly fishing ports, and with nearly 70% of workers in manufacturing industries having engaged in marine product related food manufacturing. The earthquake disaster resulted in the reclaimed land around Kesennuma bay area, where fisheries and marine product processing industries are concentrated, being hit by Tsunamis and a significant level of subsidence, all of which resulted in crushing damage. Reconstruction of marine product processing industries cannot take place without the ground first being elevated. However, reconstruction of fishing port related facilities, marine product processing plants, stores, and houses has not been commenced upon for nearly a year because the 3rd supplementary budget of the government was not approved until November 20, and building restrictions were imposed by Miyagi Prefecture.

Land elevation is expected to take place through projects that subsidize the development of fishing ports or land readjustments, etc., and in which “reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises” are drawing attention. The projects will use national funds to directly subsidize small- and medium-sized enterprise groups engaging in the reconstruction and development of

the facilities/equipment required in the reconstruction project plans. These are the first projects implemented through investing national funds in private sector projects, something which was never occurred with previous large-scale disasters. It is being highly regarded as it will encourage small- and medium-sized enterprises in the disaster-stricken areas and facilitate investment in the restart of economic activities.

However, there are issues with the promotion of the industrial reconstruction and creation of employment opportunities in the coastal areas in particular. The present situation and issues with these projects will therefore be pointed out here.

The projects were first approved in the 1st supplementary budget of June 2011. Under this system the government will subsidize no more than 1/2 and prefectures no more than 1/4 of the expense of restoring/developing facilities/equipment when small- and medium-sized enterprises in the disaster-stricken areas formulate reconstruction project plans which have been certified by prefectures as being important to the local economy/employment.

According to the framers of the system it was originally designed to include the restoration of supply chains and large-scale enterprises also being possible subjects. In addition, the acceptance of applications and judgments are mainly carried out by prefectures. The projects were adopted a total of three times from the 1st supplementary budget through to the 3rd supplementary budget.

1st adoption (Aug. 5, 2011)	28 groups in three prefectures (Aomori, Iwate, and Miyagi) Total subsidized amount of 17.9 billion yen (of which national funds will account for 11.9 billion yen)
2nd adoption (Nov. 8, 2011)	38 groups in four prefectures (Iwate, Miyagi, Fukushima, and Ibaraki) Total subsidized amount of 23.4 billion yen (of which national funds will account for 15.6 billion yen)
3rd adoption (Dec. 27, 2011)	106 groups in six prefectures (Aomori, Iwate, Miyagi, Fukushima, Ibaraki, and Chiba) Total subsidized amount of 165.1 billion yen (of which national funds will account for 110.1 billion yen)

[2] Differences exist in the way of thinking of the individual prefectures regarding the subsidies, as indicated by the content of the 1st adoption

The content of the 1st adoption is examined here. Under this system applications for the projects from small- and medium-sized enterprise groups are judged after being examined by

plan certification committees of the respective prefectures and a project subsidy examination committee of the government. The 1st public invitation for applications was published on the website of the Small and Medium Enterprise Agency on June 9, 2011 and with the application period set to be June 13 to 24. According to interviews with traders and manufacturers in Kesennuma City it was difficult for small- and medium-sized enterprises to meet that schedule because the application period was too short for the efficient dissemination of the information and to be able to make an application while the communication and transportation means are yet to have been recovered.

The results of the applications in the 1st public invitation (1st adoption) were announced on August 5. Comparison of the adopted projects in Miyagi and Iwate Prefectures suggests the way of thinking about the project adoptions in these prefectures are quite different (Table 9 in the Appendix).

Requirements for the public invitation differ in each prefecture. In Miyagi Prefecture the applicable groups are categorized into five types, namely the "supply chain type", "economy/employment growth type", "locally valuable enterprise cluster type", "marine product (seafood) processing type", and "shopping district type", whereas no such categorization took place in Iwate Prefecture. In Miyagi Prefecture, in particular, precision instruments or machinery are actively manufactured in the inland areas, and therefore "supply chain type" industries were considered to have been selected as one of the main subjects of support. However, the adoption did not take place evenly between the abovementioned five types. Enterprise groups of "supply chain type" were mainly adopted, and with the local industry of marine product processing only Onagawa Town and Minamisanriku Town adopted it. The marine product processing group in Kesennuma was finally adopted in the 3rd public invitation. In contrast to this, and in the case of Iwate Prefecture, small cities in the Sanriku areas were adopted mainly for the core industry of marine product processing.

Differences can also be observed with the application reception points. In Iwate Prefecture applications to the prefecture are made through the Business Management Support Division of the Department of Commerce, Industry, Labor and Tourism, whereas in Miyagi Prefecture it was through the New Industry Promotion Division of the Department of Economy, Commerce, Industry and Tourism, which is responsible for attracting and developing new industries such as the automobile and IT industries, etc. The characteristics of these reception points are considered to have possibly resulted in the groups in the 1st adoption being biased toward the "supply chain type". From the point of view of fairly supporting the industries/enterprises that will form the basis of the disaster victim's lives in the individual disaster-stricken areas it is important that no misunderstandings exist in that the prefecture is facilitating "disparities in

reconstruction" by focusing on industries/enterprises of importance to it.

The selection criteria in the "reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises" are not necessarily very clear, and in addition the reasons for non-adoption were not disclosed to the enterprise groups which were not adopted, and thus dissatisfaction is growing among the groups that were not adopted. In order to achieve smooth system operation prompt discussions on the establishment of more concrete criteria and disclosure of the reasons for non-adoption that take into consideration the achievements and reflections of previous public invitations are both expected.

(2) Issues with the reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises

Some issues are considered to exist with utilizing these projects to reconstruct industrial activities in the disaster-stricken areas in the future when the status of the progress on the reconstruction is taken into account.

First, the subjects of the subsidies tend to be inclined toward manufacturing industries in the supply chain or shopping districts. After taking into consideration that manufacturing industries in the inland areas are on a recovery trend as a result of implementation to date the system is also expected to be applicable to the broad range of industries that form local industries, including the marine product processing, construction, and various services industries, etc. The system is implemented without basic municipalities and local chambers of commerce and industry, etc. being involved in the process of the project application, and thus they could come in conflict with local reconstruction plans and projects. The reconstruction of infrastructures, elevation of ground, and reconstructed city planning projects need to be consistent.

Secondly, the establishment of large-scale enterprises is also included within some industries. While financial resources are limited a greater focus should be placed on support for small- and medium-sized enterprises.

Thirdly, issues with implementation of the system exist. As described above the period between the announcement of the public invitation and submission of applications was too short, and thus the applicants were forced to work to a very tight schedule. The preparation of documents, etc. is also rather troublesome. Enterprises that lost all their managerial documents/data due to the damage from the Tsunamis in particular will find it extremely difficult to prepare the necessary documents. In addition, the adoption process was not transparent as the prerequisites for applications were unclear and the reasons for non-adoption not disclosed. Furthermore, the time it takes for an application to be made, adopted, and then finally granted a subsidy is unreasonably long. The turnover of funds until completion of the construction is also

linked to the problem of “overlapping debt”, which is becoming burdensome to disaster-stricken enterprises. Operation of the system needs to be drastically reviewed in thereby enabling applicants to utilize the subsidies more effectively.

Fourthly, the system formally supports groups of enterprises, but in actuality individual enterprises can also be granted subsidies. However, independently managed enterprises cannot apply unless they can find other enterprises that can then jointly form a group. Granting subsidies individually to small- and medium-sized enterprises that are deemed to have played core roles in the local economy should be discussed.

As discussed above the “reconstruction and construction subsidy projects involving facilities and equipment of groups such as small- and medium-sized enterprises” are the first projects to be implemented using national funds, something which has not occurred with previous large-scale disasters, and are being highly regarded as they encourage small- and medium-sized enterprises in the disaster-stricken areas and facilitate investment toward the restart of economic activities. For that reason alone the government and prefectures should think hard and closely consider the disaster-stricken municipalities and other relevant parties for making the system and its operation more flexible in thereby enabling full utilization of the system.

5 Recommendations toward industrial reconstruction and employment support

(1) Alleviation of labor market mismatches

[1] Improvement of the job-seeker support system in making it more compatible with the actual labor market situation

a. Area/attribute based employment targets

In order to make the job-seeker support system more effective as a measure for reconstruction from the earthquake disaster an incentive system in which the disaster victims in areas where finding employment is difficult are provided with training implemented by private training institutions and with larger amounts of subsidies being granted when they are employed is needed after taking into consideration the labor market situation in the disaster-stricken areas.

Under the present system training institutions can more easily obtain employment achievements by selecting unemployed persons that find it relatively easy to gain employment, such as those with short unemployment periods, younger of age, or highly educated, etc., and then providing them with training. In contrast to this training institutions are likely to avoid accepting long-term unemployed persons of an older age who are not very highly educated. A so-called “cream skimming” situation where people who find it difficult to gain employment are basically excluded from training institutions could therefore occur.

In order to avoid that situation the following concrete measures are being proposed. First, the present implementation of granting a certified vocational training subsidy of 50,000 yen for each person trained should be corrected, and instead a mechanism that ensures the subsidies are in line with the level of the employment difficulty should be introduced. That is to say, an incentive system should be established in which guidelines or targets for improving the employment rate that rank the level of the employment difficulty of trainees according to their unemployment period, age, sex/gender, educational level, and public assistance recipient status, as described below, are set, and larger amount of subsidies granted afterwards for the employment of trainees with higher level of difficulties.

The reason that necessitates correction of undifferentiated employment achievement setting also applies to the industrial/vocational characteristics of the disaster-stricken areas. As described above, although the effective job-offer to job-seeker ratios in the three disaster-stricken prefectures have been improving significant disparities exist between the different industries, occupations, and areas. Targets for improving the employment rate by attribute and area, rather than uniform employment rate targets, therefore need to be set a requirement for the certified vocational training, and then the incentive system designed accordingly.

b. Cooperation with other employment restoration promotion projects

Presenting policies on actively employing those that received training through the job-seeker support system as a requirement for employment creation through the employment restoration promotion projects can be used an incentive for unemployed persons to take active part in the training. In addition to the employment restoration promotion projects various other earthquake disaster measures have already been taken. For example, 887 persons via disaster victim employment development subsidies and 746 via practical employment promotion subsidies are taking a step forward toward being employed after the earthquake disaster (Table 12 in the Appendix). As described above the expectation is thus that appropriately combining other employment reconstruction promotion projects and the job-seeker support system will secure more reconstruction human resources that meet the needs of not only job-seekers but also the recruiting enterprises.

c. Alleviation at household level

The present job-seeker support system requires as a condition of receiving the allowances that "no other member in the household shall be receiving the allowance and taking vocational training". While evaluating the situation with the system usage and its effects this requirement should be removed at least for concerning the training. In addition, the conditions for receiving benefits are expected to be altered to include "spouses and children/parents within the same household are not working more than a specific number of hours per week", etc.

[2] Cooperation with "From Welfare to Employment"

People that unexpectedly lost their accustomed workplaces and businesses face difficulties with being concretely motivated to find a job. In addition, and as mentioned in the "Introduction", while the restoration of public services, including medical care, day-care, and long-term care services, etc., is relatively lagging quite a few people still have difficulty not only gaining employment but only in visiting Hello Works due to the burden of having to care for others. While unemployment allowances from employment insurance are being terminated, certain people finding it difficult to gain employment are considered to be pursuing public assistance in thereby securing an income. From the point of view of promoting sustainable reconstruction in the regions public assistance must be a system that "is easy to use and which helps people to become independent". In addition, consideration should be given to enabling people that are forced to live away from their hometown municipalities due to the disaster in

thus enabling them to be more smoothly provided with living support, including public assistance, etc.

The government has responded to various policy recommendations concerning the reinforcement of employment support for public assistance recipients, etc. by promoting “From Welfare to Employment” support projects. With these projects agreement was reached that municipalities would request Hello Works for employment support based on information provided by welfare offices in response to people facing difficulty with employment/living, including public assistance recipients, child rearing assistance recipients, and housing allowance recipients, etc. At Hello Works employment support navigators formulate employment support plans that meet the needs and living environments, etc. of people facing difficulties via employment support menus. The support menus of Hello Works, which include out-reach services at an early stage, are available via variety methods according to the situation of people facing difficulties[13]. In addition to career consultations toward employment ability developments such as employment preparation programs, trial employment, public vocational training, etc., employment guidance/job placements, individual job offer developments, and follow-ups for retention after employment are all available.

While both municipalities and Hello Works in the disaster-stricken areas are being kept extremely busy agreements concerning “From Welfare to Employment” support projects have not been reached or are inadequate even when an agreement has been reached. In that sense the establishment/enhancement of a careful individual support system, including by securing staff members such as support navigators, etc. at Hello Works, etc., is actually needed in the disaster-stricken areas.

[3] Ensuring sufficient staffing at Hello Works

Securing staff members for developing job offers at Hello Works is important in alleviating labor market mismatches and through finding potential job offers in the disaster-stricken areas. However, Hello Works in the disaster-stricken areas have been kept extremely busy handling unemployment allowance procedures and job placement services, and with the shortage of staff members for developing new job offers having become

[13] Efforts to facilitate self-sufficiency through employment and adaptation to workplaces via “From Welfare to Employment" support projects and an employment support program for public assistance recipients, etc. resulted in a steady increase in the number of persons supported and the number of employment cases from 13,288 persons and 7,153 cases in FY 2008 reaching 21,139 persons and 12,597 cases in FY 2010, respectively. These numbers are expected to further increase with the estimated numbers for FY 2011, based on the actual figures up to December, being approximately 44,000 persons and approximately 23,000 cases (Source: Employment Security Bureau of the Ministry of Health, Labour and Welfare).

extremely serious[14].

At the Hello Works of Labour Bureaus in the three disaster-stricken prefectures the effective numbers of job-seekers per staff member were extremely large at 512 in Iwate Prefecture, 776 in Miyagi Prefecture, and 724 in Fukushima Prefecture (as of January 2012). Labour Bureaus appointed additional consultants to cope with this situation, but the effective number of job-seekers per staff member or consultant have remained at a high level and with the average of the three disaster-stricken areas being 63 (Table 11 in the Appendix). The smooth operation of the job-seeker support system also depends on the active involvement of Hello Works makes securing a sufficient number of staff members essential, including for job offer developments.

(2) Reconstruction of local industries in the disaster-stricken areas

The economies of the individual disaster-stricken areas can move onto the path of reconstruction if the number of economic agents that can reinvest increases in thereby creating the local circulation of funds, and thereby recovering the employment situation. To do so basic municipalities must take the lead in formulating reconstruction implementation plans that take complex local industries and multi-worker households into consideration and establish a cross-industrial (agriculture, fisheries, manufacturing, commerce, and services) progress management system.

[1] More flexible and enhanced "reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises"

Although these projects can be regarded as part of an epoch-making system that directly injects national funds into the private sectors, the following matters, at least, need to be improved upon.

First, taking into consideration that manufacturing industries in the inland areas are on a recovering trend the system is expected to be also applicable to the broad range of industries that form the local industries, including marine product processing, construction, and various services industries, etc. In addition, the system shall be operated in such as way as to allow enterprises that have been deemed to play core roles in the local economy to be individually subject to subsidies.

Secondly, the system should be able to be utilized without any worry in cases where the

[14] At Labour Bureaus in the three disaster-stricken prefectures support members were dispatched to Hello Works, etc. to cope with the shortage of staff members: 4,248 support members in Iwate Prefecture, 8,510 in Miyagi Prefecture, and 4,296 in Fukushima Prefecture, or a total of 17,054 for the three prefectures (from April 10, 2011 to January 28, 2012) (Table 10 in the Appendix).

actual reconstruction work will take place later on due to the necessity for elevation work. More concretely, the carry-over of subsidies, which take the degree of the progress of elevation work into account, should be allowed until the end of March 2016.

Thirdly, the system needs to be corrected to become a subsidy system that is easy for disaster victim enterprises/establishments to apply to and operate. The application period is expected to be made sufficiently long and the procedures, etc. more simple and flexible. In addition, and in consideration of the funding treatment during the period from the grant decision until completion of construction, payments need to be made each fiscal year according to the progress of the projects and based on the judgment of the municipalities concerned.

Fourthly, the adoption of subsidized projects need to be corrected in implementing a system where priority for subsidies/financing is first decided using the unit of a basic municipality and based on the characteristics of disaster-stricken industries in the region and damage from the disaster to the local community. The government and prefectures then make adoptions after balancing the entire budget. Clarifying the consistency of the reconstruction plans/projects of the basic municipalities is important.

[2] Smoother promotion of reconstruction

As described in Chapter 2 regional disparities in the reconstruction exist. With the regions where reconstruction is falling behind the entire region must be allowed to cooperate in the reconstruction. To do so the following matters are expected to need to be dealt with.

First, inter-ministerial cooperation must be strengthened in preventing abuse of the "vertically segmented administration" system in reconstruction projects. For example, basic reconstruction projects involving elevation work vary from those concerning land readjustments to those concerning fishing port developments etc., and with different criteria being used by the respective ministries/agencies for each project, thus making reconstruction of the entire region of Kesennuma, for instance, where few fishing port areas exist but with both workplaces and residences difficult. The government is therefore expected to play a role in arranging the overall reconstruction according to the actual situation with the disaster-stricken areas, including the Reconstruction Agency functioning to arrange the application of core projects according to the actual fishing port functions or selecting the reconstruction projects according to the actual conditions of the disaster-stricken areas, etc.

Secondly, basic municipalities and the chambers of commerce and industry/commerce and industry associations, etc. that are closely associated with local industries need to be utilized in industrial reconstruction as contact points for one-stop services. The government needs to design a system in which these basic municipalities and the chambers of commerce

and industry/commerce and industry associations, etc. can exert adjustment functions as contact points when discussing new support measures.

Thirdly, the problem of the "overlapping debt" of disaster victim enterprises needs to be eliminated. The burden of the "overlapping debt" increase as the reconstruction period lengthens. The "industrial reconstruction board" established in each prefecture should actively promote its elimination. At the same time the government, municipalities, chambers of commerce and industry, commerce and industry associations, fishery cooperatives, and agricultural cooperatives should create a system wherein production facilities can be rented to enterprises/management bodies with remaining previous debts associated with their production facilities, etc.

Fourthly, at present, if alternative assets, etc. (buildings, structures, machinery/equipment, ships, vehicles and delivery equipment, and two-wheeled vehicles that were destroyed/lost due to the Great East Japan Earthquake and meet the applicable requirements and scope) are used for businesses for the period between March 11, 2011 and March 31, 2016, disaster special depreciation can be applied to an amount calculated by multiplying the specified depreciation rate according to the time of acquisition, etc. but while not exceeding the amount of the reserve fund. However, this is only applicable to acquired assets. The scope of application should therefore be expanded to allow gratuitously transferred assets to be recorded as assets, and then special disaster depreciation can be applied to them.

Fifthly, the nuclear power plant accident compensation needs to be made promptly and without fail in the Fukushima Prefecture. A system that supports relatively long-term "temporary housing" projects and business restarts (support for securing business sites, investment, and securing/maintaining employment) needs to be created.

[3] Training of personnel to engage in life-prolonging repair of infrastructures

Life-prolonging repairs will be the key to keeping roads, bridges, quay walls, and river floodgates, etc. that escaped damage in the disaster-stricken areas in good condition.

The aging of infrastructures in Japan has become serious. For example, of approximately 155,000 bridges over 15 meters long more than half (approximately 80,000) were 30 years old or more as of 2010 <17>. 58% of those 80,000 bridges are municipal roads, but have not been appropriately maintained/managed.

In order to cope with this problem a "life-prolonging project subsidy system" was commenced upon in FY 2007. In actuality, however, the formulation of life-prolonging repair plans has fallen behind at the municipality level (23% of municipalities had not conducted inspections as of April 2011, or as of April 2010 for municipalities in Iwate, Miyagi,

Fukushima Prefectures). Securing the necessary budget and a lack of skills were given as the reasons for not conducting regular inspections by the municipalities that had failed to conduct them <17>.

Major construction contractors and secondary construction contractors have already developed construction methods based on preventive maintenance techniques and inspection methods, but their roles are naturally limited to the subjects of repair are scattered throughout hilly and mountainous areas. Local small- and medium-sized contractors are therefore expected to engage in their emergency repair and inspections/maintenance. The issues here are skills and human resources <18>. Training human resources that can engage in their repair, inspection, and maintenance can therefore be expected to expand opportunities for creating employment in the disaster-stricken areas.

A model project in Izumi City of Chiba Prefecture can be referred to with regard to this. Maintenance/management skills were transferred to former employees of railroad companies and municipal officials there. A case of bridge asset management in Aomori Prefecture, which used joint venture methods to transfer and share the skills, would also be good reference material <18>. These life-prolonging projects are also expected to create employment opportunities for the elderly and females.

(3) Revitalizing areas through business start-ups via the initiative of residents - Establishing Reconstruction Non-profits

Developing an environment that enables as many people as possible, regardless of their age, sex/gender, and work experience, to gain employment and play a role in the reconstruction is important in thereby securing human resources who can engage in reconstruction and realize sustainable reconstruction in the disaster-stricken areas. In anticipation of the sound development of various “reconstruction non-profits” (tentative name) via the initiative of residents recommendations made with regard to developing the necessary environments are provided here.

In addition to recovering the marine product processing and other industries that had been the core industries before the earthquake disaster rebuilding a sustainable construction industry and the creation of new environment/energy related industries are also considered necessary with the employment of residents of the disaster-stricken areas. In contrast to this the establishment of community-based “community building companies†” with the aim of community revitalization in areas suffering a decline in their central urban areas, etc. can also provide many suggestions[15].

[15] Cases of community revitalization through community building companies include Kawagoe City of Saitama Prefecture, Nagahama City of Shiga Prefecture, Marugame Town, Takamatsu City of Kagawa Prefecture. Among the disaster-stricken areas of the Great East Japan Earthquake efforts via community building companies are progressing in Ishinomaki City, Kamaishi City, and Tagashiro City.

The concept that focuses on reconstruction from the Great East Japan Earthquake can be referred to as “reconstructed community building companies”. They are described in the intermediate recommendations compiled in November by the “Study Group on Reconstructed Community Building”, which was established within the Development Bank of Japan in May 2011. The “reconstructed community building companies” of the said recommendations are said to have been “drawn up as being distinct from discussion of general ‘community building companies’”. Their core businesses are assumed to be “planning businesses (reconstruction planning, coordination, special reconstruction zone, and application for subsidies)” and “municipality subrogation businesses (investigation/planning and PPP/PFI related work, etc.)” <19>. A proposal suggesting that the mayors of municipalities simultaneously hold the position of being the presidents was also made. The expectations with “reconstructed community building companies” are quite high in that they could facilitate public-private cooperation with trends in decentralization and regional autonomy reform also taken into consideration.

In addition to the model of “reconstructed community building companies”, which aims to establish one such company in each municipality, the Sub-Committee would like to recommend the establishment of various “reconstruction non-profits” (tentative name) via the initiative of residents also being promoted. Various models can be assumed for the reconstruction non-profits, along with discussions that took place at meetings of the “New Public Commons” Roundtable and its successor Council on the Promotion of “New Public Commons,” could be good reference material here. That is to say, “social corporations” drew attention as a corporate system that supports “New Public Commons” in a report made by an expert examination committee of the Council on the Promotion of “New Public Commons”. Social corporations are prescribed as being capable of “playing an active part in resolving social issues through applying business methods”. Provision was made for them taking the form of profit oriented corporations (stock companies, membership companies, and enterprise cooperatives, etc.), non-profit corporations (incorporated nonprofit organizations, general incorporated associations/foundations, public interest incorporated associations/foundations, social welfare corporations, and cooperatives, etc.), and both profit and non-profit (stock companies and incorporated nonprofit organizations, etc.) <20>. the advantages and limitations of the various corporate bodies, including a new type, have also been discussed at meetings of the “New Public Commons” Roundtable.

In view of the needs with the reconstruction from the Great East Japan Earthquake conceivable points of emphasis with reconstruction non-profits as social corporations are summarized, and then after limiting the forms the system development requires to be modeled after public interest corporations is described below.

[1] Points of emphasis with "reconstruction non-profits" as social corporations

The expectation is that the appropriate framework will invite investment nationwide for the purpose of reconstruction support and thereby promote activities which will then create businesses/employment in the disaster-stricken areas. The points of emphasis with reconstruction non-profits as social corporations are therefore considered to be the following.

1) The purpose of activities shall be social businesses involved in "reconstruction".
2) In order to achieve this purpose the stock (equity) mode shall be used to facilitate investment in the reconstruction support.
3) For this purpose favorable tax treatment, etc. with investments shall be granted.
4) In return for the favorable tax treatment no dividend payments shall be made (in this case the investments basically have the characteristic of being contributions, for which reason the favorable tax treatment can be justified). Although no dividend payments are permitted the transfer of shares to third parties and redemption of shares at the time of a corporate dissolution, which will, however, be limited to the invested amount and only when positive properties exist, may be allowed in some cases (a system shall be developed to enable other corporations engaged in reconstruction businesses in the disaster-stricken areas to inherit to the fullest extent possible the positive properties still remaining after redeeming shares to investors an amount limited to their investment at the time of a corporate dissolution).
5) Decision making rights shall be separated from the invested amount (unlike general profit corporations, the amount of investment made is not linked to level of influence upon decision making).

Referring to conventional cases in the region suggests that, for example, creating employment through establishing reconstruction non-profits through utilizing local resources, for example know how and networks, etc. accumulated by the incorporated nonprofit organizations "Mori wa Umi no Koibito" in the Kesennuma region and also facilitating entry of construction industry in projects such as the "Green Employment Project" can be considered[16].

[16] The necessity of forest restoration is not just limited to the production of timber. Forest development can be beneficial in a variety of ways, and which include cultivating water sources, preventing disasters in mountainous areas such as debris flows, absorbing/storing CO_2, maintaining biodiversity, and contributing to the cultivation of marine resources, etc. However, these benefit the external economy and not the business operators that actually develop the forests if the system remains as is. Forest degradation in Japan is due to a shortage of labor, with that inability to secure labor being because the business operators cannot manage to pay personnel expenses and equipment costs as they try to keep up with the price of imported timber.

[2] Public interest corporation type "reconstruction non-profits"

Public interest corporations can make better use of the "deemed contribution system†". In the event reconstruction non-profits are modeled after public interest corporations the following measures can be used to provide a framework at present. That is to say, Articles 2 and 4 of the Act on Authorization of Public Interest Incorporated Associations and Public Interest Incorporated Foundation (hereinafter referred to as the Public Interest Corporation Act) of 2006 define "business for public interest purposes" as being "business of the kind listed in each item of the appended table that relates to scholarship, art, charity or other public interests and that contributes to the promotion of interests for many and unspecified persons". Adding the new item of "business that promotes reconstruction in the disaster-stricken areas", etc. or including reconstruction non-profits as being a business that falls under item 23† ("In addition to each of the foregoing items, business provided for in Cabinet Order as one relating to the public interest") in the Appended Table (relating to Article 2) of the said Act. Article 3† of the said Act provides for the administrative agency becoming prefectural governors under certain conditions.

Furthermore, the establishment of standards for public interest corporation authorization that suit the characteristics of the individual reconstruction non-profits, which differ to other public interest corporations, and the "Act on Authorization of Public Benefit of Reconstruction Non-profits" with the aim of facilitating its authorization should be discussed from a medium-term perspective. More concretely, examining representative regulatory methods of the Public Interest Corporation Act reveals the said Act to regulate the content of businesses of public interest corporations from three points of views. That is to say, first, the point of view of whether revenue from public interest purpose businesses exceeds the amount of appropriate costs required to implement that business or not. Secondly, whether the ratio of business for public interest purposes is at least 50/100 or not. Thirdly, whether idle properties exceed a specified limit or not.

The existing system grants some favorable tax treatment to public interest corporations that meet these regulations, including [1] profits from public interest purpose businesses not being taxed, [2] profits of public interest corporations not originating from public interest purpose businesses are also not taxed, provided that 50% of them are incorporated into the account of public interest purpose businesses and are limited to the extent of the incorporated amount, and [3] the contribution to public interest corporations is granted favorable tax treatment. Issues with drafting the "Act on Authorization of Public Benefit of Reconstruction Non-profits" will therefore include how far the regulations because of these three points of views should be relaxed for reconstruction non-profits and in turn how far should the favorable

tax treatment be increased for reconstruction non-profits. Attempts are being made here to relax the authorization regulations of the Public Interest Corporation Act, and based on the following three basic policies.

(a) Ratio of business for public interest purposes

First, with the issue of to what extent the above three regulations should be retained the regulations regarding the ratio of business for public interest purposes shall be used as a basic framework and with the scope of businesses for reconstruction purposes being expanded through modifying the rules that outline the boundary line between businesses for reconstruction purposes (public interest purposes) and business not for reconstruction purposes and according to the actual status of reconstruction non-profits. This will make meeting the requirements of the ratio of business for public interest purposes easier than through evaluating it as based on the concept of public interest purposes of the Public Interest Corporation Act. Regulations on the ratio of business for public interest purposes will be removed from the judgment criteria for the authorization of public interest corporations, but this shall then in turn be covered by an examination item requesting that the "content of its business shall contribute to the promotion of the purposes provided for in its articles of incorporation". If the content of the business does contribute to the promotion of the purposes provided for in the articles of incorporation the ratio of business for public interest purposes is also considered to have been met in normal cases.

In addition, businesses for reconstruction purposes performed by reconstruction non-profits shall broadly include business that does not actually contribute to the benefit of a large number of the general public but does contribute to the purposes provided for in the articles of incorporation. Furthermore, profit oriented businesses shall also be included in businesses for reconstruction purposes, provided that they contribute to the purposes provided for in the articles of incorporation and their scope does not exceed any extent unavoidable in contributing to those purposes as provided for in the articles of incorporation.

(b) Regulations on revenue from public interest purpose businesses

Secondly, regulations on revenue from public interest purpose businesses shall be removed. The rationality of regulations on revenue from public interest purpose businesses is that a larger number of people would benefit through lower price setting. However, the process of contributing to the public benefit is not necessarily unique to reconstruction non-profits. Regulations on revenue from public interest purpose businesses, as provided for in the Public Interest Corporation Act, shall therefore not be succeeded. Revenue exceeding

that considered reasonable shall be taxed. In addition, this shall result in the regulations on revenue being removed from the judgment criteria used when authorizing public interest corporations.

(c) Regulations on idle properties

Thirdly, regulations on idle properties shall be relaxed from being a reason for the cancellation of authorization to being a reason for termination of favorable treatment. Possession of an excessive amount of idle properties is completely undesirable. However, the possession of idle properties does not necessarily mean that the corporation of concern is not contributing to the public interest, and a massive amount of idle properties is unlikely in general with the normal earning capacity of reconstruction non-profits. Therefore allowing this as a reason for canceling the authorization of public interest corporations is considered overly strict with respect to reconstruction non-profits. This shall result in the regulations on idle properties being removed from the judgment criteria for the authorization of public interest corporations.

Efforts should be made in conducting long-term reconstruction projects not only by the government but with the cooperation of municipalities and the private sector and through this system design. To do so will require the government taking measures to the fullest extent possible.

6 Conclusion

The above recommendations made by the Sub-Committee can be summarized by the phrase "industrial reconstruction/employment support that closely supports the disaster victims and residents in the disaster-stricken areas". A year has passed since the Great East Japan Earthquake, with some industries in the inland areas having made relatively satisfactory progress with their reconstruction efforts. In addition, there are some efforts being made not just in the recovery process but also in the reconstruction in such a way as to transform into more a profitable form.

In contrast to this, however, there are also some areas and industries that are unable to find a way to recovery even, not to mention reconstruction. In the event many people start to give up on restarting businesses or gaining employment in their hometowns one after another before the reconstruction work makes any progress following the completion of elevation work in the coastal areas of the disaster-stricken areas, or a situation where the infrastructure development is finally completed but "people", the most important entities in the reconstruction are lacking, could occur. With regard to reconstruction of the disaster-stricken areas, there have been opinions aired that any such discussion should take place from the macro-economic point of view with the entire budget of the government and fairness in support taken into account. However, as far as a survey conducted by the Sub-Committee indicates the disaster-stricken areas, and the coastal areas in particular, are still in need of emergency support and are not yet at the stage where the above discussion would be apt. Because of this point of view these recommendations are being made with the primary aim of supporting the employment of "people" that are willing to take part in the reconstruction and making industrial reconstruction carried out by them more substantial, while being limited to points that require urgent improvement.

The reasons that the reconstruction is not progressing in some parts of the disaster-stricken areas include the topographical characteristics of the area and abuse of the "vertically segmented administration" system in reconstruction core projects, etc. These areas should not be abandoned as "one year has already passed" or the "efforts of municipalities are insufficient", but instead providing them with improved support is desirable. In the course of making these recommendations cases where people living in temporary housing without telephones or facsimiles were requested to prepare a large amount of documents when filing applications at short notice or the employment rate after training was included in the requirements for certification from private training institutions in regions where gaining employment was difficult were observed. These response actions are considered to have lacked excessive consideration for the actual conditions of the disaster-stricken areas.

In the "Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake" made by the Reconstruction Headquarters in response to the Great East Japan Earthquake of the

government “Realization of social inclusion and promotion of ‘New Public Commons’” was listed in [4] of “(4) Nation-building which incorporate lessons learnt from the Great Earthquake” of “5. Policies and Measures for Reconstruction”. “Social inclusion”, as listed by the Reconstruction Headquarters, is an idea that originated in Europe, and refers to the creation of a society in which opportunities to participate are secured for everyone regardless of age, gender, occupation, place of origin, place of residence, and health. Correcting disparities between regions through utilizing the characteristics of the regions is also part of that idea. The government has been expressing this idea by also using the phrase building a society where everyone has “a place they belong and equal opportunities” In addition, social corporations and public interest corporations, which the Sub-Committee also recommended be enhanced/created, are expected to play a leading role in the “New Public Commons’”.

In addition, the fact that “realization of social inclusion” was listed as a nation-building policy that incorporate lessons learnt from the Great Earthquake means that the path economic and social development in Japan after World War II has taken shall also be reviewed. This also includes reflection of the fact that regional disparities represented by an excessive concentration in Tokyo and the reverse side of the depopulation/aging of local areas have made the entire nation as well as the most advanced areas vulnerable to economic fluctuations and disasters. Furthermore, whereas the government, and the central government in particular, has conventionally played an exclusive role in public interest matters, the aim with the “New Public Commons” is to increase public interest matters in which basic municipalities, residents, and private organizations play the leading role.

Proceeding with industrial reconstruction/employment support that closely supports the disaster victims and residents in the disaster-stricken areas will also correct the form the nation has taken. A society that is more resilient to disasters and economic fluctuations is considered to be able to be created only through revitalizing the respective regions and according to their characteristics.

<Definition of terms>

Job-seeker support system

The job-seeker support system is a new system that commenced on October 1, 2011, in response to the "Act on Support for Employment of Specified Job Seekers through the Provision of Vocational Training, etc." (promulgated on May 20, 2011). The system was made permanent after taking the immediate human resource development support projects (so-called fund training) into consideration. While succeeding the purpose of the fund training the system supports those unable to receive employment insurance that satisfies income/asset conditions by providing them with both training and living expenses, and which is called the "second safety net" after employment insurance. That is to say it is a system used to achieve stable "employment" through (a) providing free vocational training (job-seeker support training), (b) providing allowances to make taking vocational training easier if certain requirements are met, including those concerning the income of the trainee, household income, and assets, etc., and (c) implementing strong employment support at Hello Works. Private vocational training institutions to which training is entrusted through this system are certified by the Japan Organization for Employment of the Elderly, Persons with Disabilities and Job Seekers.

The system consists of two types of training. One is "basic training (basic course)", which is a vocation training for use in acquiring the basic skills required for employment and other related knowledge. The other is called "practical training (practical course)", which is a course for collectively acquiring the practical skills necessary in the employment of specific types of jobs, including IT, medical office work, long-term care, electricity related work, machinery related work, and construction related work. Both of them are three- to six-month long.

Certified private vocational training institutions receive 50,000 yen per month per trainee as a "grant-in-aid for certified vocational training". In addition, with practical courses subsidies of 10,000 to 20,000 yen are also paid according to the employment rate, thus providing an incentive for the training institutions to raise the employment rate. In contrast to this, however, and according to the Ministry of Health, Labour and Welfare, with basic training a warning (yellow card) is given if the employment achievements fall below 40% and a certification cancellation measure (red card) if it falls below 30%. With practical training, which is close to employment, relatively more severe criteria are established with yellow cards being used at 50% and red cards at 35%.

Subjects of the training in this system are people that are unable to receive employment insurance, but are willing to be employed, and need to receive assistance. More concretely, the subjects are assumed to be those separated from non-regular work to which employment insurance does not apply, long-term unemployed persons whose employment insurance receipt period has

been terminated, school graduates that have never been employed, and self-employed persons that discontinued their businesses, etc. People that do not intend to be employed, those unable to be employed at present due to child rearing or nursing, those not willing to receive training (NEETs), and public aid recipients, etc. are not subjected to the system. The job-seeker support system can also be characterized by the close involvement of Hello Works toward employment than with fund training. The system aims to achieve employment at as earlier stage as possible through close employment support being mainly provided by Hello Works. More concretely, close support is provided through formulating individual support plans for trainees at Hello Works and requesting them to regularly visit Hello Works during their respective stages of training.

Requirements for receiving allowances with job-seeker support system

With the job-seeker support system the requirements for receiving allowances are as follows. (a) a monthly income of no more than 80,000 yen, (b) household (spouse, children, and parents living together or sharing the same livelihood) monthly income of no more than 250,000 yen, (c) household financial assets of no more than 3 million yen, (d) not in possession of any land/buildings other than their present residence, (e) receive all the training on the date it is conducted (no less than 80% if failed to receive training on some particular days for unavoidable reasons), (f) no other person in the household is receiving the allowance or training through the system, and (g) no history of dishonest receipt of unemployment allowances, etc. within the past three years.

Fund training (immediate human resource development support projects)

Fund training was temporarily commenced upon in July 2009 in consideration of the rapid worsening of employment situation after the Lehman Shock of autumn 2008, and a large-scale job separation among non-regular workers in particular. The most notable characteristic of this system was that people who were unable to receive unemployment insurance were provided with free vocational training while at the same time a specified amount of living expenses during the training period if the specified conditions were met. That is to say, training institutions certified by the Japan Vocational Ability Development Association received 60,000 to 100,000 yen per trainee per month as a “training subsidy”. In addition, a “new training creation subsidy” of one to three million yen was granted to subsidize the initial cost of creating a new training course. Fund training was terminated in September 2011 upon commencement of the job-seeker support system. Examining its achievements from data published by the Ministry of Health, Labour and Welfare reveals approximately 540,000 persons to have received the fund training courses which commenced during the pertinent period and of them approximately 360,000 to have been provided with living expenses for the period they received the training. Their improved skills through training resulted in the

employment of approximately 160,000 persons <21>.

Outline of "reconstruction and construction subsidy projects for facilities and equipment of groups such as small and medium-sized enterprises"

An outline of the projects is as follows.

a. Subjects

Groups of multiple small- and medium-sized enterprises, etc. (medium-scale and large-scale enterprises are also applicable), cooperatives such as business cooperatives, etc., and shopping districts

b. Requirements

i. Importance of functions of the group, etc. (has to be one of the following)

- The group plays an important role for enterprises outside the group or industries in other areas <case of playing an important role in the supply chain of the entire industry>
- The group is of a large business/employment scale and contributes a lot to the local community/employment <case of being a local core industry and its peripheral industries support the local economy/employment>
- The group of industries plays a core role in the economy/society of a certain region and is essential in the reconstruction or maintaining employment in the region <case of being an industry group utilizing local resources that thereby forms the entire process flow, etc.>

ii. Significance of damage from the earthquake disaster

- The entire establishment or part of it suffered significant damage from the earthquake disaster, etc.

c. Subjects of subsidies

Expenses for facilities/equipment that were damage by the earthquake disaster. Both facilities/equipment of individual members and facilities/equipment shared among groups, etc. are subjects.

d. Subsidy rate

No more than 1/2 by the government and no more than 1/4 by prefectures (no more than 1/3 by the government and no more than 1/6 by prefectures in the case of medium-scale/large-scale enterprises)

e. Subsidy scheme

Groups, etc. willing to receive subsidies formulate reconstruction project plans and then apply to their prefecture. Prefectures certify the plans that satisfy the requirements, and then grant subsidies after the government's decision on grants is provided to the prefectures.

Outline of "life-prolonging project subsidy system"

A system that commenced in FY 2007 to facilitate a transition from breakdown maintenance (large-scale repairs only when the damage gets serious; the average life-span of bridges is 60 years) to preventive maintenance. Half of the expenses are subsidized by the Ministry of Land, Infrastructure, Transport, and Tourism. Preventive maintenance involves regular inspections being conducted for the early detection of damage. Taking measures before accidents, replacements, or large-scale repairs occur can prolong the average life span of bridges to 100 years. Subsidies may be granted not only for the formulation of plans but also for inspections. Life-prolonging projects contribute to a reduction in the life-cycle cost of bridges and flatten the maintenance/management costs out, thereby saving on the cost while also securing the safety of bridges <18>.

Case of "Green Employment Project"

An example of this would be in Kesennuma oyster farmers that sensed a crisis because of the frequent occurrence of red tides took the lead in the activity of planting deciduous broad-leaf trees on a mountain that was the source of a river in 1989 and which became the incorporated nonprofit organization of "Mori wa Umi no Koibito" in 2009. Its purposes included environmental education and forest creation/natural environment conservation <22>, and it does not therefore aim to engage in the present ongoing restoration/reconstruction or to create employment. However, forest creation is a national issue that is not just limited to fish culture areas and has also been linked to employment creation.

In the late 1990s immediate employment measures and environmental measures were combined and forest development related projects commenced upon. The Forestry Agency commenced upon the "Green Employment Project" in FY 2003. This project subsidizes employers that use "trainees" in forest developments (90,000 yen per month per person + insurance premium for workmen's compensation), and the training is for no more than three years. A total of 11,241 persons received training over seven years up to FY 2009, with 40-50% of newly employed persons in forestry each year having been "trainees". The retention rate after five years of those employed through being trainees was 44.6% <23>.

A Tottori Prefecture version of the "Green Employment Project" that was commenced upon in FY 2009 was further upgraded. That is to say, in addition to "basic salaries" for the training period of 130,000 yen, which was determined based on the minimum wage of the prefecture, housing assistance/traveling expenses were also provided. However, issues with the retention rate still remain in place. Quite a few of the employers were in the construction business because the prefecture is promoting the entry of construction business workers into the forestry industry. Chizu Town in Tottori Prefecture utilizes the prefectural system to create employment through the residents'

participation. This is an attempt to avoid “vocational training without employment”, a situation where receiving vocational training does not lead to employment. Town projects were proposed by sub-committees of the “Committee of 100” that consisted of residents, with wood biomass use, forest therapies, and “forest kindergartens” (outdoor childcare practice), etc. having been selected <23>.

Community building companies

Companies with a strong public nature and established for the purpose of regional promotion. Many of them aim at the development/enhancement of urban areas. In many cases they refer to TMOs (Town Management Organizations), which were established by the Act on Vitalization of City Centers. Five characteristics assumed with “community building companies” are listed on the website of the Ministry of Land, Infrastructure, Transport and Tourism and as the image of community building that revitalizes city centers. That is to say, developers (who engage in the “development” of sustainable city centers, including the hardware-side of developments such as infrastructures and facilities, etc.), management (promote the maintenance/management of communities through implementing projects that raise the value of the community and with local needs taken into consideration in thus enabling consistent private investment), public interest (retain public interest in community building and provide achievements that will benefit the residents), enterprises (retain the financial base of organizational management and implement projects with a sense of business management), and community-based (create community-based businesses that improve the quality of living spaces in city centers in thereby developing local human resources).

Deemed contribution system

Of assets belonging to the profit businesses of public interest incorporated associations/foundations, the amounts disbursed for the businesses of public interest purposes that they perform themselves other than that of their profit businesses are deemed to be the amounts of contributions with respect to the profit businesses. With the deemed contribution, however, the allowable limit of deductible expenses of contribution to public interest incorporated associations/foundations is [2] if the amount of [2] exceeds the amount of [1] ([1]: an amount equivalent to 50/100 of the amount of earnings of the fiscal business year, [2]: an amount required for implementing the business for public interest purposes). In addition, with certified incorporated nonprofit organizations the deducted amount of contributions is between 20% and whichever is higher of [1] 50% of earnings or [2] 2 million yen based on the revised certified incorporated nonprofit organization system. However, with incorporated nonprofit organizations certified under the former system by the end of March 2012 the deducted amount remains at 20% until the

certification institutions are transferred to the competent authorities.

The relevant Article 37-5 of the Corporation Tax Act is as follows. “an amount disbursed for a business other than a profit-making business by public interest corporations, etc. out of assets that belong to profit-making businesses (in the case of public interest incorporated associations or public interest incorporated foundations the amount of assets disbursed of assets which belong to its profit-making business, but for businesses provided for in a Cabinet Order as relating to the public interest other than its profit-making businesses) shall be deemed to be the amount of contribution pertaining to the said profit-making businesses, and the provision of paragraph (1) shall apply to it. ”

Act on Authorization of Public Interest Incorporated Associations and Public Interest Incorporated Foundation (Appended Table (relating to Article 2))

(i) Business to promote academism and scientific technology
(ii) Business to promote culture and art
(iii) Business to support persons with disability or needy persons or victims of accident, disaster or crime
(iv) Business to promote welfare of senior citizens
(v) Business to support persons having will to work for seeking the opportunity of employment
(vi) Business to enhance public health
(vii) Business to seek sound nurturing of children and youths
(viii) Business to enhance welfare of workers
(ix) Business to contribute to sound development of mind and body of the citizen or to cultivate abundant human nature through education and sports, etc.
(x) Business to prevent crimes or to maintain security
(xi) Business to prevent accident or disaster
(xii) Business to prevent and eliminate unreasonable discrimination and prejudice by reason of race, gender or others
(xiii) Business to pay respect or protect the freedom of ideology and conscience, the freedom of religion or of expression
(xiv) Business to promote the creation of gender-equal society or other better society
(xv) Business to promote international mutual understanding and for economic cooperation to overseas developing regions
(xvi) Business to preserve global environment or protect and maintain natural environment
(xvii) Business to utilize, maintain or preserve the national land
(xviii) Business to contribute to sound operation of the national politics
(xix) Business to develop sound local community

(xx) Business to secure and promote fair and free opportunity for economic activity and to stabilize and enhance the lives of the citizenry by way of activating the economy

(xxi) Business to secure stable supply of goods and energy indispensable for the lives of the citizenry

(xxii) Business to protect and promote the interest of general consumers

(xxiii) In addition to each of the foregoing items, business provided for in Cabinet Order as one relating to the public interest

Act on Authorization of Public Interest Incorporated Associations and Public Interest Incorporated Foundation (Article 3)

The administrative agency in this Act shall be the Prime Minister or the prefectural governor, as set forth in each of the following items according to the classification of public interest corporations listed in such items:

(i) Public interest corporations listed in the following: the Prime Minister

(a) Those having their offices within the area of more than one prefecture

(b) Those having articles of incorporation setting forth that they operate the business for public interest purposes within the area of more than one prefecture

(c) Those operating the business for public interest purposes closely related to the administration or business of the national government and designated by Cabinet Order

(ii) Public interest corporations other than those listed in the preceding item: the Governor of the prefecture where their office is located

<Reference>

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<2> Sendai Branch, Bank of Japan, "Trends with the Economy of Tohoku in 2011", December 15, 2011. *

<3> Ministry of Health, Labour and Welfare, "Present Employment Situation in the Three Disaster-Stricken Prefectures (Monthly)", March 2, 2012. *

<4> Iwate Labor Bureau, "Job Offers and Applicants (January)", March 2, 2012. *

<5> Miyagi Labor Bureau, "Job Offers and Applicants (January)", March 2, 2012. *

<6> Fukushima Labor Bureau, "Job Offers and Applicants (January)", March 2, 2012. *

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<13> Employment Security Bureau, Ministry of Health, Labour and Welfare, "Outline of the

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<20> Expert Examination Committee on Examining Public Contracts, etc. of the Government with the Civil Sector, etc., "New Public Commons" Roundtable, "Report on Examining the Relation of the Government with the Civil Sector", July 2011. *

<21> Website of the immediate human resource development/employment support fund projects. *
http://www.kikin.javada.or.jp/

<22> Website of the Non Profit Organization "Mori wa Umi no Koibito".
http://www.mori-umi.org/index.html

<23> 早尻正宏，「森林セクターの雇用保障と公共事業」，井手英策編『雇用連帯社会　脱土建国家の公共事業』，岩波書店，2011.

<Background Information 1> Progress of deliberations of the Sub-Committee on the Promotion of Industry and Employment, Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ

Establishment of the Sub-Committee on the Promotion of Industry and Employment, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 27 Sub-Committee on the Promotion of Industry and Employment (1st)

○ Deliberation matters, future course of action

2012

January 10 Sub-Committee on the Promotion of Industry and Employment (2nd)

○ Recommendations from the Fisheries Commission and the Agronomy Commission, development of construction industry, industrial revitalization support, etc.

February 21 Sub-Committee on the Promotion of Industry and Employment (3rd)

○ Job-seekers support system, reconstruction and construction subsidy projects for facilities and equipment of groups such as small- and medium-sized enterprises, damages to fisheries industry and long-term issues, efforts by Reconstruction Agency, effects on children, etc.

February 22/23

Field survey in Sendai City and Kesennuma City, Miyagi Prefecture by the Sub-Committee on the Promotion of Industry and Employment

March 4 Enlarged executive meeting (1st) of the Sub-Committee on the Promotion of Industry and Employment

○ Draft recommendations

March 8 Sub-Committee on the Promotion of Industry and Employment (4th)

○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on the Promotion of Industry and Employment "Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas – Towards the Promotion of Industry and Employment to Support Victims in Disaster-Stricken Areas –"

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-Committee on the Promotion of Industry and Employment from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations of (proposed) Recommendations by the Sub-Committee on the Promotion of Industry and Employment "Supporting Job-Seekers and Establishing Reconstruction Non-profits in Disaster-Stricken Areas – Towards the Promotion of Industry and Employment to Support Victims in Disaster-Stricken Areas –"

<Appendix>

Table 1　Status of damage from the Great East Japan Earthquake and the Great Hanshin-Awaji Earthquake

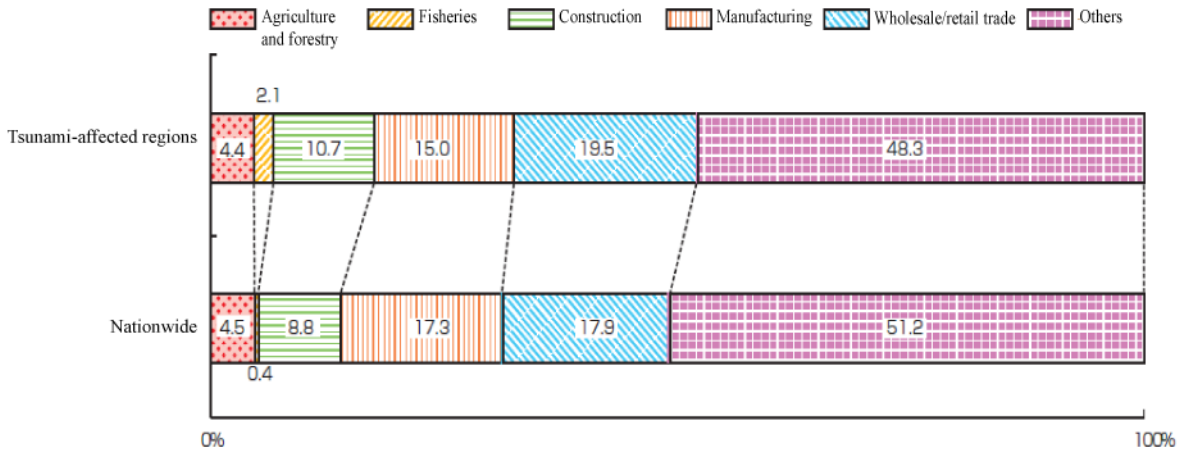
			Great East Japan Earthquake	Great Hanshin-Awaji Earthquake
Date of occurrence			March 11, 2011	January 17, 1995
Deaths/missing persons			19,225 persons	6,437 persons
Damaged houses (completely/partially destroyed)			368,587 houses	249,180 houses
Amount of damage of stock (estimated)	Buildings, etc. (houses/residential land, stores/offices/plants, machinery, etc.)		Approx. 10.4 trillion yen	Approx. 6.3 trillion yen
	Lifeline facilities (water supply, gas, electricity, communication/broadcast facilities)		Approx. 1.3 trillion yen	Approx. 0.6 trillion yen
	Social infrastructure facilities (rivers, roads, harbors, sewage, airports, etc.)		Approx. 2.2 trillion yen	Approx. 2.2 trillion yen
	Others	Agriculture, forestry, and fisheries related (agricultural lands/facilities, forests and fields, fisheries related facilities, etc.)	Approx. 1.9 trillion yen	Approx. 0.5 trillion yen
		Others (educational facilities, insurance medical/ welfare related facilities, other public facilities, etc.)	Approx. 1.1 trillion yen	
	Total		Approx. 16.9 trillion yen	Approx. 9.6 trillion yen

(Source) Great East Japan Earthquake　The figures pertaining to the dead/missing persons were published by the Emergency Disaster Countermeasures Headquarters, National Police Agency on January 20, 2012. The figures for damaged houses were published by the Disaster Management Headquarters, Fire and Disaster Management Agency on January 11, 2012. The figures for the amount of damage were published by the Cabinet Office (Disaster Management) on June 24, 2011.
Great Hanshin-Awaji Earthquake　The figures pertaining to the dead/missing persons and damaged houses were final figures provided by the National Police Agency on May 19, 2012. The figures for the amount of damages were published by the Disaster Prevention Bureau, National Land Agency on February 16, 1995.

Table 2　Manufacturing establishments distributed in the Tsunami flooded area by industry (Iwate, Miyagi, Fukushima)

Industry	Number of establishments	Number of employees	Value of manufactured goods shipped, etc. (billion yen)	Value added (billion yen)
Miscellaneous seafood products	78	1,120	16.5	4.1
Sliding doors and screens	45	114	1.0	0.5
Frozen seafood products (processed and packaged)	42	1,167	31.8	8.4
Offset paper printing	40	343	3.9	2.3
Salted-dried and salted products	36	613	13.1	2.9
Subtotal of 3 marine product processing industries (A)	156	2,900	61.4	15.4
Subtotal of manufacturing industries in the flooded areas in the 3 prefectures (B)	1,091	23,714	913.1	221.9
Proportion of marine product processing industries (A/B)	14.3%	12.2%	6.7%	6.9%

Source: Research and Statistics Department, Minister's Secretariat, Ministry of Economy, Trade and Industry, "Manufacturing establishments located in the Tsunami disaster-stricken areas of the Tohoku Region Pacific Coast Earthquake", August 2011
Note: Original source was a "Census of Manufactures 2008"



Source: MIC, 2005 Population Census.

Note: Industries are classified according to the Japan Standard Industry Classification (revised March 2002). "Others" represents the total for the following major categories of industry: mining; electricity, gas, heat supply, and water; information and communications; transport; finance and insurance; real estate; eating and drinking services and accommodation; medical, health care, and welfare; education and learning support; compound services; services (not elsewhere classified), government services; and unclassifiable industries.

* "The Tsunami-affected regions" include the 39 municipalities within Aomori, Iwate, Miyagi, and Fukushima Prefectures that were subject to the Disaster Relief Act due to the Great East Japan Earthquake (as of March 24, 2011) and which were reported to have suffered flooding caused by the Tsunami according to Approximate Estimates of the Extent of Flooding Caused by the Tsunami (Report No. 5) published by the Geographical Survey Institute on April 18. The figures for Sendai City are for the wards of Miyagino, Wakabayashi, and Taihaku.

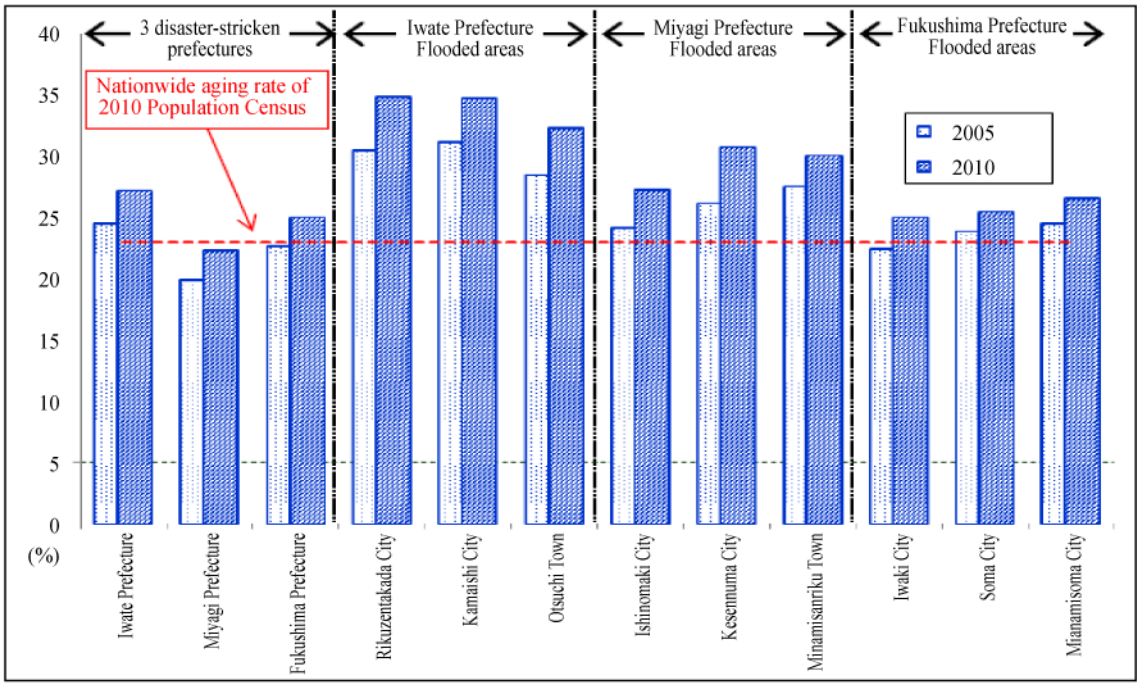
Source: "2011 White Paper on Small and Medium Enterprises in Japan", page 31

Figure 1 Breakdown of persons employed by industry in the Tsunami-affected regions (2005)

Table 3 Changes in the aging rate nationwide and in the 3 disaster-stricken prefectures

	Aging rate (percentage of population aged 65 or older)	
	Nationwide	3 disaster-stricken prefectures
1990	12.0%	13.4%
1995	14.5%	16.4%
2000	17.3%	19.4%
2005	20.1%	22.0%
2010	23.0%	24.3%

Source: "Population Census" (1990-2010), Ministry of Internal Affairs and Communications



Source: "Population Census" (2005 and 2010), Ministry of Internal Affairs and Communications

Figure 2　Aging rate in the 3 disaster-stricken prefectures

Table 4　Financial capability index of disaster-stricken coastal cities/towns

Financial capability index of disaster-stricken coastal cities/towns

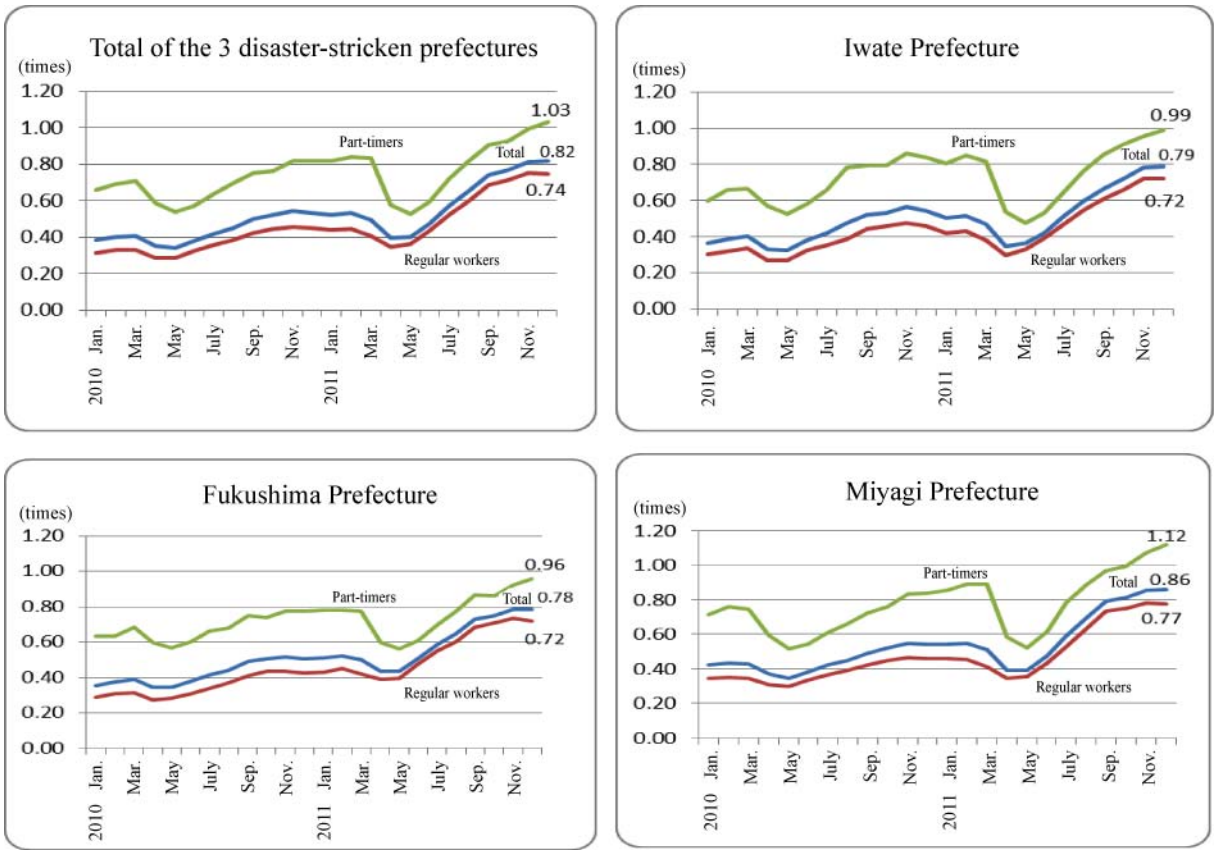
	Aging rate (%)	Financial capability index (FY 2009)
Miyako City	27	0.34
Ofunato City	27	0.41
Rikuzentakada City	31	0.27
Kamaishi City	31	0.46
Ootsuki Town	29	0.31
Yamada Town	28	0.27
Ishinomaki City	24	0.50
Kesennuma City	26	0.42
Higashimatsushima City	21	0.43
Watari Town	21	0.56
Yamamoto Town	28	0.38
Minamisanriku Town	28	0.30
Mianamisoma City	23	0.62
Aomori Prefecture	23	0.32
Iwate Prefecture	25	0.31
Miyagi Prefecture	20	0.52
Fukushima Prefecture	23	0.45
Ibaraki Prefecture	19	0.59
Chiba Prefecture	18	0.77
Nationwide	20	0.49

Financial capability index of prefectures (2010) - Reference

[Reference]	Hyogo Prefecture	Kobe City
FY 1993	0.70	0.83
FY 1994	0.68	0.83
FY 1995	0.64	0.83
FY 1996	0.61	0.78
:		
FY 2009	0.63	0.73
FY 2010	0.61	0.73

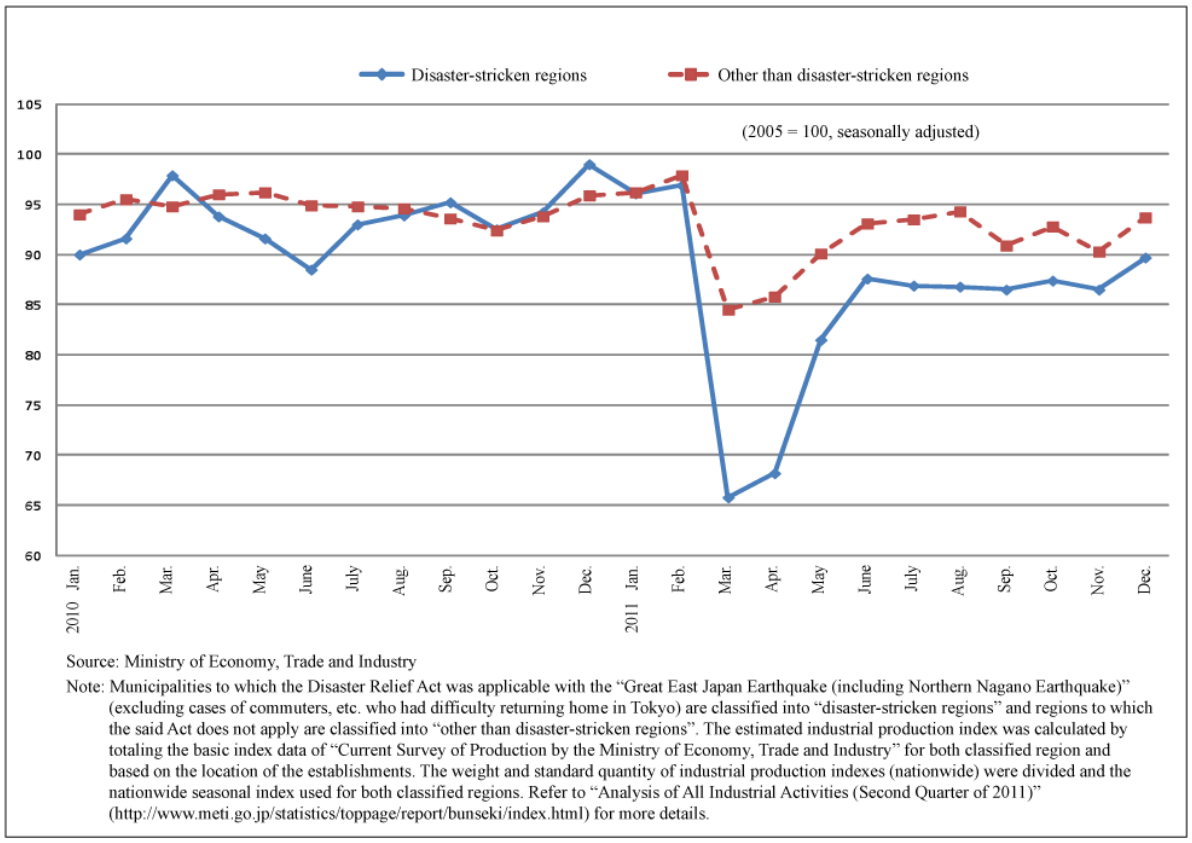
Source: "2005 Population Census", Ministry of Internal Affairs and Communications (MIC) and the MIC website

Note: 1. The aging rate refers to the percentage of the population aged 65 or older to the total population. The figures are as of 2005.
2. The disaster-stricken coastal areas refer to cities, towns, and villages located in the coastal areas of Aomori, Iwate, Miyagi, and Fukushima Prefectures to which the Disaster Relief Act was applicable.
3. The financial capability index refers to a figure that is calculated by dividing standard financial revenue by basic financial needs.
4. The nationwide figures are the prefectural average.



Source: "Job Offers and Applicants (Employment Security Statistics)", Ministry of Health, Labour and Welfare

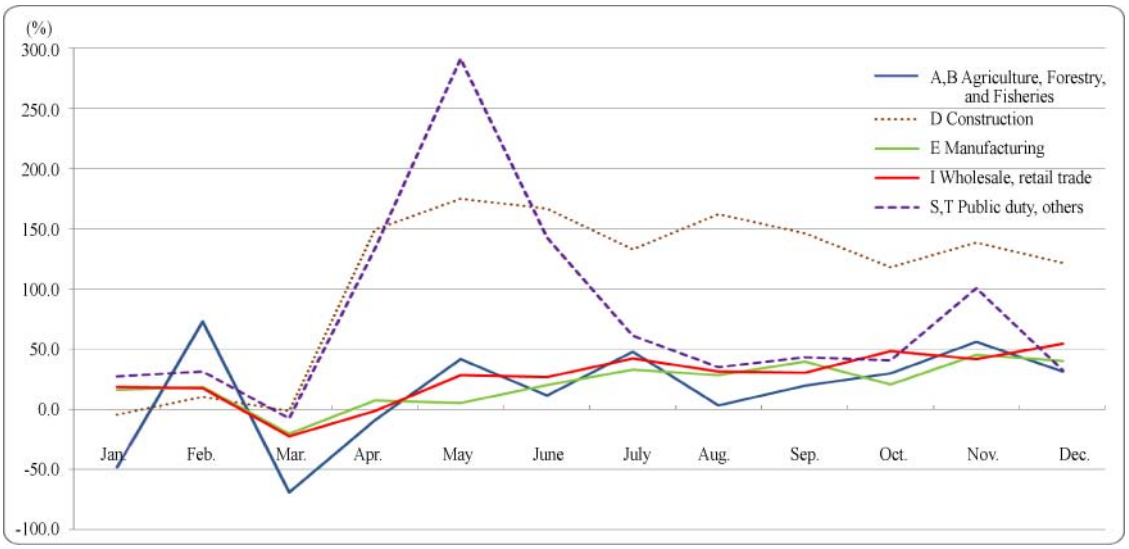
Figure 3　Changes in the effective job-offer to job-seeker ratio in the 3 disaster-stricken prefectures (unadjusted figures)



Source: Ministry of Economy, Trade and Industry

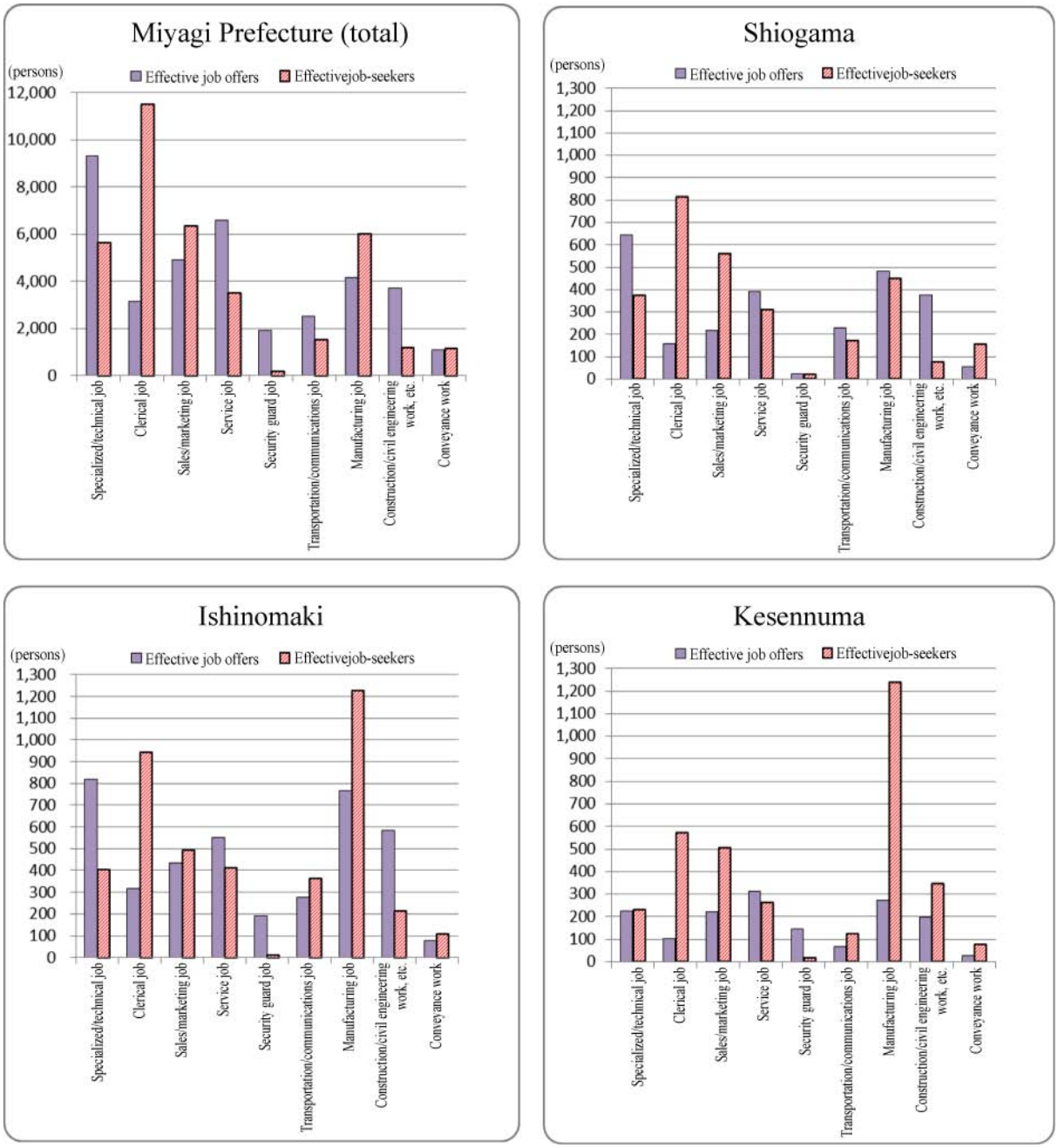
Note: Municipalities to which the Disaster Relief Act was applicable with the "Great East Japan Earthquake (including Northern Nagano Earthquake)" (excluding cases of commuters, etc. who had difficulty returning home in Tokyo) are classified into "disaster-stricken regions" and regions to which the said Act does not apply are classified into "other than disaster-stricken regions". The estimated industrial production index was calculated by totaling the basic index data of "Current Survey of Production by the Ministry of Economy, Trade and Industry" for both classified region and based on the location of the establishments. The weight and standard quantity of industrial production indexes (nationwide) were divided and the nationwide seasonal index used for both classified regions. Refer to "Analysis of All Industrial Activities (Second Quarter of 2011)" (http://www.meti.go.jp/statistics/toppage/report/bunseki/index.html) for more details.

Figure 4 Changes in the estimated industrial production index by region with respect to the earthquake disaster



Source: "Job Offers and Applicants (Employment Security Statistics)", Ministry of Health, Labour and Welfare

Figure 5 Changes in the number of new job offers from the same month the previous year by industry in the 3 disaster-stricken areas (Unadjusted figures 2011/2010)



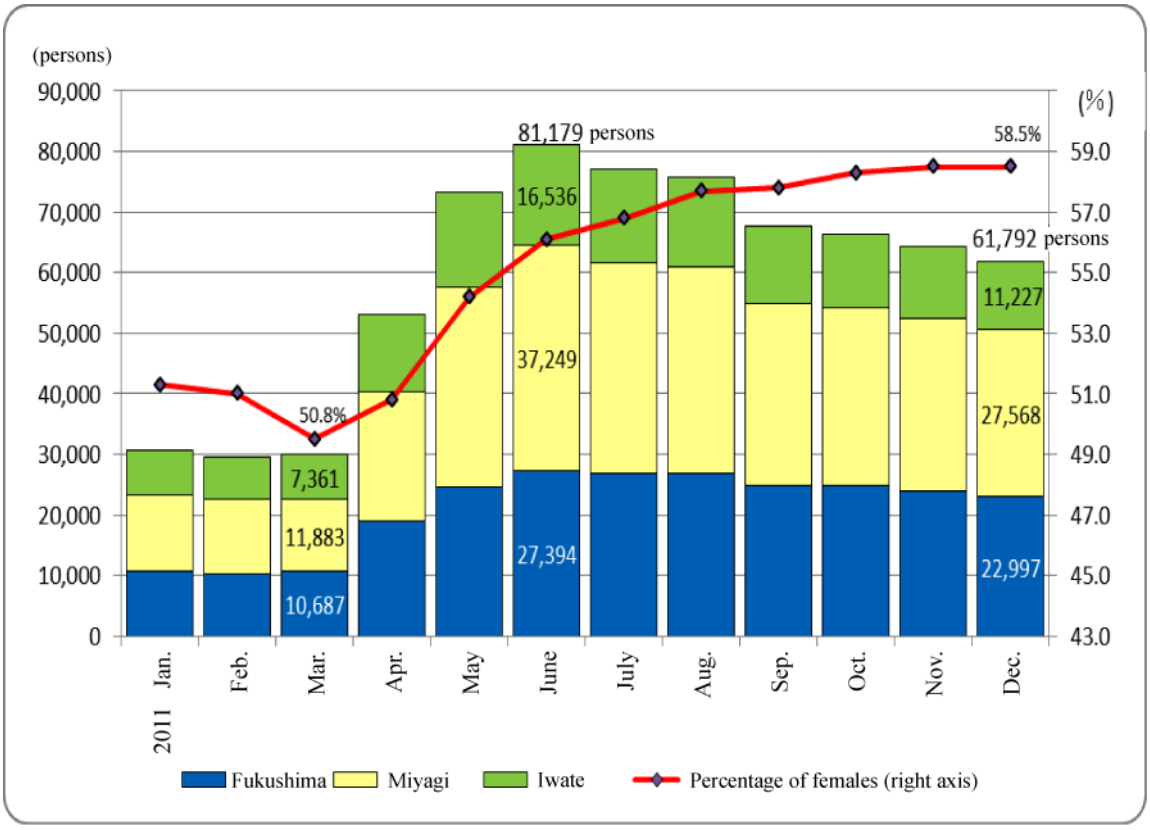
Source: "Balance sheet on job offers and job-seekers" (December 2011), Miyagi Labor Bureau

Figure 6 Status with job-seekers/job offers by industry in Miyagi Prefecture (December 2011)

Table 5 Industrial structure of Kesennuma City (2008)

Middle division of industrial classification	Number of establish-ments	Number of engaged persons				Cash earnings	Value of Raw Materials Used, etc.	Value of manufactured goods shipment, etc.
		Total	Regular workers					Total amount
			Total	Males	Females			
	353	5,982	5,771	2,653	3,118	1,455,087	7,759,189	11,913,588
09 Food	162	4,055	3,972	1,545	2,427	934,259	6,531,005	9,597,425
10 Beverages, tobacco and feed	7	93	93	80	13	31,362	58,071	257,860
11 Textile mill products	20	321	308	41	267	X	X	X
12 Lumber and wood products, except furniture	15	48	37	30	7	8,943	20,859	40,411
13 Furniture and fixtures	24	75	47	39	8	13,746	14,684	40,145
14 Pulp, paper and paper products	2	40	40	28	12	X	X	X
15 Printing and allied industries	16	329	317	196	121	X	X	X
16 Chemical and allied products	1	11	11	9	2	X	X	X
17 Petroleum and coal products	1	3	3	3	-	X	X	X
18 Plastic products, except otherwise classified	4	78	77	38	39	X	X	X
20 Leather tanning, leather products and fur skins	1	1	-	-	-	-	X	X
21 Ceramic, stone and clay products	7	50	50	42	8	X	X	X
24 Fabricated metal products	19	109	97	81	16	X	X	X
25 General-purpose machinery	11	83	77	68	9	25.367	27,953	67,391
26 Production machinery	17	166	158	133	25	61,301	118,716	216,774
27 Business oriented machinery	4	183	182	130	52	59,148	264,351	294,009
28 Electronic parts, devices, and electronic circuits	5	81	79	21	58	15,795	2,344	26,966
29 Electrical machinery, equipment and supplies	2	40	40	8	32	X	X	X
31 Transportation equipment	21	184	172	153	19	62,256	188,559	268,475
32 Miscellaneous manufacturing industries	14	32	11	8	3	2,629	5,779	11,730
Percentage of food	45.9%	67.8%	68.8%	58.2%	77.8%	64.2%	84.2%	80.6%

Source: 2009 edition of "Statistics on Kesennuma City", Kesennuma City, original sources "Census of Manufactures; Report by cities, towns and villages 2005", "Industries in Miyagi", Statistics Division, Policy Planning Department, Miyagi Prefectural Government



Source "Monthly Report on Employment Insurance Activity", Ministry of Health, Labour and Welfare

Figure 7 Changes in the actual number of employment insurance recipients (including individual extended benefits, etc.) in the 3 disaster-stricken areas

Table 6 FY 2011 Job-seeker support training certification status (preliminary figures) (Courses commenced upon in October 2011 through to March 2012)

As of January 23, 2012

		Certified courses (total)		Basic courses		Practical courses	
		Capacity	Number of courses	Capacity	Number of courses	Capacity	Number of courses
1	Hokkaido	7,654 persons	312 courses	1,900 persons	84 courses	5,754 persons	228 courses
2	Aomori	1,814 persons	95 courses	260 persons	15 courses	1,554 persons	80 courses
3	Iwate	1,469 persons	90 courses	519 persons	35 courses	950 persons	55 courses
4	Miyagi	2,895 persons	140 courses	1,108 persons	58 courses	1,787 persons	82 courses
5	Akita	721 persons	44 courses	309 persons	20 courses	412 persons	24 courses
6	Yamagata	1,223 persons	64 courses	343 persons	18 courses	880 persons	46 courses
7	Fukushima	2,284 persons	123 courses	892 persons	49 courses	1,392 persons	74 courses
8	Ibaraki	1,938 persons	108 courses	730 persons	45 courses	1,208 persons	63 courses
9	Tochigi	1,015 persons	60 courses	378 persons	23 courses	637 persons	37 courses
10	Gunma	1,626 persons	73 courses	440 persons	25 courses	1,186 persons	48 courses
11	Saitama	4,101 persons	179 courses	1,301 persons	67 courses	2,800 persons	112 courses
12	Chiba	4,437 persons	200 courses	1,220 persons	59 courses	3,217 persons	141 courses
13	Tokyo	15,346 persons	592 courses	1,837 persons	67 courses	13,509 persons	525 courses
14	Kanagawa	5,406 persons	235 courses	1,626 persons	78 courses	3,780 persons	157 courses
15	Niigata	1,721 persons	99 courses	612 persons	38 courses	1,109 persons	61 courses
16	Toyama	802 persons	56 courses	220 persons	16 courses	582 persons	40 courses
17	Ishikawa	900 persons	56 courses	295 persons	22 courses	605 persons	34 courses
18	Fukui	369 persons	25 courses	160 persons	11 courses	209 persons	14 courses
19	Yamanashi	803 persons	42 courses	179 persons	10 courses	624 persons	32 courses
20	Nagano	1,870 persons	100 courses	502 persons	30 courses	1,368 persons	70 courses
21	Gifu	1,439 persons	83 courses	477 persons	30 courses	962 persons	53 courses
22	Shizuoka	2,110 persons	122 courses	698 persons	47 courses	1,412 persons	75 courses
23	Aichi	4,215 persons	211 courses	780 persons	44 courses	3,435 persons	167 courses
24	Mie	639 persons	37 courses	271 persons	16 courses	368 persons	21 courses
25	Shiga	1,129 persons	61 courses	360 persons	20 courses	769 persons	41 courses
26	Kyoto	2,169 persons	110 courses	544 persons	33 courses	1,625 persons	77 courses
27	Osaka	12,488 persons	501 courses	2,186 persons	93 courses	10,302 persons	408 courses
28	Hyogo	5,170 persons	232 courses	1,280 persons	62 courses	3,890 persons	170 courses
29	Nara	1,162 persons	56 courses	360 persons	16 courses	802 persons	40 courses
30	Wakayama	783 persons	39 courses	320 persons	17 courses	463 persons	22 courses
31	Tottori	427 persons	23 courses	160 persons	9 courses	267 persons	14 courses
32	Shimane	261 persons	16 courses	158 persons	11 courses	103 persons	5 courses
33	Okayama	1,660 persons	87 courses	348 persons	19 courses	1,312 persons	68 courses
34	Hiroshima	2,308 persons	117 courses	559 persons	32 courses	1,749 persons	85 courses
35	Yamaguchi	959 persons	54 courses	253 persons	16 courses	706 persons	38 courses
36	Tokushima	739 persons	39 courses	180 persons	9 courses	559 persons	30 courses
37	Kagawa	1,029 persons	54 courses	280 persons	15 courses	749 persons	39 courses
38	Ehime	730 persons	41 courses	280 persons	16 courses	450 persons	25 courses
39	Kochi	406 persons	27 courses	130 persons	9 courses	276 persons	18 courses
40	Fukuoka	7,239 persons	323 courses	2,110 persons	96 courses	5,129 persons	227 courses
41	Saga	866 persons	46 courses	204 persons	11 courses	662 persons	35 courses
42	Nagasaki	1,705 persons	81 courses	390 persons	20 courses	1,315 persons	61 courses
43	Kumamoto	2,715 persons	131 courses	658 persons	36 courses	2,057 persons	95 courses
44	Oita	1,480 persons	74 courses	420 persons	21 courses	1,060 persons	53 courses
45	Miyazaki	1,494 persons	79 courses	431 persons	25 courses	1,063 persons	54 courses
46	Kagoshima	1,218 persons	63 courses	539 persons	29 courses	679 persons	34 courses
47	Okinawa	2,721 persons	144 courses	912 persons	48 courses	1,809 persons	96 courses
	Nationwide	117,655 persons	5,544 persons	30,119 persons	1,570 persons	87,536 persons	3,974 persons

* Certified courses do not include applications being examined in Osaka (ordinary applications) and additional applications for the 3rd supplementary budget in some prefectures (all of which are for courses that commenced in March).

Source: Ministry of Health, Labour and Welfare

Table 7 Status with damage from the Great East Japan Earthquake by prefecture (as of June 16, 2011)

	Number of deaths (persons)	Number of missing persons (persons)	Number of completely destroyed houses (houses)	Number of partially destroyed houses (houses)	Number of partly damaged houses (houses)	Actual number		Proportion	
						Number of deaths/ missing persons	Number of completely/ partially destroyed houses	Number of deaths/ missing persons	Number of completely/ partially destroyed houses
Hokkaido	1	0	0	0	5	1	0	0.0%	0.0%
Aomori	3	1	281	1,020	78	4	1,301	0.0%	0.7%
Akita	0	0	0	0	4	0	0	0.0%	0.0%
Yamagata	3	0	0	1	37	3	1	0.0%	0.0%
Iwate	4,538	2,625	20,990	3,118	3,093	7,163	24,108	31.0%	12.2%
Miyagi	9,151	4,742	71,764	36,138	47,962	13,893	107,902	60.1%	54.7%
Fukushima	1,617	360	15,500	25,060	69,875	1,977	40,560	8.6%	20.6%
Ibaraki	24	1	2,052	13,823	127,544	25	15,875	0.1%	8.0%
Tochigi	4	0	253	1,936	54,944	4	2,189	0.0%	1.1%
Gunma	1	0	0	1	15,434	1	1	0.0%	0.0%
Saitama	1	0	7	41	13,863	1	48	0.0%	0.0%
Chiba	19	2	752	3,906	21,182	21	4,658	0.1%	2.4%
Tokyo	7	0	9	114	2,953	7	123	0.0%	0.1%
Kanagawa	4	0	0	11	168	4	11	0.0%	0.0%
Niigata	0	0	31	203	1765	0	234	0.0%	0.1%
Nagano	0	0	34	169	495	0	203	0.0%	0.1%
Shizuoka	0	0	0	0	523	0	0	0.0%	0.0%
Nationwide total	15,373	7,731	111,673	85,541	359,925	23,104	197,214	100.0%	100.0%

Source: "June 16, 2011, 2011 Tohoku Region Pacific Offing Earthquake (Great East Japan Earthquake) (128th report)", Fire and Disaster Management Agency
Note: In addition to damage listed in the table there was 1 other victim that was injured in Mie Prefecture, thus making the number of damaged prefectures 18.

Table 8 Status with damage by major municipality in Iwate, Miyagi, and Fukushima Prefectures (as of May 19, 2011)

	Total population (persons)	Total number of houses (houses)	Actual number		Percentage		
			Number of deaths/missing persons (persons)	Number of partially destroyed houses (houses)	Number of deaths/missing persons To total population in 2010	Number of partially destroyed houses (houses) To total number of houses in 2008	Population in flooded areas To total population in 2010
Iwate Prefecture	1,330,530	549,500	7,444	19,764	0.5%	3.6%	8.1%
Miyako City	59,442	25,010	767	4,675	1.3%	18.7%	30.9%
Ofunato City	40,738	16,530	464	3,629	1.1%	21.9%	46.8%
Rikuzentakada City	23,302	8,550	2,191	3,341	9.4%	39.1%	71.4%
Kamaishi City	39,578	18,420	1,347	3,723	3.4%	20.2%	33.3%
Otsuchi Town	15,277	6,130	1,718	—	11.2%	—	78.0%
Yamada Town	18,625	7,950	865	2,983	4.6%	37.5%	61.3%
Tanohata Village	3,843	–	36	268	0.9%	—	41.2%
Fudai Village	3,088	–	1	0	0.0%	—	36.1%
Noda Village	4,632	–	38	476	0.8%	—	68.6%
Yono Town	17,910	6,650	0	26	0.0%	0.4%	15.3%
Miyagi Prefecture	2,347,975	1,013,900	14,395	78,839	0.6%	7.8%	14.1%
Sendai City	1,045,903	530,660	865	12,370	0.1%	2.3%	1.0%
Ishinomaki City	160,704	64,870	5,734	—	3.6%	—	69.9%
Shiogama City	56,490	23,250	22	1,748	0.0%	7.5%	33.1%
Kesennuma City	73,494	25,670	1,534	10,244	2.1%	39.9%	54.9%
Natori City	73,140	25,820	1,046	—	1.4%	—	16.6%
Tagajo City	62,979	26,810	190	4,500	0.3%	16.8%	27.2%
Iwanuma City	44,198	17,010	184	—	0.4%	—	18.2%
Higashimatsushima City	42,908	15,450	1,426	6,758	3.3%	43.7%	79.3%
Osaki City	135,127	54,030	4	417	0.0%	0.8%	0.0%
Watari Town	34,846	11,520	270	2,594	0.8%	22.5%	40.4%
Yamamoto Town	16,711	5,310	747	2,846	4.5%	53.6%	53.8%
Matsushima Town	15,089	5,560	4	493	0.0%	8.9%	26.9%
Shichigahama Town	20,419	6,650	76	—	0.4%	—	44.8%
Onagawa Town	10,051	–	1,093	3,067	10.9%	—	80.1%
Minamisanriku Town	17,431	5,540	1,178	—	6.8%	—	82.5%
Fukushima Prefecture	2,028,752	808,200	2,060	16,150	0.1%	2.0%	3.5%
Koriyama City	338,772	145,870	1	3,432	0.0%	2.4%	0.0%
Iwaki City	342,198	147,740	385	—	0.1%	—	9.5%
Sukagawa City	79,279	27,250	11	1,193	0.0%	4.4%	0.0%
Soma City	37,796	15,030	457	1,512	1.2%	10.1%	27.6%
Mianamisoma City	70,395	25,050	765	5,657	1.1%	22.6%	18.9%
Hirono Town	5,418	–	3	140	0.1%	—	25.6%
Naraha Town	7,701	–	14	50	0.2%	—	22.7%
Tomioka Town	15,996	6,880	19	0	0.1%	0.0%	8.8%
Okuma Town	11,511	–	44	30	0.4%	—	9.8%
Futaba Town	6,932	–	35	63	0.5%	—	18.4%
Namie Town	20,908	7,830	186	0	0.9%	0.0%	16.1%
Shinchi Town	8,218	–	114	548	1.4%	—	56.8%

Source: Statistics Bureau of the Ministry of Internal Affairs and Communications and its website. Original sources "Social and Demographic Statistics", "Housing and Land Survey", and data published by the Fire and Disaster Management Agency and the respective prefectures.
Note: "-" indicates the figures were deemed uncertain due to the small number of samples.

Table 9　List of groups certified for subsidies for facilities and equipment of small- and medium-sized enterprises

	Name of group	Type of group	Main members	Main industries
Miyagi Prefecture 14 groups 6.5 billion yen 4.3 billion yen from the government	ALPS Electric group	Supply chain type	8 companies, including ALPS Electric	Electronic parts manufacturing
	Iwanuma industrial complex automobile parts supplies group	Supply chain type	2 companies, including Uchida	Automobile parts
	Kyowa Aluminum group	Supply chain type	2 companies, including Kyowa Aluminum	Alumite treatment, etc.
	Suppliers group of small to medium display glass substrates for smart phones	Supply chain type	2 companies, including Kuramoto Machinery	Processing and sales of glass substrates
	Yamamoto region die casting reconstruction	Supply chain type	3 companies, including Iwaki Diecast	Non-ferrous metal processing
	Tokyo Electron Miyagi supply chain group	Supply chain type	2 companies, including Tokyo Electron Miyagi	Electrical machinery
	Furukawa NDK group	Supply chain type	2 companies, including Furukaa NDK	Electronic parts manufacturing
	Industrial cluster of ship construction/repair in Ishinomaki City	Economy/employment growth type	10 companies, including Yamanishi	Shipbuilding and ship repair
	Toyo Knife group	Economy/employment growth type	4 companies, including Toyo Knife	Knives for industrial machinery
	Group of core enterprises in Iwanuma air port areas	Locally valuable enterprise cluster type	8 companies, including Artics	Automobile parts, etc.
	Kesennuma fishing port reconstruction task force	Locally valuable enterprise cluster type	8 companies, including Kidoura Shipyard	Shipbuilding and ship repair
	Nippon Paper Ishinomaki group	Locally valuable enterprise cluster type	2 companies, including Nippon Paper	Paper/pulp paper manufacturing
	Onagawa fish market buyers cooperative	Marine product (seafood) processing industry type	Onagawa fish market buyers cooperative	Ice producing
	Minamisanriku area marine product processing reconstruction group	Marine product (seafood) processing industry type	8 companies, iincluding Kaneki-Yoshida	Marine product processing
Iwate Prefecture 8 groups 7.7 billion yen 5.1 billion yen from the government	Marine product processing base development in the northern part of prefecture	(Kuji City)	10 parties, including Marusa Saga Shouten	Marine product processing
	Miyako/Yamada marine product processing group	(Miyako City, Yamada City)	39 parties, including Kawahide	Marine product processing
	Kamaishi region marine product prosessing group	(Kamaishi City)	17 parties, including Ono Foods	Marine product processing
	Ofunato region marine product/food processing group	(Ofunato City)	36 parties, including Oikawa Reizo	Marine product processing
	Kuji region shipbuilding group	(Kuji City)	4 parties, including Kitanihon Shipbuilding	Shipbuilding
	Kamaishi/Otsuchi region shipbuilding related group	(Kamaishi City)	8 parties, including Kosaba Sempaku Kogyo	Shipbuilding
	Coastal electronic/precision appliances group	(Miyako City, Kamaishi City)	17 parties, including Tohoku Hirose Electric	Electronic parts manufacturing
	Sea side town Mast group	(Otsuchi Town)	Otsuchi commerce development	Retail trade

Source: Website of the New Industry Promotion Division, Miyagi Prefectural Government http://www.pref.miyagi.jp/shinsan/shinsan-d/2011hojyo/20110805koufu.htm, and website of Iwate Prefecture http://www.pref.iwate.jp/view.rbz?of=1&ik=0&cd=33894.

Table 10 Status with support members dispatched to Hello Works, etc. in the 3 disaster-stricken prefectures (from April 10 to January 28)

Labor Bureau	Total number of persons
Iwate	4,248
Miyagi	8,510
Fukushima	4,296
Total	17,054

(Reference: The actual number of support members dispatched to the disaster-stricken areas)
Week of May 16, 2011 (maximum number): 129 persons (22 in Iwate, 67 in Miyagi, and 40 in Fukushima)
Week of January 22, 2012 (most recent): 20 persons (9 in Iwate and 11 in Miyagi)
* 20 staff members were additionally sent to Fukushima in January 2012.

Source: Ministry of Health, Labour and Welfare

Table 11 Effective number of job-seekers per staff member/consultant at Hello Works in the 3 disaster-stricken areas

Labor Bureau	Effective number of job-seekers (regular workers) <excluding new graduates but including part-timers> (December 2011)	Number of staff members (as of January 2012)	Number of consultants (as of January 2012)	Total number of staff members and consultants (as of January 2012)	Effective number of job-seekers per staff member	Effective number of job-seekers per staff member/consultant
Iwate	31,069	137	375	512	227	61
Miyagi	55,004	205	571	776	268	71
Fukushima	40,977	222	502	724	185	57
Total of the 3 disaster-stricken prefectures	127,050	564	1,448	2,012	225	63

Source: Ministry of Health, Labour and Welfare

Table 12 Achievements of subsidies, etc. with respect to the Great East Japan Earthquake, etc. (as of December 2011)

Name of subsidy, etc.	Number of subjects (*1)
[1] Disaster victim employment development subsidy (*2)	887
[2] Subsidy to promote trial employment of non-new graduates within 3 years after graduation	1,205 (705)
[3] Subsidy to promote employment of non-new graduates within 3 years after graduation (new graduate equivalent)	227 (158)
[4] Practical employment promotion subsidy	918 (746)

*1 Subjects refer to the following.
[1] Disaster victim employment development subsidy – persons for which a decision to grant the subsidies to was decided
[2] Subsidy to promote trial employment of non-new graduates within 3 years after graduation – persons whose trial employment commenced
[3] Subsidy to promote employment of non-new graduates within 3 years after graduation (new graduate equivalent) – persons employed as a result of increased employment
[4] Practical employment promotion subsidy – persons whose practical training commenced
The figures in parentheses indicates the number for the 3 disaster-stricken areas.

*2 Achievements by prefecture could not be identified due to the processing system, but a major part of them are considered to have been achievements of the 3 disaster-stricken prefectures.

Source: Ministry of Health, Labour and Welfare

Recommendations

Toward Making a New Step Forward in Radiation Measures - Taking Actions based on Fact-based Scientific Research -

April 9, 2012

Science Council of Japan

Committee on Supporting Reconstruction
after the Great East Japan Earthquake

Sub-Committee on Counter-measures for Radiation

These recommendations compile and publish the results of deliberations of the Sub-Committee on Counter-measures for Radiation, Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan.

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Summary

1 Background to the recommendations

The Great East Japan Earthquake that occurred on March 11, 2011 off the Pacific Ocean of the Tohoku Region was the 4th largest earthquake recorded in human history. It was a very complex disaster because of an accident that occurred at the Fukushima Daiichi (No. 1) Nuclear Power Station of Tokyo Electric Power Co., Inc. (TEPCO) which was triggered by a total loss of power after seven Tsunamis extending from 30 minutes to 6 hours after the earthquake occurred, thereby resulting in serious amounts of damage.

The human damage and property damage resulting from the Tsunami disaster were both unfathomable, while the disaster also deprived the disaster victims/disaster-stricken areas of both their residences and places to work. Despite having the severe psychological trauma and had their lives inconvenienced by having to live at temporary housing the victims are still proceeding with restoration/reconstruction activities in thereby realizing a permanently safe society. When reconstructed they must be “communities resilient to disasters” in a multi-faceted sense. In addition, people cannot make a living unless industries that can sustain the disaster-stricken areas steadily take root, with job opportunities then being ensured by those industries. Furthermore, and with regard to the nuclear power plant accident, completion of its final disposition may require a time span of more than one generation. Many people have been forced to evacuate for an extended period of time, thus establishing a long-term health management system for those who fear having been exposed and decontamination measures in the areas where radioactive materials were deposited are posed as imminent issues.

These various reconstruction challenges thus require the specific provision of desperately needed knowledge to the victims through mobilization in the various fields of science, which is precisely the duty of Science Council of Japan (SCJ). The 21st Term SCJ made the commitment soon after the occurrence of the great earthquake by setting up the Great East Japan Earthquake Task Force, issuing urgent recommendations on seven consecutive occasions, and so on. At the inception of the 22nd Term SCJ in October 2011 the Committee on Supporting Reconstruction after the Great East Japan Earthquake was established to succeed the Great East Japan Earthquake Task Force. On November 16, the Sub-Committee on Building Disaster-Resilient Communities, the Sub-Committee on the Promotion of Industry and Employment, and the Sub-Committee on Counter-measures for Radiation were set up under the said Committee.

The Sub-Committee on Counter-measures for Radiation considers identification/analysis of the present situation with and future transition of radioactive contamination and effective

dissemination of what can be done to prevent health damages to be an urgent issue.

2 Present situation and issues

Estimating the present situation with and future transition of contamination from radioactive material resulting from the Fukushima Daiichi Nuclear Power Plant accident necessitates the review on the course of the accident and systematic implementation from a) estimation of the period of radioactive material emission from the nuclear power plant and total amount of emissions, b) identification of the environmental distribution/transition of radioactive materials, c) comprehensive identification of exposure routes to human victims by period and place, d) estimation of the respective victim's radiation exposure time and exposure doses through the comprehensive identification, through to e) assessment of potential subsequent health effects as the result of exposure. The necessary information to fulfill these tasks, however, was not necessarily managed/provided in an integrated manner. The data and information, although very precise, were divided and managed by respective administrative agencies, research institutions, and researchers, and disclosed in forms that did not allow for easy cross-sectional sharing.

Thus, the Sub-Committee aimed to respond to the anxiety of the residents in the neighborhood of the Fukushima Daiichi Nuclear Power Plant and the Japanese people in general to the fullest extent possible within a limited period of time by a) putting together all the separate information, b) revealing the perspective of where and in what form the information sources should be stored, and then c) estimating the resulting health effects through connecting that information. A provisional estimation, although based on the limited data and information available at present, also suggested the importance of appropriate management of cumulative radiation doses in thereby accurately identifying future health concerns. Furthermore, and in the course of these discussions, minimizing the effects of exposure and more precisely estimating negative health effects due to exposure were shown to be in urgent need.

3 Content of the recommendations

Based on the exposure dose and health effects estimated for different exposure routes the following six recommendations will be provided here in helping to minimize health effects and improving the assessment of health effects due to radiation exposure.

Recommendation 1:

The government/municipalities shall continue to estimate exposure doses and provide

medical checkups/examinations to residents in thereby protecting the health of those already exposed to radiation, and children and infants in particular. For this purpose, the government/municipalities shall establish a system that can provide thyroid ultrasound examinations and blood tests, along with a regional medical system that enables residents to receive appropriate and prompt treatment in the case of health abnormalities being detected.

Recommendation 2:

The government/municipalities shall implement appropriate measures such as establishing decontamination targets, including the post-return of residents and management of decontamination work, etc., in order to prevent the cumulative exposure doses from reaching the level that could pose a negative health effect because of potential further exposure due to their return/decontamination work.

Recommendation 3:

Academic circles in Japan shall plan appropriate epidemiological research on estimating the radiation dose-response curve with respect to the carcinogenic rate and cancer mortality rate, implement it in cooperation with the government/municipalities, promote an integrated understanding with other basic research, and promptly reflect the results in the health management of the residents.

Recommendation 4:

The government and academic circles in Japan are requested to cooperate in establishing a cross-disciplinary research system that can be used to identify the overall picture related to the assessment of radioactive health effects and in thereby more accurately identifying the actual situation with radiation contamination and health effects associated with the Fukushima Daiichi Nuclear Power Plant accident and appropriate implementation of decontamination and health effect prevention measures.

Recommendation 5:

he government shall establish a system that enables the prompt and steady collection of data required in looking back on the accident and data which will have a significant effect on the accuracy when estimating health effects, and also a public system for providing standardized data in a form that most readily allows researchers to use/analyze it.

Recommendation 6:

Institutions/researchers engaged in radiation-related measurements or model-based estimations are expected to disclose the results of the various measurements/estimations used as basic figures in assessing radioactive health effects together with uncertainty information. In addition, accuracy control or improvement of the measurement/estimated results based on uncertainty information will need to be planned and implemented.

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1 Introduction

The 4th biggest earthquake recorded in human history, with a moment magnitude of 9.0 off the Pacific Ocean of the Tohoku Region, took place on March 11, 2011. Seven Tsunamis that extended from 30 minutes to 6 hours after the earthquake then resulted in enormous damage to the coastal areas of the Tohoku and Kanto Regions, in Iwate, Miyagi, Fukushima, Ibaraki, and Chiba Prefectures in particular.

There are a total of six power plants, Units 1-6, of the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Co., Inc. (hereinafter referred to as the Fukushima Daiichi Nuclear Power Plant) that commenced operation during 1971-1979 with the electricity output of Unit 1 being 460,000 kilowatts, Units 2-5 784,000 kilowatts, and Unit 6 1,100,000 kilowatts. The first high wave of the Tsunamis reached the Fukushima Daiichi Nuclear Power Plant at around 15:27 and the second at 15:35, with the height of the Tsunamis reaching a maximum of 15 meters.

The Fukushima Daiichi Nuclear Power Plant accident that resulted from the Tsunamis resulted in the emission of a vast amount of radioactive materials which then led to contamination of wide areas of national land and ocean, while also posing the risk of radiation exposure†[18] to many Japanese people, mainly neighborhood residents. After the issuance of an evacuation order to the residents in areas within a 20-kilometer radius of the Fukushima Daiichi Nuclear Power Plant on March 12 almost 100,000 people, including voluntary evacuees, had their daily lives suddenly interrupted and were forced to leave their home, workplaces, and in some cases families to live in the evacuation areas. In addition, many people were worried about potential health effects due to radiation exposure that may have continued since immediately after the accident to date, and grew anxious about not only their own futures but also those of their children and grandchildren.

The Sub-Committee thus regarded assessing the effects of exposure to radioactive materials on the residents' health through estimating the present situation with and future transition of contamination by radioactive materials from the nuclear power plant accident and making recommendations on the means of alleviating those effects to the fullest extent possible to therefore be an extremely urgent issue.

The Sub-Committee considered that it would necessitate the course of the accident being reviewed and systematic implementation of estimation of the period of radioactive material emission from the Fukushima Daiichi Nuclear Power Plant and total amount emitted,

[18] Hereinafter refer to <Definition of terms> for words and phrases marked with †.

comprehensive identification of the environmental distribution/transition of radioactive materials and exposure routes to human victims by period and place, estimation of radiation exposure time and exposure doses, and assessment of potential subsequent health effects. The necessary information for these tasks, however, was not necessarily managed/provided in an integrated manner. The work of the Sub-Committee revealed the data and information, although very precise, to have been separated and managed by respective administrative agencies, research institutions, and researchers, and to thus have been disclosed in forms that did not allow for easy cross-sectional sharing of it.

The Sub-Committee therefore aimed to respond to the anxiety of residents in the neighborhood of the Fukushima Daiichi Nuclear Power Plant and the Japanese people in general by collating all the separated information to the fullest extent possible and within a limited period in thereby pinpointing the perspective of where and in what form the information sources are stored and predicting the resulting health effects through connecting that information. Furthermore, and based on the results of the discussions, the Sub-Committee issued recommendations for use in minimizing the effects of exposure and making more precise predictions of the health effects due to exposure.

2 Approaches used in these recommendations

(1) Outline of approaches used in these recommendations

Outline of ways of thinking

[1] Total emitted amount of radiation resulting from the nuclear power plant accident that then led to radiation exposure

↓

[2] Distribution of total emitted amount of radioactive materials to the environment

- Estimated distribution and measured distribution in the sea, atmosphere, soil, and rivers
- Nuclear species and decay
- Predicted transition of contamination with future environmental circulation and concentrations taken into account

etc.

[3] Comprehensive identification of exposure routes to humans

- Form of exposure (relatively high level of radiation over a short period after the accident vs. low level radiation over mid- to long-periods)
- Routes of exposure (external exposure vs. internal exposure)
- Exposure dose by location/period
- Exposure time

etc.

[4] Estimation of exposure doses to date, and assumed exposure doses hereafter

↓

[5] Assessment of effects on human health

↓

[6] Recommendations in preventing any health damage to the fullest extent possible (concrete measures and estimation of effects)

- Decontamination
- Inspection of water and food
- Early detection of any abnormalities by monitoring people's health and provision of appropriate medical care etc.

As revealed by the "outline of ways of thinking" given above the Sub-Committee aimed to provide prototype processes for estimating the total emitted amount of radioactive

materials from the Fukushima Daiichi Nuclear Power Plant ([1]), connecting separated information on environmental transitions ([2], [3]), exposure doses [4], and assessment of health effects ([5]), and predicting the resulting health effects. Through this the Sub-Committee was to determine the effectiveness of connecting all the information, specify any data urgently needed and any uncertainties that could significantly affect the results, and discuss the necessity of identifying information in an integrated manner.

In predicting at this time the extent and level of effects on the residents' health due to the accident the following two works, in particular, were important.

1) Reflecting the results of assessing the abovementioned emitted amounts and diffusion obtained in the field of science and engineering, including atomic, meteorology, oceanic, and simulations, etc., in the assessment of exposure doses obtained in the field of medicine/public health, including radiology and food safety, etc. and predictions
2) Estimating the extent and level of potential health effects in the future through integrating the predicted exposure doses from 1) into precedence research in the field of radiology.

In these recommendations efforts were made to link the exposure dose assessments to the emitted amount and diffusion assessments[19].

More concretely, the overall perspective, from the emission of radioactive materials to the effect on human health, although mainly for "[2] Distribution of total emitted amount of radioactive materials to the environment" from the outline of ways of thinking above is provided in Chapter 3 of these recommendations. "[3] Comprehensive understanding of exposure routes to humans" is discussed in Chapter 4, and "[4] Estimation of exposure doses to date, and assumed exposure dose hereafter" and "[5] Assessment of effects on human health" in Chapter 5.

(2) Scope of discussion and definition

[1] Definition of time base

Comprehensive understanding of exposure to radioactive materials emitted to the environment due to the accident requires, primarily, setting the time base of when, i.e. how long after the accident, and how long the exposure took place. This is an issue common to

[19] Due to the limited time available to put together these recommendations the assessment of the exposure doses could not be integrated into the assessments of the emitted amounts and diffusion, and in the form of connecting the results of a certain stage as input values for the next stage. The same monitored data of radiation doses in the air was used, however, as evidence to verify the emitted amounts, diffusion, and exposure doses, and thus no significant inconsistencies are considered to exist between the different stages.

both internal and external exposure. Setting the time base requires consideration of

a. Period and duration of radioactive material emission from the nuclear power plant,
b. Physical half-life† of the nuclear species† emitted and half-life of internally exposed nuclear species inside the human body, and
c. Scale of phenomenon in the natural environment, including advection, diffusion, deposition, and inter-media transfer.

Furthermore, with this accident while some cases of people immediately evacuating within a short time after the accident exist there are also cases where people remained in areas of relatively high radiation doses for a certain period and then evacuated, and the return of resident after decontamination is being planned for areas where those residents are evacuated at present. The time scale of the transfer of those residents is therefore also considered to be an important factor. The half-life of cesium 137 (hereinafter referred to as ^{137}Cs), a major nuclear species of concern with long-term exposure, is approximately 30 years and hence a time scale of at least several decades needs to be considered. In contrast to this however the duration of high radiation during the passage of a radioactive plume† only lasted about an hour in some cases. These recommendations use break values of three hours, three days, three weeks, three months, three years, and 30 years to illustrate immediately after and over the short/medium/long-term as model time scales in thereby identifying the exposure resulting from the various time scales. The classification of Table 1 is used to indicate the contribution ratio to cumulative exposure dose.

Table 1 Exposure time scale and major factors to be considered

Classification	Model time scale	Factors in emission and environmental factors	Factors in exposure
Immediately after*)	3 hours to 3 days	Changes in emission, advection paths of the plume, and behavior of short-lived nuclear species containing rare gases	Residential area, and transfer for evacuation purposes (Distinction between indoor and outdoor is also important)
Short-term	3 days to 3 months	Behavior of short-lived nuclear species such as iodine, etc., period of cesium deposit, and geographical distribution	Residential area, and transfer for evacuation purposes
Medium-term	3 years	Precise identification of radiation dose distribution, re-scattering and concentration, and effectiveness of decontamination	Residential area, and food intake (Participation in decontamination work)
Long-term	30 years	Transfer of radioactive materials within environmental media	Return from evacuation area, residential area, and food intake

*) Including not only the large amount of emissions on March 15 but also the emissions deemed to have taken place on around March 20-22, although three days or more had elapsed, and to the scope of immediately after is considered appropriate.

[2] Definition of geographical zone

The results of wide-area observations[20] reveals a rather complex geographical distribution of the deposited amount of radioactive materials to the ground surface and radiation dose rates in the air through advection/diffusion in wind and deposition due to rainfall/snowfall, etc. However, measured data that reveals the behavior of the radioactive plume immediately after the accident is rather limited and thus estimated values using modeling were mainly used. In addition, and as shown in Table 2, consideration also needs

[20] Airborne monitoring by the Ministry of Education, Culture, Sports, Science and Technology (including joint monitoring with the U.S. Department of Energy)
http://radioactivity.mext.go.jp/old/ja/monitoring_around_FukushimaNPP_MEXT_DOE_airborne_monitoring/

to be given to activities with regard to transfer of the exposed subjects.

In any case precise estimation of the amount of exposure requires the geographical distribution to be taken into account. These recommendations adopt the approach of estimating the exposure dose by establishing several geographical zones and setting representative scenarios for each zone.

Table 2　Geographical zones used in setting exposure scenarios

Classification	Radiation dose rate in the air and additional exposure dose	Matters of particular concern with the scenario
Zone A A zone with an additional annual exposure dose before decontamination of around 50 mSv	50 mSv/y (10 μSv/h) 10-20 mSv/y after decontamination	・ Exposure during transfer for evacuation purposes ・ Exposure at the evacuation area ・ Decontamination level, and exposure after return
Zone B A zone with an additional annual exposure dose before decontamination of around 20 mSv	20 mSv/y (4 μSv/h) 5-10 mSv/y after decontamination	・ Exposure during the period between the accident and the date of evacuation ・ Exposure at the evacuation area ・ Decontamination level, and exposure after return
Zone C A zone with an additional annual exposure dose before decontamination of around 5 mSv	5mSv/y (1μSv/h)	・ Thorough investigation of the situation with exposure immediately after the accident ・ Exposure at residences and during commuting ・ Exposure accompanying decontamination activities
Zone D A zone with an additional annual exposure dose before decontamination of around 2 mSv	2 mSv/y (0.4μ Sv/h)	・ Exposure at residences and during commuting ・ Exposure accompanying decontamination activities
Zone E A zone with an additional annual exposure dose of around 0.5 mSv	0.5 mSv/y (0.15 μSv/h)	・ Exposure at residences and during commuting ・ Exposure accompanying distribution of food, etc.
F) A zone with little accident-related deposition	Background (0.05 μSv/h)	・ Exposure accompanying distribution of food, etc.

Note 1　The deposited amount of $^{134}Cs+^{137}Cs$ per unit area was estimated to be around

2500kBq/m^2 in Zone A, 1000kBq/m^2 in Zone B, 250kBq/m^2 in Zone C, 100kBq/m^2 in Zone D, and 25kBq/m^2 in Zone E. Bq† indicates becquerel.

Note 2 Zone A and Zone B fall under being classified as a caution zone and planned evacuation zone, respectively, and decontamination of these zones will be assumed to be carried out by the government in accordance with the Act on Special Measures concerning the Handling of Contamination by Radioactive Materials. Zone C and Zone D fall under being classified as priority areas for the radioactive contamination surveys provided for in the Act on Special Measures, and decontamination of these zones will be assumed to be carried out by the local governments.

[3] Subjects of exposure risk assessments

From the point of view of the absolute level of exposure doses, and the short-term exposure dose immediately after the accident, in particular, attention should probably be paid to those working to restore the situation after the accident at the nuclear power plant, but these recommendations assumed the disaster-victim residents to be the subjects when the assessing the exposure risks. However, workers at risk of additional exposure resulting from radioactive material emission due to the accident, for example those engaged in decontamination work or at waste disposal facilities, are included as the subjects for discussion. In addition, residents can participate in decontamination work in some cases and therefore a focus should also be placed on the effects of decontamination on those residents.

[4] Nuclear species subjected to assessment

The aspect of the contribution to exposures dose of each nuclear species is considered to be different with each of the time bases given in Table 2. Judging from actual measured results obtained to date the contribution was the largest with ^{137}Cs over the long-term, with cesium 134 (hereinafter referred to as ^{134}Cs) being at the same level or more important than ^{137}Cs over the medium-term. Examining the emitted amount at the time of the accident in becquerel (hereinafter referred to as Bq†) reveals the ratio of ^{134}Cs and ^{137}Cs to have been 1:1, but the emitted gamma ray energy to have been larger with ^{134}Cs, and thus the initial exposure contribution was larger with ^{134}Cs. The half-life of ^{134}Cs is significantly shorter at two years than that of ^{137}Cs at 30 years. The radiation dose† from cesium (^{134}Cs + ^{137}Cs) therefore drops by almost half over the first three years. (Figures 1 and 2)

In contrast to this iodine 131 (hereinafter referred to as ^{131}I) is considered important

with respect to the short-term exposure immediately after the accident. In addition to its significant contribution to external exposure it is known to accumulate in the thyroid when internally exposed to it. It was successively detected in both the water supply and food immediately after the accident.

Various monitoring media used after the accident also focused on ^{134} Cs, ^{137}Cs and ^{131}I, with precedent measuring of other species being limited, but there are some species that cannot be ignored in the assessment of exposure immediately after the accident in particular. According to data measured in Chiba City by the Japan Chemical Analysis Center <1> the contribution of xenon 133 (hereinafter referred to as ^{133}Xe), a rare gas, to initial external exposure was large. ^{133}Xe is a member of a nuclear species group referred to as a submersion nuclear species but which does not accumulate in the human body, and thus is not considered important as an internal exposure source. Clarifying whether a sharp rise in the radiation dose rates in the air observed immediately after the accident in various areas, which was considered to have been caused by the passage of a radioactive plume, was due to ^{133}Xe or ^{131}I is an extremely important issue in estimating the exposure dose and health risks.

In addition, the detection of some nuclear species, including tellurium, barium, strontium, and plutonium, etc. has been reported[21], but with food safety standards their contribution to the exposure dose is considered to have been around a total of 10%.

[21] Tellurium (^{129m}Te, ^{132}Te), ^{133}I, and ^{136}Cs were detected in measurements made by the High Energy Accelerator Research Organization (KEK) in Tsukuba City and National Institute for Environmental Studies and zinc (^{65}Zn), niobium (^{95}Nb), silver (^{110m}Ag), ^{136}Cs, barium (^{140}Ba), and lanthanum (^{140}La) in the fallout measurements made by the Ministry of Education, Culture, Sports, Science and Technology. In contrast to this, and judging from measurements of soil within Fukushima Prefecture, the contribution of long-life nuclear species, and strontium (^{90}Sr) in particular, which is considered important from the point of view of accumulation in the human body, to the exposure dose was deemed to be smaller than Cs, although more substantial measured values are needed in ensuring a more precise assessment of the exposure dose. Furthermore, nuclear species such as plutonium (Pu) and tritium (^{3}H), etc. are of public interest, with plutonium 241 (^{241}Pu), which is considered to have originated from the nuclear power plant accident because of its half-life, having also been reported. Data made available by the Ministry of Education, Culture, Sports, Science and Technology resulted in maps for ^{238}Pu and ^{239}Pu+^{249}Pu then being disclosed on September 30, 2011, with the estimated cumulative radiation doses over 50 years at the locations where the maximum values were observed being ^{134}Cs: ^{71m}Sv, ^{137}Cs: 2000mSv, ^{238}Pu: 0.027mSv, ^{239}Pu+^{240}Pu: 0.12mSv, ^{89}Sr: 0.00061mSv, and ^{90}Sr: 0.12mSv. Furthermore, maps of ^{129m}Te and ^{110m}Ag were disclosed on October 31, 2011 and with the estimated cumulative radiation dose over 50 years at locations where the maximum values were observed being ^{129m}Te: 0.6mSv and ^{110m}Ag: 3.2mSv.

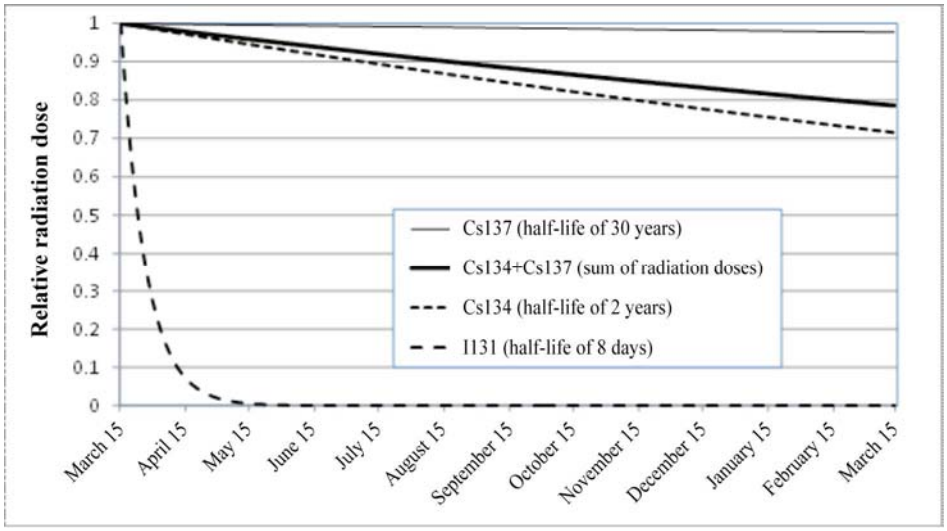


Figure 1 Theoretical value of radiation decay calculated from half-life (1)

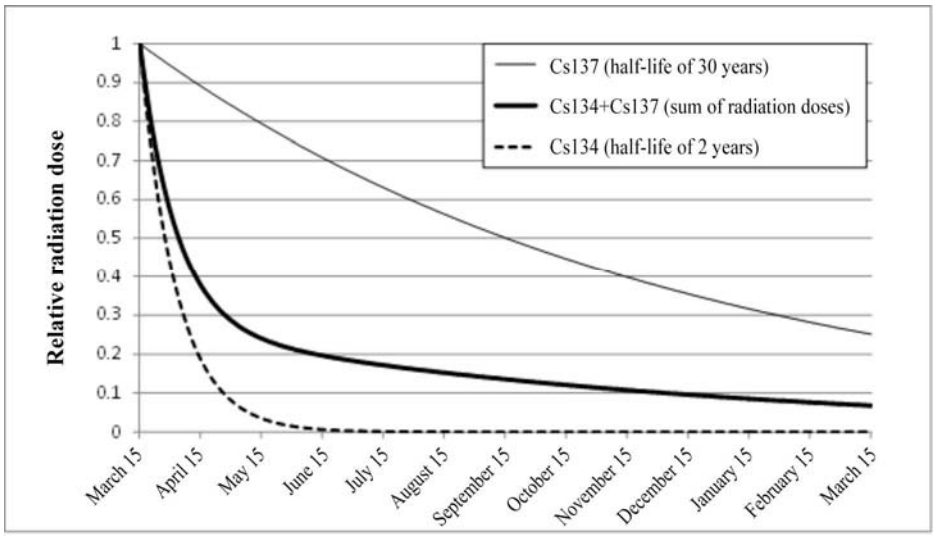


Figure 2 Theoretical value of radiation decay calculated from half-life (2)

3 Overall perspective from emission to health effects

(1) Course and outline of accident

Heat is generated in nuclear reactors from the radioactive decay of nuclear species inside the nuclear fuel, and even when the reactors are not in actual operation. Without continued cooling, therefore, the temperature continues to rise, with chemical reactions between the cladding material of nuclear fuels and water leading to further temperature rises, and which can then damage the fuel cladding tubes and generate hydrogen. For this reason nuclear power plants require a variety of cooling systems. In the case of Fukushima Daiichi Nuclear Power Plant, however, the power transmission line facilities were destroyed by the earthquake and external power was no longer available. In addition, emergency diesel generators stopped operation when the Tsunamis hit the plant, thereby resulting in the entire AC power functions being lost except for Unit 6. Sea water pumps used to release heat to sea water were also no longer functioning, thus resulting in the loss of the final heat removal function to the sea. DC power also did not last long due to the loss of its functions or exhaustion of its power supply. This led to the loss of the cooling functions and subsequent damage to the fuel as well as hydrogen generation and then a hydrogen explosion. In addition, venting was carried out to reduce the pressure inside the containment vessel.

A large quantity of radioactive materials was released during the period of March 15 through to 16, but with high radiation dose rates then occasionally being observed in the neighborhood of the Fukushima Daiichi Nuclear Power Plant for two weeks after the accident. Many of these events matched the period when venting took place from the respective units and the period when the building housing the nuclear reactor was blown apart as a result of the hydrogen explosion. In many cases rises in the radiation dose rate were observed when containment vessels were vented and the building housing the nuclear reactor collapsed, but some of it also matched the period when vapor was released into water inside the pressure suppression chamber using safety relief valves and the period of the deemed external diffusion of radioactive materials in vapor through damaged areas of the containment vessel due to intensive vaporization resulting from water being added to high temperature fuel in hot vessels containing no water. In addition, later analysis of the radiation measurements results indicates continuous releases of large quantities of radioactive material until the beginning of April.

(2) Four assessments and a figure providing an overall perspective

The following four assessments need to be carried out for use in predicting the radiation exposure of the residents in the neighborhood of the nuclear power plant and the Japanese

people in general, and its health effects, all of which is of concern and to have resulted from the accident.

1) **Assessment of emitted amounts**: estimating when, what type, and what quantities of radioactive material were emitted from the nuclear reactors into the atmosphere, land, and ocean
2) **Assessment of diffusion**: estimating how the radioactive materials emitted from the nuclear reactors diffuse into the surrounding environment and when, where, and in what quantities they were transported and deposited, and estimating the future situation
3) **Assessment of exposure doses**: estimation of the direct exposure doses by estimating when and in what quantities of diffused radioactive materials people were exposed to and then predicting possible future long-term exposure, along with indirect exposure doses, including internal exposure due to intake of food contaminated by radioactive materials and external exposure due to transfer of radioactive materials, etc.
4) **Assessment of health effects**: estimation of the level of increased possibility of the occurrence of cancer and other diseases with people who were exposed to radiation resulting from the nuclear power plant accident

The above four tasks and the major data then available need to be reviewed, as shown in Figure 3, and the respective assessments then integrated. The next chapter presents what types of relevant data are available in accordance with the assessment stages, while also providing the observations of the Sub-Committee.

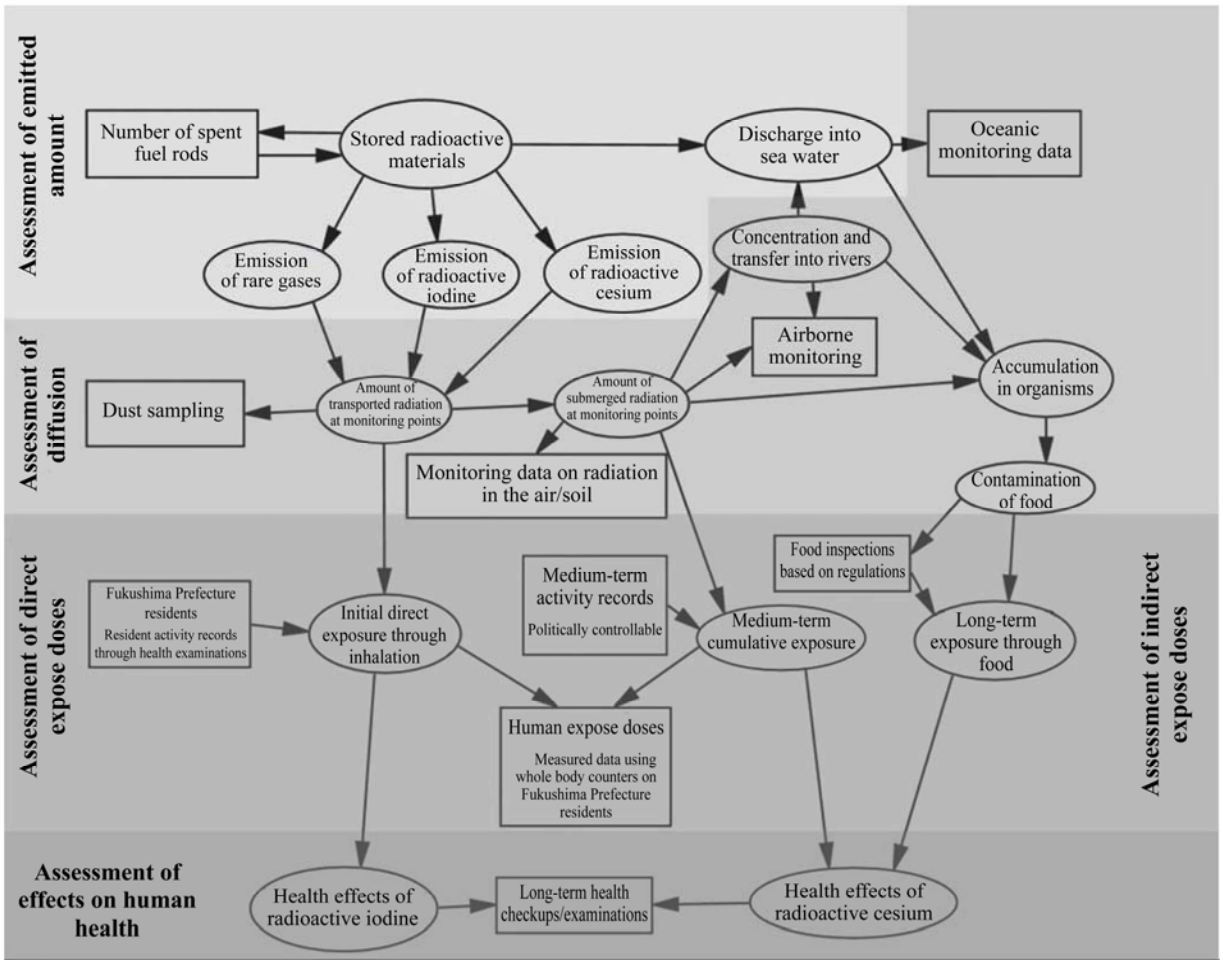


Figure 3 Simple view of short-term/long-term exposure and health effects

Note: Ovals indicate major incidents and rectangles major information

4 Comprehensive identification of exposure routes to residents and estimation of relative contribution ratio

(1) Estimation of emitted amounts

Conceivable emissions of radioactive material due to the Fukushima Daiichi Nuclear Power Plant accident include emissions into the air and discharge into the ocean/ground water. Present major emissions in relation to the assessment of effects on human health are considered to be emissions into the air, which is related to both external exposure and internal exposure through inhalation as well as indirect internal exposure through intake of exposed agricultural products, and discharge into the ocean, which is related to internal exposure through intake of marine products. Representative data on the estimated emitted amounts into the air and estimated discharged amounts into the ocean is presented here. Precise data on the direct discharge from the nuclear reactors into the ground water are not available at present.

[1] Emissions into the air

The following two estimation methods were basically adopted for use with the amount of emissions into the air because directly measured data inside the nuclear reactor facilities was incomplete, mainly for the period of large scale emissions. The Nuclear Emergency Response Headquarters put together this data and reported the estimated results to be 1 to 2×10^{17}Bq for ^{131}I and 1 to 2×10^{16}Bq for ^{134}Cs and ^{137}Cs to the International Atomic Energy Agency <2>.

a. Estimations based on the results of analyzing the state of the nuclear reactors

The Nuclear and Industrial Safety Agency disclosed the estimated emitted amounts based on observed data from the plant immediately after the earthquake and the results of analyzing the state of the nuclear reactors in Units 1-3 <3>. According to corrected data made available on May 18, 2011, it was ^{131}I : 1.6×10^{17}Bq (2.0×10^{16}Bq for Unit 1, 1.4×10^{17}Bq for Unit 2, and 7.0×10^{15}Bq for Unit 3), ^{134}Cs : 1.8×10^{16}Bq, and ^{137}Cs : 1.5×10^{16}Bq <3>.

The estimation using this method resulted in the emissions from the respective units to have been deemed to have converged by March 16 after the emissions from Unit 2 on March 15, 2011, and with no estimation for additional emissions after March 16 being possible <3>.

b. Inverse estimation from environmental monitoring data

The estimation made by the Japan Atomic Energy Agency (hereinafter referred to

as JAEA) utilizes an inverse estimation using WSPEEDI-II†, which enables integration of a simulation of the diffusion of radioactive materials in the air that reflects the weather conditions via the use of monitoring information. The estimated values corrected on August 22, 2011 by adding the information at monitoring posts for the period between May 12-15, 2011 <4> were ^{131}I : 1.3×10^{17}Bq and ^{137}Cs : 1.1×10^{16}Bq. JAEA reported that measurable emissions continued to at least up to April 5, 2011, while overseas research <5> also reported similar changes in the emissions.

[2] Discharge into the ocean

Data is available on the discharge into the ocean, with the estimated discharged amount being based on directly measured data on the discharge of contaminated water from the Fukushima Daiichi Nuclear Power Plant <6>. According to the inverse estimation and using a simulation of the offshore diffusion and sea area monitoring data conducted by the Japan Meteorological Agency <7> the major discharge dropped after the beginning of April but had not reached zero as of the end of August. The cumulative discharged amount of ^{137}Cs during the period between March 26 and May 31 was reported to be $(3.5\pm0.7)\times10^{15}$Bq, which is, however, inconsistent with the amount in <6> that was estimated from the directly observed discharged amount. The inverse estimation, however, does include issues with submergence into the ocean from the air and separation of materials originating in nuclear tests, etc. In contrast to this, and according to the discharged amount as estimated by JAEA, the amount of directly discharged ^{137}Cs into the ocean was 3.6×10^{15}Bq (^{131}I:1.06×10^{16}Bq and ^{134}Cs:3.5×10^{15}Bq) <8>.

(2) Diffusion of radioactive materials into land, air, water, and solids

[1] Distribution of initial fallout due to air diffusion

Radioactive materials emitted from the source get transported as gaseous materials or particulate materials and eventually deposited on the land and sea via dry deposition (gravity fall and vertical transport due to turbulent airflows, etc.) and wet deposition via rainfall. According to the results of calculations using several high granularity models, including WSPEEDI-II, etc., 25% to 37% of ^{137}Cs was considered to have been deposited on Japanese land from 32 to 42 degrees north latitude <9-13>. The diversity seen in this assessment is due to the difference in the assumption of the scavenging rate due to rainfall, assumption of temporal changes in the emitted amount, and the results of calculating meteorological fields, thus necessitating that a comparison of the different models of other nuclear species take place and that the simulation errors be reduced in the future. However,

the transportation mechanisms of the major emissions in March (15-16th and 20-21st of March, etc.) were almost completely identified using data analysis and model simulations.

[2] Current status with mapping of radioactive nuclear species fallout

Using the recommendation "necessity of the investigation of radiation levels after the accident of the Fukushima Daiichi Nuclear Power Plant" <14>, which was issued by SCJ on April 4, 2011, as a start point a joint team composed of the Ministry of Education, Culture, Sports, Science and Technology and universities collected 5 centimeters of the topsoil layer from around five sampling points in approximately 2,200 locations within an approximately 100-kilometer radius of the Fukushima Daiichi Nuclear Power Plant and then analyzed the nuclear species found in that soil <15>. Approximately 11,000 soil samples were collected, and the deposited amounts (radiation dose per unit area) of five gamma-ray emitting nuclear species, namely ^{134}Cs, ^{137}Cs, ^{131}I, ^{129m}Te, and ^{110m}Ag, then measured using a germanium semiconductor detector, and a map of the concentrations of the respective radioactive nuclear species in the soil created.

A later comparison of the measurement results of airborne monitoring with the deposited amounts found in the soil proved to be consistent, and thus the subsequently conducted airborne monitoring over the whole of East Japan can also be regarded to have reproduced rather accurate deposited amounts. The results of measurements made via airborne monitoring can therefore be regarded to be useful as basic data for use in comprehensively identifying the exposure routes to residents, the actual situation with and the dynamics of radioactive materials, and estimating the emitted amount into the air, etc.

[3] Process of transfer, diffusion, and concentration of the amount of fallen radioactive nuclear species on land

Radioactive material fallout on the land surface identified to have been transferred through the natural environment, including forests, soil, and rivers, etc. A report prepared by the Ministry of Education, Culture, Sports, Science and Technology <16>, in which the Yamakiya region, Kawamata town, Date county located in the upper reaches of the Kuchibuto River of the Abukuma River system was selected to be the model region, with the report being as follows.

1) The transfer of radioactive cesium to soil water, running water, and underground water was observed to be small as of February 2012.
2) In coniferous forests a large amount of radioactive cesium existed in the canopies, with that radioactive cesium being gradually transferred to the forest bed in the

process of passage through the canopies of rain that fell on the forests.

3) With regard to the amount of fine soil and sand particles discharged into rivers the discharge of soil and sand of no more than 0.3% of the amount of radioactive cesium fallout into rivers was verified, even with bare land with little vegetation, but the amount of discharge of radioactive cesium was rather small with pastures and forests. With rice paddy fields the discharge into rivers mainly took place when the fields were being prepared.
4) Over 90% of radioactive cesium flowed into rivers in the form of floating sand, and a maximum total concentration of ^{134}Cs and ^{137}Cs of 10,000 Bq/kg or more, which far exceeded 10 times the regulated value for sludge, was observed at many locations in the main stream of the Abukuma River. In addition, soil and sand of the same level of high concentration accumulated in the reservoir in the main stream of the Abukuma River. A positive correlation was identified between the average concentration of radioactive cesium in soil collected from the upper reaches and the concentration of radioactive cesium in river-bed soil after making particle size adjustments, which thereby took the adsorption rate of radioactive cesium on fine particles into account.

The characteristics of the transfer of radioactive cesium indicate that the radioactivity concentration of radioactive cesium in river water, river-bed soil, and floating sand at specified sampling points can be considered to be capable of being estimated if the average deposited amount of radioactive cesium in the upper reaches of the water sampling locations is obtained through utilizing a map of the deposited amount of radioactive materials. However, quantification of re-scattering mechanisms and transfer to vegetation of radioactive materials will be needed over the long-term.

[4] Process of advection diffusion of radioactive nuclear species in the ocean

Radioactive nuclear species emitted to the air, and approximately 2/3 of the radioactive cesium in particular, were estimated to have been transported to the ocean and deposited on the surface of the ocean, and thus becoming the source of radioactive materials in the ocean. Radioactive cesium has been widely detected at the surface of seawater in measurements made by oceanographic research vessels, etc. that cross the North Pacific Ocean, etc. since the beginning of April. The locally measures value was 196 Bq/m^3 for ^{137}Cs, which was higher by two digits than that in surrounding waters <17>. This was considered to be due to fallout from the air via rainfall.

Radioactive materials directly discharged from the Fukushima Daiichi Nuclear Power

Plant into the ocean get diffused through rather complex routes that are affected by ocean currents and the wind. Oceanic monitoring took place at a relatively early stage, and which identified that 100 Bq/L or more of ^{137}Cs had been diffused to the north and south along the coast of Fukushima Prefecture in late March and then gradually diffused to offshore in and after mid-April. However, the granularity in terms of time and space was rather coarse, thus making identifying a detailed advection diffusion situation from the observed data rather difficult. In addition, and from the results of a consistent numerical simulation, part of the radioactive materials will have reached the international date line around six months after the discharge, but was estimated to be considerably diluted to a concentration of approximately 0.01 Bq/L.

(3) Exposure routes

Major radiation exposure and health effects due to the emission of radioactive materials that accompanied the accident can be listed in chronological order as follows.

1) **Short-term direct exposure**: caused by radioactive materials, including those with a short half-life, emitted from the Fukushima Daiichi Nuclear Power Plant during the period of between March 12 and the beginning of April and which directly adhered to the human body or was inhaled.
2) **Long-term direct external exposure**: caused by radioactive materials emitted from the Fukushima Daiichi Nuclear Power Plant, including radioactive cesium with a long half-life, etc., deposited in residential or work environments used in daily life or at work. In addition, this type of exposure can also occur in the future.
3) **Long-term indirect internal exposure**: caused by intake of animals or fish and shellfish exposed to radioactive materials emitted from the Fukushima Daiichi Nuclear Power Plant or animals that consumed them through the food chain then being consumed by humans.

Of these 1) indicates the exposure that has already taken place. Focusing on how the exposure in 2) and 3) could possibly take place leads to the routes as viewed in Figure 4.

As shown in Table 2 the routes of particular importance differ depending on the area and period. In assessing the exposure doses the exposure sources can be classified as follows with regard to the issues involved in the respective sources.

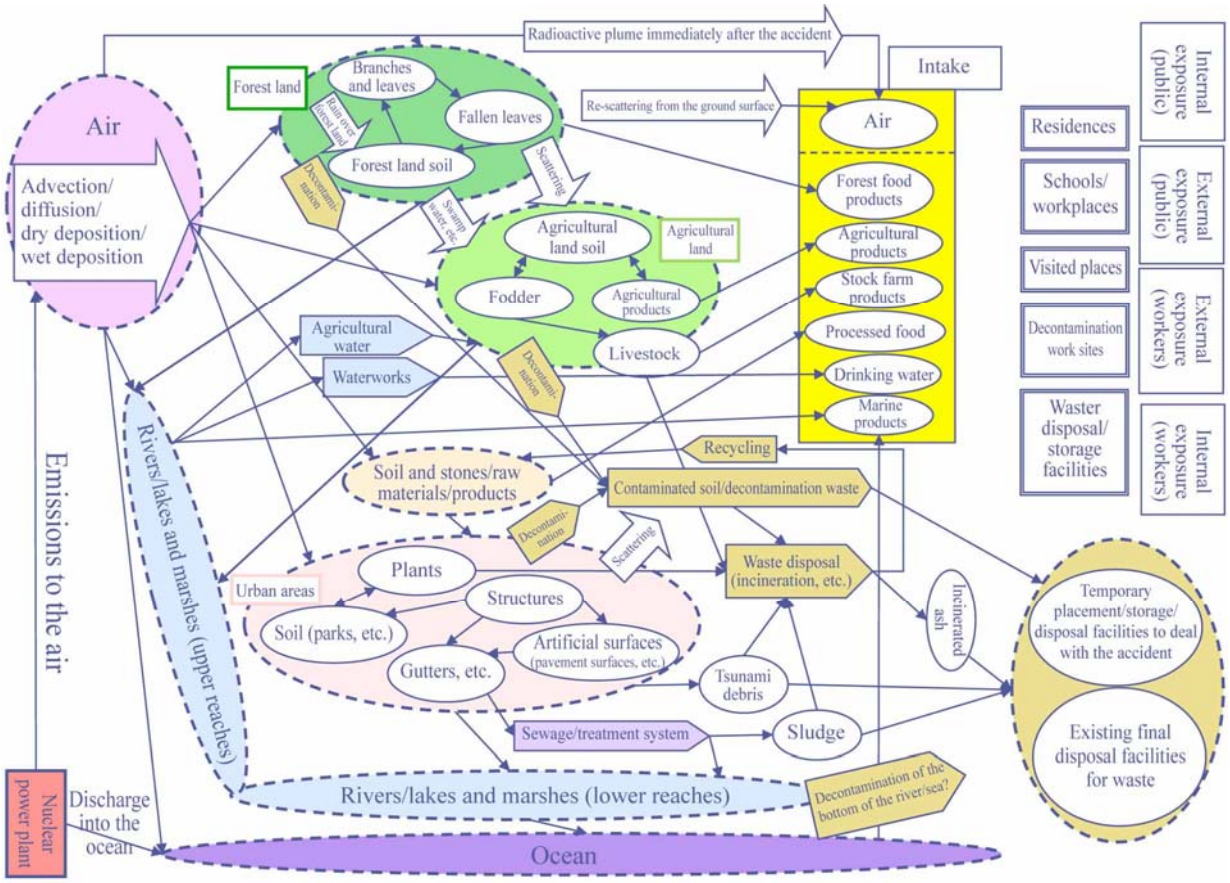


Figure 4 Overview of matters that can pose future health effects to humans

[1] Initial passage of the radioactive plume after the accident

Both internal and external exposure can be assumed to have occurred from exposure to rare gases and iodine contained in the radioactive plume immediately after the accident. In addition, external exposure from radioactive materials adhering to skin/clothes, etc. is also possible. Measurement data by nuclear species immediately after the accident is limited, thus making better estimations than rough estimates difficult at present, and even with the results of measuring the radiation dose rates in the air and the results of external exposure dose examinations being used as reference. Estimation of exposure doses could be improved in the future if the situation during the concerned period can be reproduced by subtly combining the limited measurement data immediately after the accident with simulated diffusions and depositions and by clarifying the temporal distribution of the emitted amounts by nuclear species.

[2] Radioactive materials deposited in various areas

As described in (2) of Chapter 4 the radioactive materials emitted due to the accident

were transferred through environmental media and then deposited over ground surfaces and structures on ground surface, forests, agricultural land, and the bottom of rivers, etc. Any people living in these environments could receive external exposure through them. With the estimation of exposure doses made in Chapter 5 the representative values were set based on the measurement results of radiation doses in the air available to date. The environmental dynamics by area of (2) of Chapter 4 being subtly reproduced/predicted, however, would result in estimations using models being considered also possible.

Estimating the medium- to long-term external exposure doses requires the shielding effects when time is spent indoors to be taken into account in many cases. The indoor radiation dose rate in the air, however, may not be all that lower than that of outdoors due to the deposition of radioactive materials on roofs, etc. Verification is therefore considered necessary with estimation based on the outdoor radiation dose rates in the air. In addition, the contribution of re-scattering to internal exposure has been considered relatively small, but verification through continued measurements is expected to take place.

[3] Intake of food and drink

Radioactive materials are contained in agricultural products, stock farm products, forest products, and marine products through direct adhesion of radioactive materials emitted into the environment, transfer from soil, intake of water or fodder, and the food chain, with the intake of those products then causing internal exposure. In predicting the future situation with exposure through food and drink understanding the dynamics of radioactive materials in the environment, as described in (2) of Chapter 4, is considered important.

[4] Artificial transfer of radioactive materials after the accident

Radioactive materials have been artificially transferred through the distribution of goods, including the use of construction raw materials, including macadam and cement, etc., use of wood as firewood, collection/treatment/disposition of waste, and transportation/temporary placing/storage of contaminated soil, etc. In addition to the external exposure of the residents in transferred areas the exposure of workers engaged in these processes is also possible. Regulations for decontamination and waste treatment to deal with the accident of concern (so-called Ionizing Radiation Ordinance for Decontamination[22]) are being provided.

[22] The official title is the “Ordinance on Prevention of Ionizing Radiation Danger with the Decontamination of Soil, etc. Contaminated by Radioactive Materials Produced as a Result of the Great East Japan Earthquake

5 Estimation of exposure doses and prediction of health effects

(1) Estimation of exposure doses

[1] Estimation of external exposure based on radiation dose rates in the air and residential time scenarios

The external exposure doses immediately after (within three days of the accident), over the short-term (three days to three months), medium-term (three months to three years), and long-term (three years to 30 years) were estimated by setting representative values for the radiation dose rates in the air based on "[1] Definition of time base" and "[2] Definition of area classification" in (2) of Chapter 2 and using modeling data as reference values. The medium-term exposure dose was assumed to be from ^{134}Cs and ^{137}Cs, and hence the theoretical decline in the radiation dose rate based on their half-life was taken into consideration. In addition, the following scenarios, which set the declines in radiation dose rates through decontamination measures three years after the accident occurred for each of the classifications provided for in the Act on Special Measures concerning the Handling of Contamination by Radioactive Materials (enacted on August 30, 2011) and assume continuous decontamination measures being used for a certain period after people return if the decontamination level at the time they return from evacuation is insufficient, were used (Tables 3 and 5).

Scenarios used

Zone A: a zone with an additional annual exposure dose before decontamination of around 50 milisieverts (hereinafter sievert is referred to as Sv† and milisievert mSv)

1a) No decontamination after returning at 20 mSv/y

1b) Annual decontamination of 20% constantly for 20 years after returning at 20 mSv/y

2a) No decontamination after returning at 10 mSv/y

2b) Annual decontamination of 10% constantly for 5 years after returning at 10 mSv/y

Zone B: A zone with an additional annual exposure dose before decontamination of around 20 mSv

1a) Evacuation after 3 months at residence, but no decontamination after returning at 10 mSv/y

1b) Evacuation after 3 months at residence, and an annual decontamination of 20%

Disaster". The abbreviated title was used because of the fact that the conventional Ordinance on Prevention of Ionizing Radiation Dangers has been called the "Ionizing Radiation Ordinance". This Ordinance was newly provided to prevent workers engaged in decontamination work, etc. under the Act on Special Measures concerning the Handling of Contamination by Radioactive Materials and other workers from being exposed to ionizing radiation to the fullest extent possible.

constantly for 5 years after returning at 10 mSv/y

2) Evacuation after 1 month at residence, but no decontamination after returning at 5 mSv/y

Zone C: A zone with an additional annual exposure dose before decontamination of around 5 mSv

50% reduction in radiation dose as of March 2014 from September 2011 (5 mSv/y), including the effects of decomposition

Zone D: A zone with an additional annual exposure dose before decontamination of around 2 mSv

50% reduction in radiation dose as of March 2014 from September 2011 (2 mSv/y), including the effects of decomposition

Zone E: A zone with an additional annual exposure dose before decontamination of around 2 mSv, no decontamination

This estimation is for use in surveying the level of contribution to the long-term cumulative exposure dose at various locations with differing radiation dose rates, periods, and durations, and is not precise enough to estimate accurate exposure doses. In addition, rather extreme scenarios were used in order to clearly identify the difference in the contribution ratio.

With zone A, for example, the contribution level of cumulative exposure dose after returning is large with the scenario where it is assumed that some residents will return even at 20 mSv/y and in cases where decontamination to a level of 10 mSv/y is difficult. Achieving a cumulative exposure dose of 100 mSv or less will require continuous decontamination measures after returning. With Zone B the period during which residents could remain within zones with high radiation dose rates until evacuation was set to be one month and three months, but the decontamination level of 10 mSv/y or 5 mSv/y at the time of they returned had a higher contribution level to the cumulative exposure dose.

With every zone the contribution level of medium- to long-term continued exposure was higher than that of short-term exposure during the period of a high radiation dose immediately after the accident. However, this concerns a estimation of external exposure that was based on the measured results of radiation dose rates in the air only, and, as described in (1) [2] b. of Chapter 5 (page 207), the exposure immediately after the accident needs separate consideration.

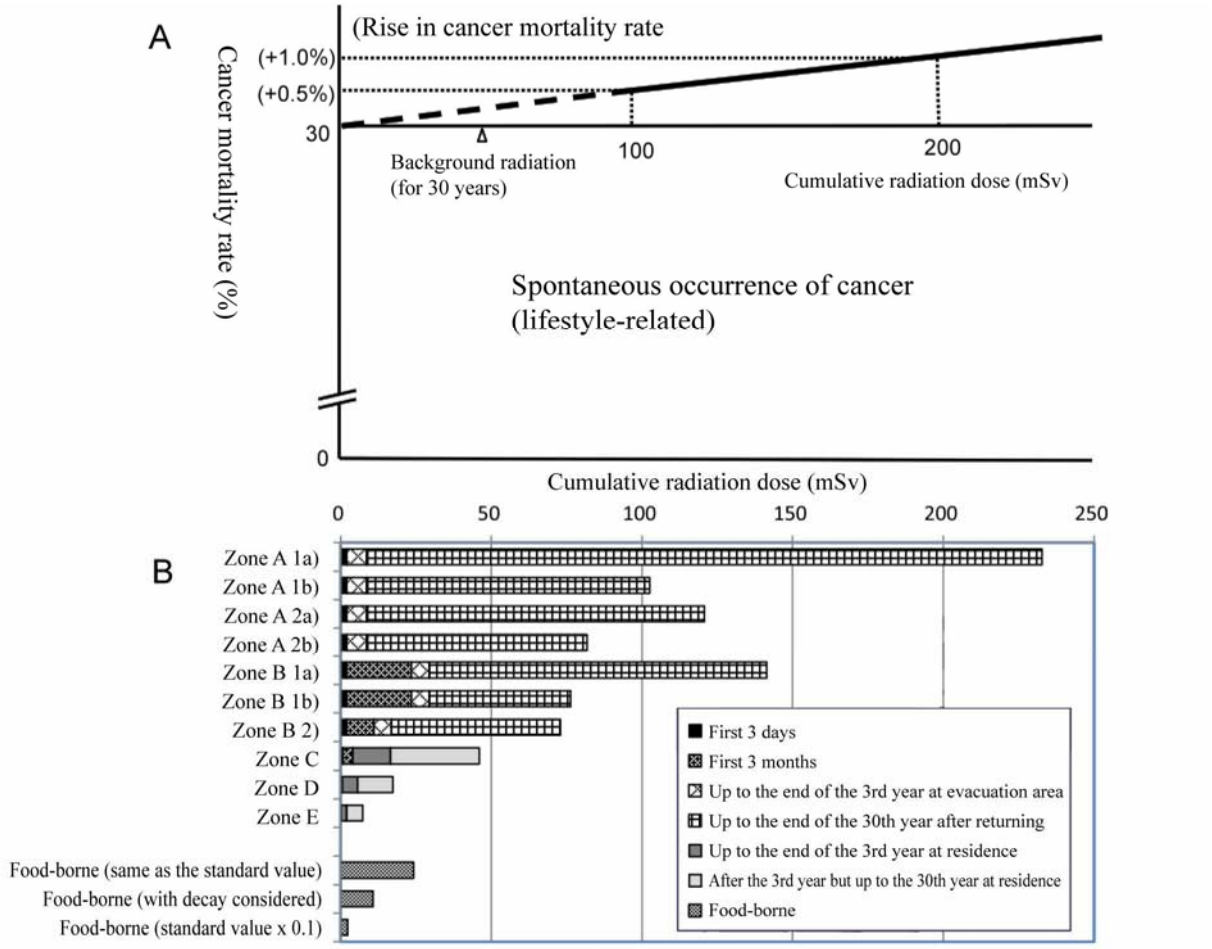
The half-life of ^{134}Cs is significantly shorter at approximately two years than that of ^{137}Cs at approximately 30 years and the radiation dose per 1Bq is stronger with ^{134}Cs, thus

the decay of ^{134}Cs can significantly affect the reduction in radiation dose from the initial stage. However, the other side to that is that the reduction in radiation dose after returning following decontamination is slower than the reduction from immediately after the accident. Care must therefore be taken that the long-term cumulative radiation dose in regions with the same exposure dose rate of 10 mSv/y can differ by the ratio of 1:2 between regions with that of 10 mSv/y one year after the accident and regions with that of 10 mSv/y at the time of returning (three years after the accident).

An assessment of health effects from the exposure doses in the respective scenarios is given in (2) of Chapter 5.

Table 3　Radiation dose rate in the air assumed when estimating the exposure dose

	Peak immediately after the accident	3 weeks after the accident	3 months after the accident	Evacuation area	Current situation as of September 2011		After decontamination (assumed to be March 2014)
	μSv/h	μSv/h	μSv/h	μSv/h	μSv/h	mSv/year	mSv/year
Zone A	50			0.6	10	52.6	10～20
Zone B	50	25	15	0.6	4	21.0	5～10
Zone C	20	5	2		1	5.3	2.6
Zone D	1	0.6	0.5		0.4	2.1	1.1
Zone E	1	0.2	0.18		0.15	0.8	No decontamination



Scenarios used

Zone A 1a) No decontamination after returning at 20 mSv/y
1b) Annual decontamination of 20% constantly for 5 years after returning at 20 mSv/y
2a) Annual decontamination of 20% constantly for 5 years after returning at 10 mSv/y
2b) Annual decontamination of 10% constantly for 5 years after returning at 10 mSv/y

Zone B 1a) Evacuation after 3 months at residence, but no decontamination after returning at 10 mSv/y
1b) Evacuation after 3 months at residence, and annual decontamination of 20% constantly for 5 years after returning at 10 mSv/y
2) Evacuation after 1 month at residence, but no decontamination after returning at 5 mSv/y

Zone C 50% reduction in radiation dose as of March 2014 from September 2011 (5 mSv/y), and including the effects of decomposition

Zone D 50% reduction in radiation dose as of March 2014 from September 2011 (2 mSv/y), and including the effects of decomposition

Zone E 5 mSv/y as of September 2011, but no decontamination

Figure 5 (A) Cancer mortality rate, and

(B) Estimation of cumulative radiation doses over the next 30 years by zone

Note) Food-borne radiation was estimated using extreme scenarios and assuming that the radiation levels in all the food consumed would barely meet the standard values.

[2] Matters of concern with direct exposure other than external exposure scenarios

a. Estimation of contribution level of xenon (^{133}Xe) at the time of the radioactive plume passage immediately after the accident

^{133}Xe accounted for the highest amount of the estimated emitted amount in units of Bq, and with ^{133}Xe having been the main contributor to the sharp rise in the radiation dose rate in the air according to data measured as of March 15, 2011 at the Japan Chemical Analysis Center in Chiba City <1>. In this location, and where the radiation dose rate was around 0.5 μSv/h during the peak period, the average concentration in the air during the period of March 14-22 was reported to be 1,300 Bq/m^3, thus indicating the possibility that the concentration rose two digits higher during the peak period of March 15. Comparison of the radiation dose rate in the air between regions reveals the rate to be three digits higher in the Planned Evacuation Zone than in Chiba City. However, the measurement data by nuclear species was not available, thus making the assessment in these regions rather difficult. With ^{133}Xe, however, the contribution of exposure from outside the body is larger than exposure through air inhaled into the lungs, thus assessing its internal exposure is considered to be in low in the level of requirements. A radiation dose of around 300 μSv/h was observed in Namie town, Fukushima Prefecture on March 15. If exposed to this for three consecutive days the exposure dose would be around 20 mSv.

b. Internal exposure to iodine at an early stage after the accident

For the period of around one week to one month after the accident the contribution of ^{131}I to internal and external exposure was considered to be relatively large, although measured data on the iodine concentration and contribution of iodine to the radiation dose rate in the air at that time is insufficient. Assessment by region requires high spatial resolution simulations. In addition, data on checkups for thyroid exposure and whole-body exposure dose measurements using Whole Body Counters (hereinafter referred to as WBC†) conducted immediately after the accident on residents in regions with high radiation dose is considered be in need of careful examination. The exposure dose of the specific organ of the thyroid (equivalent dose) and the effective dose used for the whole body need to be distinguished between and appropriately used.

[3] Food- and drink-borne internal exposure

Provisional standards were established for food and drinking water after the accident. Here, after considering the half-life and physical properties of each of the nuclear species,

the subject used in estimating medium- to long-term exposure was limited to cesium in food. Provisional standards were initially set to 500 Bq/kg and new standards from April 2012 to 100 Bq/kg, which is equivalent to 1 mSv annually (the amount in drinking water needs to be deducted to be more precise, but was not considered here for the sake of simplification). The results of inspections approximately one year after the accident revealed the amount of 100-500 Bq/kg to be detectable in quite a few cases, but the amount of actual intake is smaller than the standard values according to the results of inspection of a person's entire diet using a duplicate diet method[23] and the results of measurement by WBC. The situation where the radiation levels of all the food taken by an individual would barely meet the standard values would be very unlikely to occur, but the estimation was made using extreme scenarios here for a comparison with the external exposure doses shown in "[1] Estimation of external exposure based on the radiation dose rate in the air and residential time scenarios" in (1) of Chapter 5.

By setting the same period as for the estimation of the external exposure of 30 years the cumulative committed effective dose for the case of the intake of food that barely meets the standard values based on 1 mSv/y would be 30 mSv (approximately 24 mSv when the ratio between ^{134}Cs and ^{137}Cs is considered). In contrast, and as described above, ^{134}Cs, whose half-life is approximately two years, decays at a relatively early stage. The exposure dose through agricultural products is therefore expected to decrease, even when agricultural products are produced on the same agricultural land with the transfer of ^{134}Cs to agricultural products being constant and at the same rate. After taking into consideration the difference in the scale factor for the committed effective dose of ^{134}Cs and ^{137}Cs the initial dose of 100 Bq/kg would have dropped to approximately 21 Bq/kg in 30 years' time and the cumulative committed effective dose over 30 years would be approximately 10.8 mSv. Assuming that the contamination level of marine products would be retained due to the transfer of cesium from the land to the ocean, as described in (2) [4] of Chapter 4, and the percentage of marine products to all food intake was 10%, which is higher than the actual value, the cumulative dose would be 12.2 mSv.

These values are shown in Figure 5 for comparison against the external exposure dose calculated in "[1] Estimation of external exposure based on the radiation dose rate in the air and residential time scenarios" in (1) of this chapter. After taking into consideration

[23] According to the "Food Safety Glossary (4th edition)" (October 2008) prepared by the Food Safety Commission a method of analyzing a person's overall diet and thus measuring their total amount of intake of the food additives and pesticides contained in their daily diet and using the same diet that a survey subject took as the diet sample. This enables estimation of the amount of intake of food-borne chemical substances taken by the survey subjects. Typically a family that participates in the survey is requested to prepare an extra meal which is then used as the sample.

the decline in radiation dose due to decay the internal dose would be below the external exposure dose in Zones A to D but would exceed the external exposure dose in Zone E. Using the assumption that agricultural land used for growing plants would increase as a result of decay and agricultural products supplied that barely meet the standard values the internal exposure dose would also be exceeded in Zone D. Food is distributed nationwide and hence this estimation generally also applies to Zone F (a zone where external exposure to fallen radioactive materials due to the accident can be ignored).

[4] Exposure of workers related to decontamination work and waste treatment

At decontamination sites, especially when engaging in decontamination at locations where radioactive materials are likely to be concentrated such as gutters, etc., workers are at risk of being exposed to radiation doses that are one digit higher than the radiation dose in the air in the surroundings, although only temporarily. The actual exposure dose is considered to largely depend on the duration of the work, situation with contact with contaminated soil and mud, etc., with a quantitative estimation being difficult at present. In accordance with the Ionizing Radiation Ordinance for Decontamination the maximum exposure dose applicable to workers is 100 mSv over five years, which far exceeds the exposure dose of the residents in Zone A calculated in (1) [1] of this chapter. The effect of the residents' participation in decontamination work to the cumulative exposure dose is considered to be small as long as the duration of that work is short. In the case of engaging in the work for a long duration as volunteers, the actual situation with the level of exposure dose needs to be identified.

(2) Assessment of health effects due to exposure

With regard to health effects due to radiation a high radiation level of 1 gray (hereinafter referred to as Gy[†]) or higher can cause direct disorders to various systems of the human body when exposed to it at one time. A threshold dose is considered to exist for each disorder with regard to its occurrence. Disorders with a threshold dose of 1 Gy or lower include temporary infertility in males at 0.1 Gy and hypofunction of the hematopoietic system at 0.5 Gy <18>.

In contrast to this, however, exposure to relatively low radiation doses can also damage genes, with errors that arise when repairing the damage being known to cause gene mutations or chromosomal abnormalities, thus raising the risk of cancer. With regard to cancer due to radiation the mortality risk increases in proportion with doses of 100 mSv or higher. No scientific evidence exists that the mortality risk increases in proportion with the

low radiation dose of 100 mSv or lower. From the standpoint of radiation protection, however, the mortality risk should be assumed to increase in proportion with radiation doses of 100 mSv or lower and the cancer mortality rate estimated to be 5×10^{-2}/Sv, as based on epidemiologic studies of atomic bomb survivors of Hiroshima/Nagasaki <18>. Figure 5 A shows the above description in a schematic manner. Considering that the life-style related spontaneous cancer mortality rate of Japanese people is 30% increase in the cancer mortality rate due to radiation of 100 mSv or lower is rather small.

With regard to the effects of the accident on the residents and according to the external exposure dose estimation results in the basic survey of Fukushima Prefecture's "Prefectural People's Health Management Survey" conducted in the precedence survey areas (Kawamata town (Yamakiya region), Namie town, and Iitate village) an effective radiation dose of over 10 mSv was observed in 71 of 9,747 residents, with the highest dose being 23 mSv. The Committee for the Fukushima Prefecture "Prefectural People's Health Management Survey" evaluated that health effects due to radiation to be unlikely (announced on March 20, 2012) <19>.

167 workers working to restore the situation after the accident were exposed to effective radiation doses of over 100 mSv (as of the end of January 2012) <20>. In addition, some workers were exposed to high internal doses, although mainly due to the intake of radioactive iodine (the maximum committed effective dose was 590 mSv). No health effects have been observed in the health checkups of those workers to date.

Simply contrasting the effective radiation dose with the increased risk is not considered advisable <18>. The horizontal axes of Figure 5 A and B use the same scale in helping to understand the outline of health effects due to an exposure dose estimated over 30 years in the respective scenarios. In addition, the Δ on the horizontal axis of Figure 5 A indicates the cumulative expose dose over 30 years at approximately 1.5 mSv per year, and which is equivalent to the dose that Japanese people are deemed to be exposed to from background radiation. This reveals the additional exposure dose due to the intake of food with the concentration of the standard values for 30 years to be smaller than the exposure dose from background radiation.

6 Recommendations

The Sub-Committee estimated the health effects due to Fukushima Daiichi Nuclear Power Plant accident based on currently available reliable data. Reliability assessment of the results of integrating the results of multiple studies on emissions through to health effect assessment conducted by the Sub-Committee, however, requires that reliability information on the results of the measurements/estimations used as the base figures (hereinafter referred to as uncertainty information) be disclosed, but in actuality this information was not provided in many cases.

However, provisional estimations, although based on the limited data and information available at present, also suggested the importance of appropriate management of cumulative radiation doses in thereby accurately identifying future health conditions.

Based on the exposure doses discussed and health effects estimated for the different exposure routes the following six recommendations are provided here for use in minimizing health effects and improving the future assessment of health effects due to radiation exposure.

(1) Alleviation of effect on public health resulting from the Fukushima Daiichi Nuclear Power Plant accident

The following three recommendations to the relevant government/municipalities/academic circles were made in order to alleviate effect to public health resulting from the Fukushima Daiichi Nuclear Power Plant accident.

Recommendation 1:

The government/municipalities shall, in cooperation with academic circles, continue to improve the precision of the estimated exposure doses immediately after the accident and implement those estimated cumulative exposure doses in protecting the health of those already exposed to radiation, and children and infants in particular. In addition, and with regard to the medical checkups/examinations of residents being continuously implemented by the government/municipalities, a system that can be used to provide thyroid ultrasound examinations and blood tests shall be established with the installation of appropriately calibrated whole body counters. A regional medical system that enables residents to receive appropriate and prompt treatment in the case of health abnormalities being detected shall also be established. The government/municipalities shall establish a system that enables residents to maintain good health not only by reducing future radiation exposure to the fullest extent possible but also via thorough implementation of health management, and concerning cancer factors other than radiation exposure.

Recommendation 2:

The government/municipalities shall implement appropriate measures such as the establishment of decontamination targets, including the post-return of residents and management of decontamination work, etc., in order to prevent cumulative exposure doses from reaching a level that could pose a negative health effect because of potential further exposure due to their return/decontamination work.

Recommendation 3:

Academic circles in Japan shall plan appropriate basic biological/medical research and epidemiological research for use in estimating a low radiation dose-response curve for the carcinogenic rate and cancer mortality rate, implement it in cooperation with the government/municipalities, identify the actual situation with the health effects of low radiation doses through integration of the findings thereby obtained, and promptly reflect the measures derived in the health management of the residents.

(2) Assessment of the present situation with and future of damage caused by radiation and more accurate estimation of health effects

The following three recommendations were made regarding an assessment of the present situation with and future of damage caused by radiation and more accurate estimation of health effects.

Recommendation 4:

The government and academic circles in Japan will be requested to cooperate in establishing a cross-disciplinary research system for use in identifying the overall picture related to the assessment of radioactive health effects, as shown with the approach used in these recommendations, more accurately identifying the actual situation with radiation contamination and health effects associated with the Fukushima Daiichi Nuclear Power Plant accident, and appropriate selection/implementation of decontamination and health effect prevention measures.

Recommendation 5:

In order to facilitate assessments/research that contribute to the assessment of health effects the government shall establish a system that enables a prompt and steady collection of the data required in examining the accident, data that significantly affects estimation accuracy when estimating health effects, and data that can be used as evidence to determine

policies that prevent any damage from the health effects, and an integrated system that provides data in the form that allows researchers to use/analyze it. In addition, a system that enables academic circles to verify the validity/reliability of the provided data is also necessary. Establishing this type of system is desirable not only for this accident but also for use as a system that contributes to the reduction of the disaster/accident damage that could possibly affect the lives of the people.

Recommendation 6:

Institutions/researchers engaged in radiation-related measurements or model-based estimations are expected to disclose the results of the various measurements/estimations that will be used as base figures in assessing radioactive health effects together with uncertainty information. In addition, accuracy control or improvement of the measurements/estimated results based on uncertainty information needs to be planned and implemented.

7 Future issues

In addition to the six recommendations given in Chapter 6 five issues still need to be resolved by academic circles, in particular, and are as described below.

(1) Improvement of modeling and data analysis technologies in relation to emission/diffusion/ exposure/health effects

Improvement of the precision of atmospheric/oceanic diffusion simulations conducted in cooperation with researchers in various fields needs to be continued in the future. Improved simulations are needed, for example more precise numerical models and improved technologies, in thereby covering for any missing emission source information and modeling data through data analysis, including inverse estimations and data assimilation, etc. However, thorough understanding of the deposition/transfer of radioactive materials scattered over wide areas, exposure routes, and health effects will require cooperation between the fields of radiation protection and earth sciences.

(2) Reinforcement of academic reasoning related to assessment of radioactive health effects and the approach

With regard to the effects of low radiation doses a very large amount of scientific literature has been reviewed by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and U.S. Committee on the Biological Effects of Ionizing Radiations (BEIR). Based on the studies, which cover various point of views, including radiation dose-response relationships, doses and dose-rate effectiveness, and existence of threshold values, etc., the International Commission on Radiological Protection (hereinafter referred to as ICRP) assumed application of a linear no-threshold model (hereinafter referred to as the LNT model) as the tool to be used in risk management and regulation on the basis of the concept of radiation protection. ICRP recommendations <18> based on this approach have been broadly and internationally accepted and incorporated into radiation safety related laws and regulations in countries all over the world.

The frequency of cancer due to low dose radiation is far lower than the spontaneous occurrence of cancer, and thus significant uncertainty can be observed in the results of epidemiologic studies, and with no sufficient scientific evidence existing that enabled verification of the LNT model itself. Large-scale comprehensive research thus needs to promptly take place. The risk of cancer with children in particular is of high public interest and also a cause of public anxiety, thus leading to risk assessment research, etc. being expected to take place.

An epidemiologic study on the atomic bomb survivors of Hiroshima/Nagasaki was based on a long observation period with various statistical analysis methods being used. Thorough analysis through this study is therefore expected to result in data from the existing large population.

Furthermore, clarifying the mechanism via biological studies as evidence to cover the statistical uncertainties in epidemiologic studies is also a future issue. Molecular biological studies on gene damage from low radiation dose exposure have been conducted for a number of years now. Recent progress in biotechnologies, however, provides new research methods that enable studies on gene damage from low dose radiation from a molecular biological point of view.

(3) A transition from countermeasures/standards setting at an early stage based on a precautionary principle to the setting of medium- to long-term countermeasures/standards based on academic reasoning and cost-benefit analysis

Effects of radiation emitted into environment not only last a long time but also cannot be artificially eliminated. Furthermore, scientific knowledge on long-term effects of low dose radiation on the human body is still insufficient.

Using the assuming that radiation would have some unrecoverable effects on the human body the government set radiation control zones and implemented measures in accordance with the “precautionary principle[†]”, including thorough control of radioactive materials, etc. In fact the forced evacuations and decontamination with regard to human residences, being in accordance with the level of radiation dose rate in the air and effects on the human body, and food inspections with regard to internal exposure, have been implemented in accordance with the precautionary principle.

However, the process and evidence of political decision making in setting these standards was unclear, thus leading to public distrust. With regard to the way political decisions are made, it was once again clarified after the accident that no scientific discussions or examinations had taken place on the evidence which should rationally be used to make political decisions when scientific causal relationships and facts cannot be clearly identified. There still remain many important issues with effectively referable precedents rarely available throughout human history, including the return of the residents that are owners of land in regions with significant radioactive material depositions, etc. The ideal political decision making process that takes human values into consideration in cost-benefit analysis with these issues needs to be discussed across the fields of humanities and science and within academic circles.

(4) Strengthening of risk communication between academic circles and society

The issue raised here is an extremely important issue for scientists: how to provide risk information that is based on scientific knowledge and its assessments to society. Discussions have been inadequate on exactly how scientists should provide information in cases where many people are worried because no explanation was available in an understandable manner, and on what kind of risk exists, but the fact is that the risk was yet to have been sufficiently verified scientifically at that point. In addition, and because the scope and definition of objective “scientific facts” were unclear, the scientific facts and scientific impact assessment of facts based on the assumption of future aspects got mixed up, and assessments with large uncertainties in the point of concerns were reported as facts. Information on appropriate scientific data collection methods in particular was inadequate, and the difficulty in accurately predicting the effects on human body increased confusion via that information provision.

In consideration of that situation sufficient discussions will need to take place in the future on exactly how information can be appropriately provided at a point when a clear conclusion can scientifically be reached.

Furthermore, training of personnel to engage in radiation education and radiation related work needs to be carried out as a part of risk communication and in thereby educating and reinforcing medical professionals (doctors, nurses, public health nurses, maternity nurses, pharmacists, and veterinarians, etc.) is a future issue.

(5) Limitations of recommendations

Lastly, the limitations of these recommendations also need to be clarified. The Sub-Committee made the effort to collect and compile existing data to the fullest extent possible, but quite a few documents could not be accessed.

Information on the assessments of the exposure dose and health effects on those working to restore the situation after the accident at the Fukushima Daiichi Nuclear Power Plant in particular was not made sufficiently available to the Sub-Committee. SCJ issued a recommendation on the “Integrated Management of Exposure of Radiation Workers” on July 1, 2010 to point out the necessity for the integrated management of the radiation exposure of radiation workers, including revision of all the relevant laws and regulations. SCJ should include this when they proceed with discussions of this issue.

In addition, the effects of radiation on the human body are composite, and the contribution ratio can roughly be estimated scientifically, but it is only a stochastic

estimation. Actual effects on individuals cannot be scientifically clarified with the approach used here. SCJ compiled these recommendations while fully aware of these limitations.

<Definition of terms>

Exposure (internal exposure and external exposure)

Exposure of organisms to radiation. Internal exposure refers to exposure to radiation emitted by radioactive nuclear species that exist inside the body while external exposure refers to exposure to radiation emitted by radioactive sources outside the body. The effects of both external exposure and internal exposure can be added to assessments.

Nuclear species (radioactive nuclear species)

An atomic nucleus consists of protons and neutrons. A specific number of protons and neutrons distinguishes the atomic nucleus. A nuclear species is an atomic nucleus with a specific number of protons and neutrons. There are two types of nuclear species: stable nuclear species and unstable nuclear species in which the number of number of protons and neutrons changes as a result of alpha or beta decay. Radioactive nuclear species refers to nuclear species that causes these types of decay. Gamma decay usually takes place over a very short time and the number of protons and neutrons do not change. Some nuclear species gradually emit gamma rays (called gamma decay from a metastable state), however, and nuclear species while in this metastable state are also referred to as radioactive nuclear species.

Half-life

Radioactive nuclear species involve alpha or beta decay, upon which they are transformed into a different type of nuclear species. Gamma decay does not change the number of protons and neutrons but the energy in the metastable state changes and conversion to a state of less energy takes place. The initial number of nuclear species therefore decreases with time. Half-life refers to the time taken for the initial number of nuclear species to decrease to half.

Radioactive plume

Plume refers to a cloud-like substance that come outs of chimneys like smoke. When radioactive materials are emitted due to the explosion of atomic bombs or nuclear power plant accidents a mass of gas containing radioactive materials flows out, and is like a thread of smoke. Radioactive plume refers to this type of mass of gas containing radioactive materials.

Radiation dose (high, low, in the air, threshold, equivalent, effective, and committed effective)

An index used to indicate the amount of energy of radiation absorbed by a substance per unit mass. The radiation absorbed dose is used to indicate the energy absorbed per 1kg of

substance (J: joule), the equivalent dose is calculated by multiplying the radiation absorbed dose of organs/tissues by a radiation weight factor that takes into consideration the level of effects of different types of radiation, and the effective dose is calculated by adding up the results of multiplying each equivalent dose by a tissue weight factor that takes into consideration the difference in radiation sensitivity of organs/tissues. In the case of internal exposure an assessment is made based on the energy absorbed by each organ over 50 years with adults and for the period until they reach age 70 with children, and this is thus called the committed effective dose. A unit called ambient dose equivalent is used when monitoring air.

Unit (becquerel (Bq), sievert (Sv), and gray (Gy))

A unit used with radiation is Bq (becquerel). 1 Bq means that radiation is emitted as a result of nuclear species decaying once every second. A unit used for the radiation absorbed dose is J/kg, and Gy (gray) is used as a special name (1 J/kg = 1Gy). The unit used for the equivalent dose and effective dose is Sv (sievert).

WSPEEDI-II

A simulation system introduced by the Japan Atomic Energy Agency in 2009 for use in estimating air diffusion and emitted points of radioactive materials in case of the abnormal emission of radioactive materials due to a nuclear facility accident. WSPEEDI-II refers to the second edition of the Worldwide version of System for Prediction of Environmental Emergency Dose Information that was developed in 1997.

Whole Body Counter (WBC)

Equipment to measure gamma-rays emitted from radioactive nuclear species inside the whole body using a detector outside the body. Alpha-rays and beta-rays have weak penetration and are therefore not measurable outside the body. Multiple types of WBCs exist, including a shield type, which masks the radiation outside by completely covering the measuring equipment, and an open type. Only radioactive nuclear species existing inside the body at the time of measurement can be measured. Estimating internal radiation exposure doses therefore requires nuclear species intake scenarios or calculation models.

Precautionary principle

A principle that where there are threats of serious or irreversible damage a lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation and which was agreed upon at the Rio Declaration at the

United Nations Conference on Environment and Development in 1992. Although no internationally agreed strict definition exists, COMEST (World Commission on the Ethics of Scientific Knowledge and Technology) of UNESCO, for example, published “The Precautionary Principle” in March 2005 and proposed the following definition as a solid base for discussions: “When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain actions should be taken to avoid or diminish that harm. Morally unacceptable harm refers to harm to humans or the environment that is threatening to human life or their health, or serious and effectively irreversible, or inequitable to present or future generations, or imposed without adequate consideration of the human rights of those affected. ” This proposal recommended that the judgment of plausibility should be grounded in scientific analysis and analysis should be ongoing so that chosen actions are subject to review. It also stated that uncertainty may apply to, but need not be limited to, causality or the bounds of the possible harm. The proposal further stated that “Actions are interventions that are undertaken before harm occurs that seek to avoid or diminish the harm. Actions should be chosen that are proportional to the seriousness of the potential harm, with consideration of their positive and negative consequences, and with an assessment of the moral implications of both action and inaction. The choice of action should be the result of a participatory process.”

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<Background Information 1> Progress of deliberations of the Sub-committee on Counter-measures for Radiation, Committee on Supporting Reconstruction after the Great East Japan Earthquake

2011

November 16 Executive Committee (140th) of SCJ
Establishment of the Sub-committee on Counter-measures for Radiation Contamination, Committee on Supporting Reconstruction after the Great East Japan Earthquake and its members decided

December 8 Sub-committee on Counter-measures for Radiation Contamination (1st)
○ Basic ideas, information sources of radiation contamination and exposure, etc.

December 28 Sub-committee on Counter-measures for Radiation Contamination (2nd)
○ Overall perspective, data map (1st draft), data sources, etc.

2012

January 8 Executive meeting of the Sub-committee on Counter-measures for Radiation Contamination (1st)
○ Main ideas of the draft recommendations, etc.

January 16 Sub-committee on Counter-measures for Radiation Contamination (3rd)
○ Simulation model, health effects due to radiation, future deliberations, etc.

January 19/20 Field survey in Fukushima City, Mianamisoma City, and Soma City, Fukushima Prefecture by the Sub-committee on Counter-measures for Radiation Contamination

February 12 Executive meeting of the Sub-committee on Counter-measures for Radiation Contamination (2nd)
○ Main ideas of the draft recommendations, etc.

February 17 Sub-committee on Counter-measures for Radiation Contamination (4th)
○ Future deliberations, etc.

March 7 Sub-committee on Counter-measures for Radiation Contamination (5th)
○ Draft recommendations

March 16 Committee on Supporting Reconstruction after the Great East Japan Earthquake (3rd)

- ○ Approval of a proposal to change the title of the Sub-committee on Counter-measures for Radiation Contamination to “Sub-committee on Counter-measures for Radiation”
- ○ Report and deliberations of (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation

March 26 – April 1

Call for opinions on (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation from Council Members and Members

April 3 Committee on Supporting Reconstruction after the Great East Japan Earthquake (4th)

Report and deliberations on (proposed) Recommendations by the Sub-committee on Counter-measures for Radiation “A New Step towards Counter-measures for Radiation – Towards Science-based Policy Action –”

The following <Background Information 2> and <Background Information 3> were edits of material prepared in cooperation between the members of the Sub-Committee and experts in the course of compiling these recommendations. The recommendations were compiled by selecting parts of the abovementioned material and then summarizing them.

<Background Information 2> Supplementary information to "(1) Estimation of emitted amounts" of Chapter 4

1) Abundance of nuclear materials at Nuclear Power Units 1-4 before the accident

Stohl et al. <1> estimated the nuclear fuels inside the nuclear reactors of Units 1-3 of the Fukushima Daiichi Nuclear Power Plant that emitted radioactive materials and the spent fuel in Unit 4 with possible emissions based on the number of spent fuel rods and ORIGEN code <2> that the abundance of cesium 137 before the accidents in the nuclear reactors of Units 1-3 was 2.4×10^{17} Bq, 3.5×10^{17} Bq, and 3.5×10^{17}Bq, respectively, or a total of 9.4×10^{17}Bq, and that of the spent fuel in Unit 4 was 1.1×10^{18}Bq (or a total of 2.2×10^{18}Bq in Units 1-4).

2) Uncertainty of estimation based on the results of analyzing the state of the nuclear reactors

The emitted amount, as estimated based on the results of the state of the nuclear reactors having been analyzed by the Nuclear and Industrial Safety Agency and the assistance of the Japan Nuclear Energy Safety Organization using the severe accident analysis code MELCOR (Methods for Estimation of Leakages of Release), lacks observations of the temperature inside the nuclear reactors and their damage status. According to the Nuclear Emergency Response Headquarters report, which made use of "sensitivity analysis" in examining the level of changes in the results of the estimations by changing various parameters, however, the minimum and maximum values of the estimated emission rate of iodine and cesium from Unit 2 in that sensitivity analysis differs by approximately 20 times <3>. Significant uncertainty therefore exists in the estimated total emitted amount using this method (iodine 131: $0.3\text{-}8\times10^{17}$ Bq, cesium 134: $0.4\text{-}9\times10^{16}$Bq, cesium 137: $0.3\text{-}8\times10^{16}$Bq), and hence other estimation methods are necessary in reducing that uncertainty.

3) Uncertainty of inverse estimation using WSPEEDI-II

The process of the inverse estimation of the emitted amount using WSPEEDI-II can be summarized as follows.

First, the level of diffusion at the monitoring points is estimated using WSPEEDI-II and the unit amount of radioactive materials emitted from the Fukushima Daiichi Nuclear Power Plant. Next, dust sampling or radiation dose rate measurements at the monitoring points takes place for use in then comparing the level of difference with estimated values, and an inverse estimation conducted for the emission rate at the point of the Fukushima Daiichi Nuclear Power Plant. Lastly, the average value of the inversely estimated values was calculated. However, the level of uncertainty of this estimated value is not currently available. In contrast

to this Stohl et al. used measured values from remote areas and calculated the estimated emitted amount of cesium 137 to be 3.6×10^{16} Bq, and also reported the estimated value with uncertainty information to be $2.3\text{-}5.0\times10^{16}$ Bq, being based on model application residual error information <1>. In addition, this overseas study also estimated the emitted amount from the nuclear reactors in Units 1-3 and spent fuel in Unit 4. It is characterized by the estimation that the contribution of Unit 4 was larger than Units 1-3. It reported that water injected over the spent fuel in Unit 4 on March 20 was effective as the estimated emitted amount radically decreased immediately after the commencement of the water injection. However, the evidence for large amounts of emissions from Unit 4 was rather poor, and hence the analysis made by Stohl et al. that used this as part of its background information needs further verification.

In contrast to this the inverse estimation made via use of WSPEEDI-II by JAEA used a smaller number of monitoring points in which the measurement error is considered independently when compared to the estimation process used by Stohl et al., and thus the estimated values can be significantly uneven, although small and with small amounts of deviation. In fact Shigekazu Hirao and Hiromi Yamazawa of Nagoya University estimated the amount of radioactive iodine and cesium emitted into the air using environmental monitoring data and a method that is relatively similar to JAEA, and thereby raised awareness of the issue in their report on March 8, 2011 that the uncertainty with this type of inverse estimation needs to be verified <4>.

In a discussion held at the third meeting of the Sub-Committee on Counter-measures for Radiation some of the members commented that model errors in the analysis by Stohl et al. could be larger than the errors in the inverse estimation using WSPEEDI-II, which can better reproduce the diffusion of initial emissions around the Fukushima Daiichi Nuclear Power Plant. In addition, and at a hearing that took place at the fourth meeting of the Sub-Committee on Counter-measures for Radiation, Haruyasu Nagai of the Japan Atomic Energy Agency (JAEA) commented that the estimation made by Stohl et al. and that of JAEA was consistent with after late March, the period during which Stohl et al. argue that the emissions from Unit 4, but which has yet to have been confirmed, significantly decreased. At present the Sub-Committee positions the inverse estimation of JAEA to be the key estimation method. In a discussion at the workshop held on March 8, 2012, the inverse estimation of JAEA, which was mainly based on monitoring points within Fukushima Prefecture, was pointed out to have underestimated the amount of discharge into the ocean, while some of the members also had doubts about the results of Stohl et al. with regard to Cs137 <5>.

With regard to the estimation of the emitted amount into the air many reported the estimated daily emitted amount to be basically the equivalent of its uncertainty value from the

beginning of April. Absolute care should be taken that this does not justify ignoring long-term cumulative emissions after the beginning of April. Preferably, the cumulative emission amount needs to be calculated and the uncertainty of the cumulative amount assessed until the temperature of the nuclear fuel inside nuclear rectors reaches a sufficiently low level that physically does not allow any emission of radioactive materials.

4) Discharge of radioactive materials into the ocean

According to documents made available by the Nuclear Emergency Response Headquarters the initial major discharge of high concentration radiation contaminated water into the ocean was estimated to have taken place during April 1-6 through trenches from the turbine building of Unit 2. This is based on a comparison between the concentration of stagnant contaminated water in the underground floor of Units 1-4 and the high concentration contaminated water discharged. The estimated discharged amounts were iodine 131: 2.8×10^{15} Bq, cesium 134: 9.4×10^{14} Bq, and cesium 137: 9.4×10^{14} Bq. In addition to this, and due to the storage of contaminated water, the release of low level contaminated water during April 4-10 and the discharge near the water intake of Unit 3 on May 3 were separately reported <6>. However, these values were estimated based on an observation of the situation with the discharge when the discharge was discovered, and thus the existence of other undetected discharges is unknown. In addition, these estimated discharged amounts are inconsistent with the results of the inverse estimations made by the Japan Meteorological Agency and the Japan Atomic Energy Agency. The results of the inverse estimates, however, are consistent. The results of the Japan Meteorological Agency, which also conducted uncertainty assessment of the estimated values, are therefore being regarded as the key analysis results for the time present.

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[25] *: The original was written in Japanese and SCJ provides informal English translation for non-Japanese readers.

<Background Information 3> Supplementary information to "(2) Diffusion of radioactive materials in land, air, water, and solids" of Chapter 4

Significant work in cooperation with a large number of relevant researchers, including other Sub-Committees, was involved in (2) of Chapter 4 of these recommendations, which had to be largely summarized in the main body of these recommendations. <Background Information 3> presents source materials that could not be described in the main body of the text.

a. Distribution of initial fallout due to air diffusion

Radioactive materials emitted from the source get transported as gaseous materials or particulate materials and eventually deposited over land and sea surfaces through dry deposition (gravity fall and vertical transport due to turbulent flows, etc.) and wet deposition via rainfall. According the results of calculations using some high granularity models 25-37% of cesium 137 emitted as a result of the accident was estimated to have been deposited over Japanese land at a latitude of 32 to 42 degrees north and the remaining portion over other areas, including the ocean (Kawamura et al., 2011; Morino et al., 2011; Ohara/Morino, 2012; Tanaka, 2011; Takigawa, 2012). The diversity is this assessment is due to a difference in the assumption of the scavenging rate due to rainfall, assumption of temporal changes in the emitted amount, and the results of calculating the meteorological fields, thus requiring a comparison be made of the different models for other nuclear species and a reduction in the simulation error in the future.

Radioactive materials emitted into the air formed a high concentration plume that then rode an air current which transported the material to the respective areas of Japanese land (Yasunari et al., 2011; Figure A3-1).

During the day on March 12 southeast winds were predominant around the nuclear power plant. According to the Ministry of Economy, Trade and Industry (2011), from the morning through to the afternoon of March 12 dust was sampled from two points, namely Katase (8:39-8:49) and Kawazoe (12:00-12:10), which are located15 kilometers northwest of the Fukushima Daiichi Nuclear Power Plant. A simulation using those results and WSPEEDI-II (Katata (2012)) estimated that iodine 131 was emitted within the range of 20TBq/hour to 40TBq/hour. Four and a half hours after the hydrogen explosion at 15:30 a radiation dose rate of 20 μGy/h was observed in Mianamisoma City, which is located 24 kilometers North Northwest, but rapidly declined to around 5 μGy/h after the passage of the mass of gas. The deposited amount was therefore estimated to be not very large. However, no dust sampling data

from the evening of March 12, when a mass of gas produced by the hydrogen explosion was considered to have passed, has been found to date, and thus the concentration and breakdown of nuclear species within the mass of gas remain unknown.

From midnight of March 12 the direction of the wind in the surrounding areas changed to northwest, with 21 μSv/h having been measured at the Onagawa Nuclear Power Plant at around 1:50 of Mach 13. Dust was sampled at 16 points on March 13, and iodine 131 exceeding the minimum limit of detection detected at Ootabashi (15:08-15:18, 84 Bq/m^3) and Hirusone (16:22-16:32, 100 Bq/m^3), etc. The maximum amount detected in front of the Environmental Radioactivity Monitoring Center of Fukushima was 5.8 Bq/m^3 until 16:00, but which then sharply increased to 60 Bq/m^3 in an observation made at 18:00-18:10, thus radioactive materials were estimated to have been transported inland. Similar to March 12, however, no consistent rise in the radiation dose rate was observed, and thus the rise in the radiation dose rate was considered to have been due to a radiation plume that passed.

A hydrogen explosion took place in Unit 3 before noon of March 14, but no dust sampling data around this time has been found to date. The direction of the wind near the front gate of the nuclear power plant was northerly and no significant increase in the radiation dose rate was observed. The results of modeling revealed the radioactive materials emitted into the air were likely to have been discharged into the ocean. From midnight of March 14 to the dawn of March 15 a significant increase in the radiation dose rate was observed near the front gate of the nuclear power plant, with an extremely high concentration in the air (1260 Bq/m^3) also being measured at 4:25-4:45 on March 15 in dust sampled at Tokai village by the Japan Atomic Energy Agency. A remarkable amount of emissions took place at that time, and radioactive materials crossed the Hamadori region of Fukushima Prefecture to the south via a northerly wind and reached the Kanto Region. They were then estimated to have been transported to the mountainous region in the northeast of the Kanto Region as the wind changed direction due to an approaching low pressure trough in the afternoon and was then deposited through wet deposition via rainfall. In addition, part of the radioactive materials may have been transported to the southern part of Hamadori region and then deposited through wet deposition. The mass of gas caused a high radiation dose rate in various regions, but the radiation dose rate then sharply declined after its passage in many locations, and thus the deposited amount was estimated to be relatively small, although excluding that in the mountainous region in the northeast of the Kanto Region.

Radiation dose observations in the surrounding areas lead to the estimation that another amount of significant emissions took place during the afternoon of March 15. According to an air diffusion simulation using the air-transport model WSPEEDI-II (Katata, 2011), etc., a

significant emission from Unit 2 took place during the afternoon of March 15, and radioactive materials then crossed the Abukuma Mountains via a southeast wind and covered the high radiation regions located northwest of the Fukushima Daiichi Nuclear Poser Plant, including Iitate village, etc., and the Nakadori region of Fukushima Prefecture. They were then estimated to have been deposited through wet deposition via a broad front of rainfall as the front passed over from the evening of March 15 to midnight of March 16. However, no sampling data during this period has been found. The radiation dose rate during the afternoon of March 15 and the emitted amount that caused an increase in the deposited amount were therefore estimated based on observations made of the radiation dose rate in the air, and the breakdown of nuclear species, etc. indirectly estimated from the deposited amount, etc. Radioactive materials emitted from the nuclear power plant during the morning of march 16 were temporarily transported to the east into the sea via a northwest seasonal wind, which grew stronger after the passage of a low pressure trough, but the direction of the wind then changed as a small scale cold low passed in the afternoon, and hence a part of the radioactive materials were considered to have been transported to the southern part of the Hamadori region of Fukushima Prefecture.

A plume generated by an emission during the morning of March 20 covered the northern part of the Kanto Region, and an emission in the afternoon resulted in wet deposition via rainfall in the northern part of Miyagi Prefecture and the southern part of Iwate Prefecture, which is considered to have caused rice straw contamination. On the next day, and as the front moved south, the radioactive materials were transported from the southern part of Ibaraki Prefecture to the western part of Chiba Prefecture and the eastern part of Tokyo Metropolis on a northwest wind. At this time, due to an approaching depression, rain fell over the entire Kanto Region and this was considered to have facilitated wet deposition.

As described above the formation of high radiation dose regions that expanded over the respective East Japan regions is considered to have been strongly affected by the wind direction and precipitation field. However, intake into the human body through inhalation takes place when radioactive materials that exist in the air are inhaled. Internal exposure therefore frequently occurs in areas with high concentrations of radioactive materials that can easily be taken into the human body, such as radioactive iodine and cesium, etc., and even without rainfall. The radioactive materials do not remain in the same location for very long because of air transportation, and hence understanding the situation at the time of concern requires observation of the concentration of radioactive materials in the air and observation data on the gamma-ray spectrum at that location. However, most monitoring posts stopped functioning due to the earthquake and a power failure, etc., and those in operation were sustained by standby

power sources, thus all the monitoring posts are considered to have ceased operating by around May 15. Understanding the situation will therefore have to be based on a combination of limited observation data and model simulations.

The deposited amount estimated from the results of model calculations and actual measurements are shown in Figure A3-2, and which enables general understanding of the status of the transportation and deposition. Errors of around one digit exist in the deposited amount (Morino et al., 2011; Ohara/Morino, 2012), however, thus requiring more precise calculations in the future.

Observation of the radioactivity concentration in the air has been conducted to be used as base data when discussing the long-term effects of low radiation internal exposure. According to this the radioactivity concentration in the air significantly increased after the accident across wide areas of the southern Tohoku Region and Kanto Region, with measurements made by Fukushima Prefecture and voluntary surveys by researchers revealing the concentration of radioactive cesium to have been 10 to 1,000 times higher (10^{-3}-10^{-5} Bq/m^3) than prior to the accident in Fukushima City, etc., even as of March 2012. The main cause of the increased radioactivity concentration in the air after the accident was the continued leakage of radioactive materials, also in small amounts, from the Fukushima Daiichi Nuclear Power Plant. In addition, a survey made by the Ministry of Education, Culture, Sports, Science and Technology, etc. revealed the contribution of re-scattering from the soil and plants to have also been measurable. Quantification of re-scattering mechanisms and transfer to pollen also needs to be promoted in the future. Furthermore, monitoring needs to be continued as additional scattering/transfer of radioactive materials through future decontamination work, treatment of the debris, and burning off fields is considered possible.

In March 2011, when the accident took place, the weather conditions were such that the winter seasonal wind remained stronger than average. If the northwest seasonal wind were also strong on March 15 most of the large amount of radioactive materials emitted from the nuclear power plant would have been blown over the ocean and thus serious contamination in Fukushima Prefecture avoided. In actuality, however, a strong low pressure trough that just happened to have passed led the wind near the ground surface inland, and also caused rainfall, thereby resulting in serious contamination. In addition, if the weather conditions were such that depressions frequently passed, as they usually do in March an average, an even more serious situation with Japanese land being contaminated by a larger amount of radioactive materials over wider areas would have occurred. An aspect of the transportation/deposition of radioactive materials largely depends on the accidental nature of the timing of the emission and the timing of atmospheric disturbance passages, thus be able to predict the transportation/deposition based

on up-to-date numerical prediction data on atmospheric conditions is important. Radioactive materials transported into the atmosphere by a large rising air current that accompanied the depression that passed over on March 15 were then transported by a strong westerly and diffused over the entire northern hemisphere, although at a low concentration (Takemura et al., 2011a, b; Stohl et al., 2011; FigureA3-3). According to the results of model calculations they reached the west coast of the United States a week later and Europe 10 days later, and were detected all over the world (e.g. Masson et al., 2011; Wetherbee et al., 2012; U.S. EPA, 2011; Priyadarshi et al., 2011).

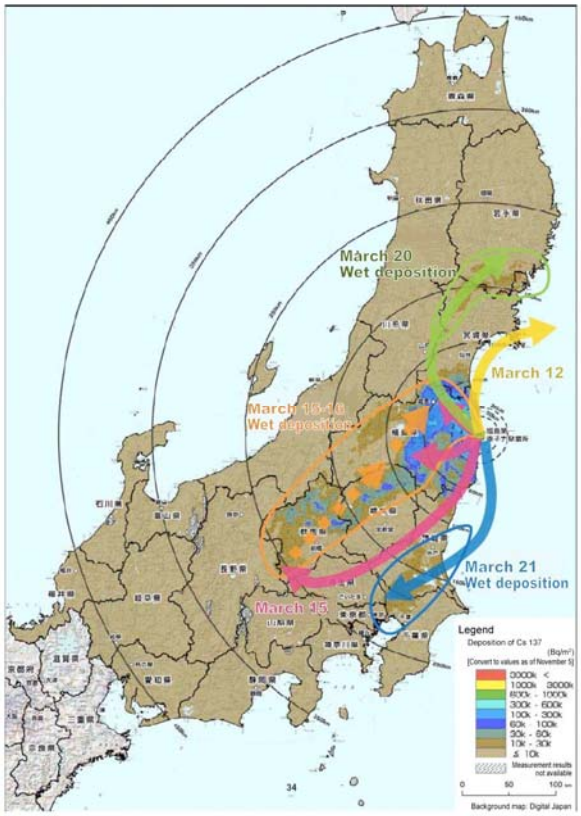

Figure A3-1. Route of radioactive plume via modeling and outline of deposition process The map shows the distribution of the deposition of cesium 137 via airborne monitoring (Prepared by partly modifying a JAEA public workshop document (2012))

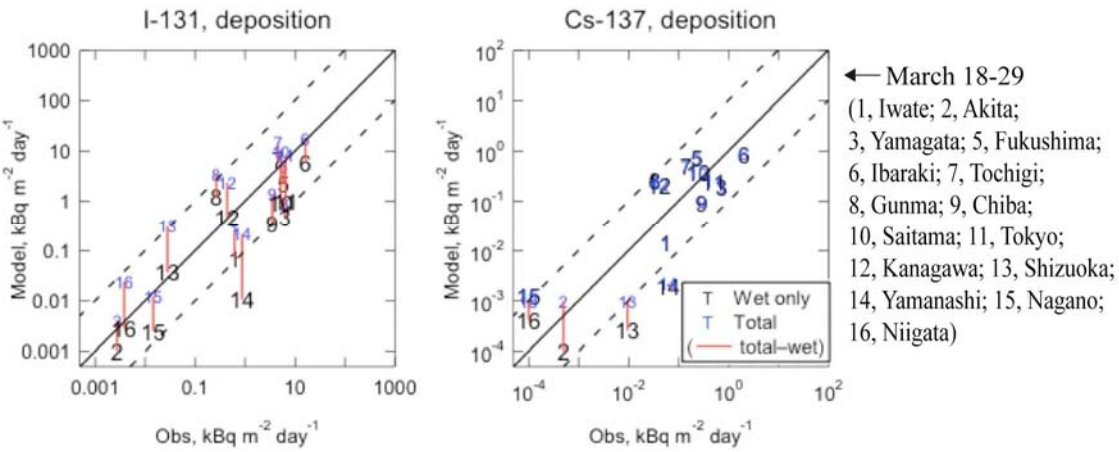

Figure A3-2. Comparison of modeling and observation results (monitoring of fallout by MEXT) on deposited amounts (Morino et al., 2011)

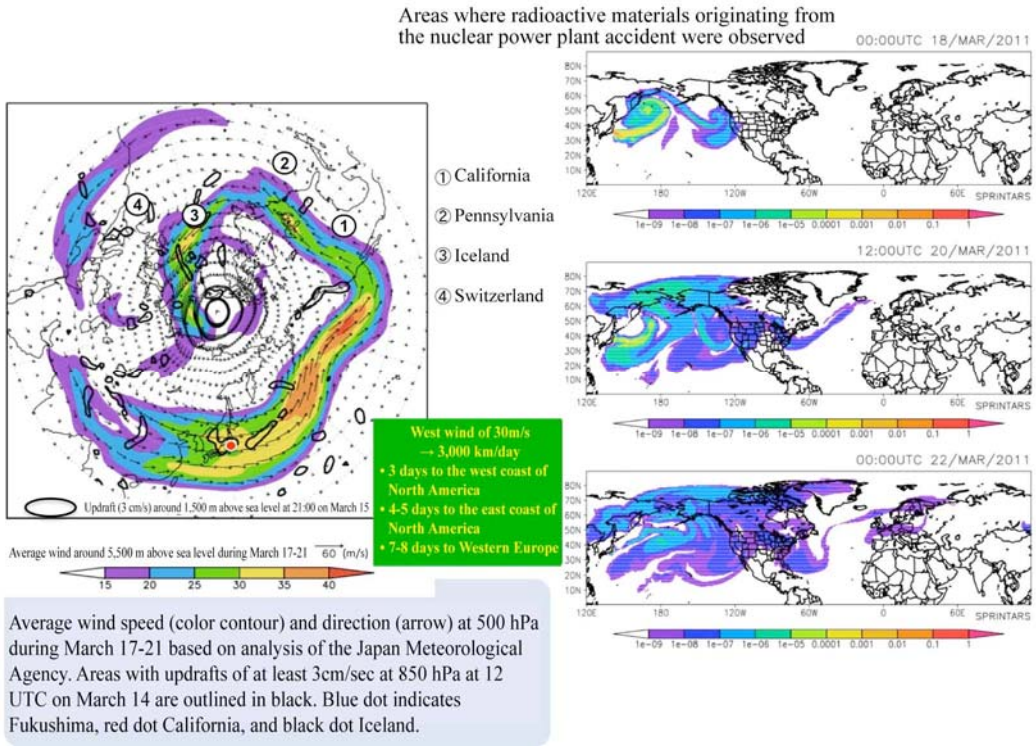

Figure A3-3. Modeling results suggesting possible global diffusion of emitted radioactive materials (Takemura et al., 2011a, b)

b. Current status with mapping of radioactive nuclear species fallout

Using the recommendation of the "necessity of the investigation of radiation levels after the accident of the Fukushima Daiichi Nuclear Power Plant" that was issued by

SCJ on April 4, 2011 as a start the joint team of the Ministry of Education, Culture, Sports, Science and Technology and universities collected 5 centimeters of soil from the surface layer at around five spots in approximately 2,200 locations within an approximately 100-kilometer radius of the Fukushima Daiichi Nuclear Power Plant, and then analyzed the nuclear species in the soil (FY 2011 Strategic Funds for the Promotion of Science and Technology "Study on Distribution of Radioactive Substances", published on march 13, 2012). Approximately 11,000 soil samples were collected, and the deposited amounts (radiation dose per unit area) of five types of gamma-ray emitting nuclear species, namely cesium 134, cesium 137, iodine 131, tellurium 129m, and silver 110m, then measured using a germanium (Ge) semiconductor detector and a map of concentration of the respective radioactive nuclear species in the soil created.

The results of the monitoring were then corrected in thereby improving the precision of the measured results of the airborne monitoring conducted during the same period of time. Comparison of the measurement results of airborne monitoring with the deposited amounts in soil at approximately 2,200 locations revealed them to be consistent, and thus subsequently conducted airborne monitoring over the whole of East Japan can also be regarded to have reproduced rather accurate deposited amounts. The measurement results of airborne monitoring can therefore be regarded as being useful as basic data for use in more comprehensive understanding of exposure routes to residents, the understanding of the actual situation with and dynamics of radioactive materials, and estimating the emitted amounts into the air, etc.

c. Process of transfer, diffusion, and concentration of the amount of radioactive nuclear species fallout over land

Radioactive material fallout over the land surface can be identified to have been transferred through the natural environment, including forests, soil, and rivers, etc., and thus requiring predictions of the changes in accumulated amounts of radioactive materials. Environmental monitoring of land has been conducted by the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of the Environment to date. This section describes, being mainly based on results of the aforementioned monitoring, the process of the transfer/concentration of radioactive materials that can lead to better understanding of the exposure routes to residents at present.

The Ministry of Education, Culture, Sports, Science and Technology (2012)

published a report on the analysis of the dynamics of radioactive materials in the Yamakiya region, Kawamata town, Date county, which is located in the upper reaches of the Kuchibuto River of the Abukuma River system.

The results of the study can be summarized as follows. (1) Transfer of radioactive cesium to soil water, stream water, and underground water was observed to have been small in scale at present. (2) In coniferous forests a large amount of radioactive cesium was present in the canopies, and the radioactive cesium was then gradually transferred to the forest bed in the process of passage through the canopies of rain that fell in the forests. (3) With regard to the amount of fine soil and sand particles discharged into rivers, a discharge of soil and sand of no more than 0.03% of the amount of fallen cesium into rivers was verified to have taken place in a 45-day long survey, even over bare land with little vegetation, but the amount of discharge of radioactive cesium was rather small over pastures and forests. With paddy fields it was mostly discharge into rivers when the fields were being prepared. (4) Over 90% of radioactive cesium flowed down into rivers in the form of floating sand, with the maximum total concentration of cesium 134 and cesium 137 of 126,000 Bq/kg being observed in the main stream of Abukuma River. This far exceeded 10 times the standard value for sludge. In addition, soil and sand with the same level of high concentrations accumulated in the reservoir of the main stream of the Abukuma River.

In addition, and according to a survey of the radioactivity concentration of radioactive materials before and after the rainy season in rivers (river water, river-bed soil, and floating sand) within Fukushima Prefecture that was conducted by the Ministry of Education, Culture, Sports, Science and Technology (2012), the radioactivity concentration of radioactive cesium in rivers tended to be high when the radioactivity concentration of radioactive cesium in the soil of the upper reaches was high (Figure A3-4). In addition, a positive correlation, although rather weak, was identified between the average radioactivity concentration of radioactive cesium in soil collected from the upper reaches and the radioactivity concentration of radioactive cesium in floating sand.

In contrast to this fine particles tended to absorb radioactive nuclear species in river-bed soil and an empirical formula of 0.65 times the specific surface area was therefore established for the concentration of radioactive cesium (He & Walling, 1997: Figure A3-5). Consideration thus needs be given to the fact that the measured values can significantly vary depending on the particle size composition in the river when making river-bed soil from a specific location an index for the contamination level. According to the Ministry of Education, Culture, Sports, Science and Technology

(2012) a positive correlation was also identified between the average radioactivity concentration of radioactive cesium in soil collected from the upper reaches and the radioactivity concentration of radioactive cesium in river-bed soil after making particle size adjustments, and thus the conclusion was drawn that the radioactivity concentration of radioactive cesium in the river water, river-bed soil, and floating sand at specified spots was likely to be capable of being estimated if the average radioactivity concentration of radioactive cesium deposited in the upper reaches of the water sampling locations were to be obtained.

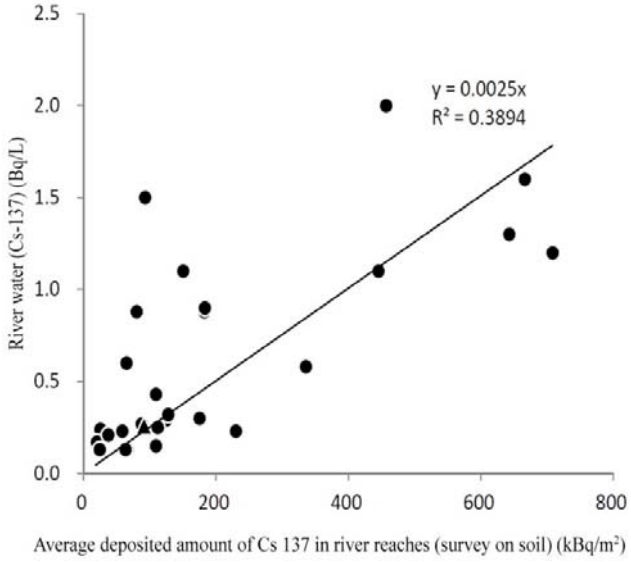

Figure A3-4. Relationship between average deposited amount in river reaches and concentration of cesium 137 in river water

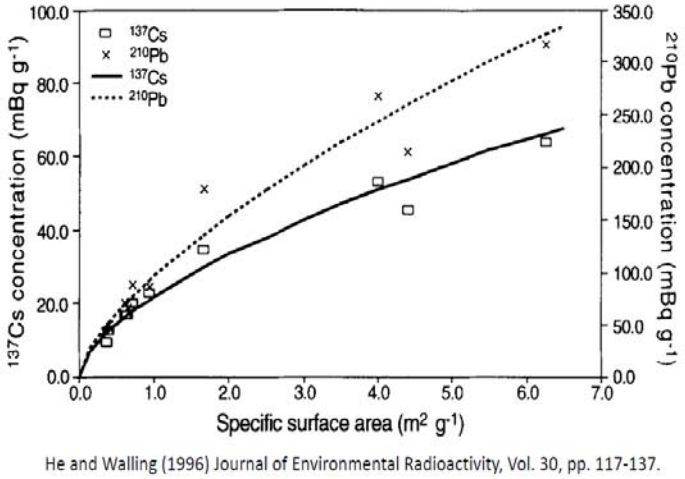

Figure A3-5. Relationship between specific surface area and concentration of cesium 137 in river water

d. Estimation of the relative contribution ratio of the amount of radioactive nuclear species fallout over land

Predicting the transfer/accumulation of radioactive species through utilizing a map of deposited amounts of radioactive materials would be enabled by better understanding of the deposited amounts over land surfaces and the outline of the dynamics of radioactive nuclear species described above, That is to say, if the deposited amount of radioactive cesium in river water, water-bed soil, and floating sand in the upper reaches and the average concentration at arbitrary water sampling locations were to be identified the radioactivity concentration of radioactive cesium in river-bed soil could then be estimated at different locations with various particle size characteristics after making particle size adjustments.

e. Process of advection diffusion of radioactive nuclear species into the ocean

Radioactive nuclear species emitted to the air, and around 2/3 of radioactive cesium in particular, were estimated to have been transported into the ocean and deposited over the surface of the ocean, thus becoming the source of radioactive materials within the ocean (Tsumune et al., 2012). Although many uncertainty factors exist with the estimated total amount, the results of many numerical simulations (Morino et al., 2011; Ohara, 2011; Tanaka, 2011; Takigawa, 2011) showed a remarkable distribution of the deposition over land in the northwest direction of the Fukushima Daiichi Nuclear Power Plant.

Radioactive cesium has been broadly detected in the surface of seawater in measurements made by voluntary observation ships and oceanographic research vessels, etc. that cross the North Pacific Ocean, etc. since the beginning of April. The figure of 196 Bq/m^{-3} for cesium 137, which was higher by two digits than that in surrounding waters, was locally measured (Aoyama et al., 2011). This was considered to be due to removal from the air via rainfall. In addition, radioactive nuclear species of Fukushima origin were detected in suspended solids and zooplankton sampled at a location of 47 degrees north latitude and 167 degrees east longitude, and 2,300 kilometers from the Fukushima Daiichi Nuclear Power Plant (Honda et al., 2011). Radioactive materials emitted into the air at the early stage after the accident and deposited over the surface of the ocean were thus surmised to have been absorbed.

With regard to monitored observations along the coastal areas and offshore, sampling of atmospheric aerosol and sea water was commenced upon on March 23

along a survey line 30 kilometers offshore from the Fukushima Daiichi Nuclear Power Plant using ships supplied by the Japan Agency for Marine-Earth Science and Technology and under the direction of the Ministry of Education, Culture, Sports, Science and Technology. And then from the middle of April on a number of voluntary research cruises were conducted by researchers of radioactive materials using both domestic and foreign ships. 15 Bq/m^{-3} of radioactive cesium was observed in atmospheric aerosol 30 kilometers offshore from the fixed point after April, thus indicating possible continued emissions into the air.

Both seawater and fresh water were used to cool the nuclear reactors and to supply water to the spent-fuel storage pool, with a large amount of high concentration radioactive nuclear species contaminated water then being produced. This then was considered to have been partly discharged directly into the ocean in front of the nuclear power plant. Tokyo Electric Power Co., Inc. (TEPCO) estimated that 0.9×10^{15} Bq of cesium 137 was discharged during April 1-6 from high concentration contaminated water being poured directly into the ocean from a crack in the front concrete wall of Unit 2. According to data on monitored observations made near the Fukushima Daiichi Nuclear Power Plant by TEPCO since March 21, 50,000 Bq/L of iodine 131 and 7,200 Bq/L of cesium 137 were observed on March 25 near the south outlet and 74,000 Bq/L of iodine 131 and 12,000 Bq/L of cesium 137 on March 26, thus suggesting possible discharges into the ocean of some form prior to April 1.

Monitored observations along coastal areas and offshore were commenced upon on March 23 at a survey line 30 kilometers offshore from the Fukushima Daiichi Nuclear Power Plant using ships supplied by the Japan Agency for Marine-Earth Science and Technology and under the direction of the Ministry of Education, Culture, Sports, Science and Technology. And then from the middle of April on a number of voluntary research cruises were conducted by researchers of radioactive materials using both domestic and foreign ships. Tsumune et al. of the Central Research Institute of Electric Power Industry examined the activity ratio of cesium 134 and cesium 137 using the above monitored observation data, and concluded that radioactive cesium observed near the surface of the ocean on March 25 or earlier had fallen from the air whereas that from March 26 on was directly discharged (Tsumune et al., 2012). In addition, a direct leakage scenario was estimated by comparing oceanic simulation and monitored observation data, and the amount of direct leakage until the end of May thus estimated to be 3.5±0.7PBq of ^{137}Cs, which was nearly four times the amount estimated by TEPCO. The estimation of the direct leakage scenario is essential in understanding the

advection diffusion situation of radioactive materials. The estimation results of other leakage scenarios have also been reported (for example, by the Japan Agency for Marine-Earth Science and Technology, the Japan Atomic Energy Agency, and University of Toulouse in France, etc.). More reasonable estimations of leakage scenario will require comparisons being made using multiple models.

Radioactive materials directly discharged into the ocean get diffused through rather complex routes that are affected by ocean currents and the wind. Oceanic monitoring has been conducted from a relatively early stage, and which identified that 100 Bq/L or more of Cesium 137 had diffused to the north and south along the coast of Fukushima Prefecture by late March but which then gradually diffused to offshore in and after mid-April. However, the granularity in terms of time or space was rather rough, and therefore identifying a detailed advection diffusion situation using observed data is therefore rather difficult.

In parallel with oceanic monitoring simulations of the distribution of radioactive materials using multiple numerical models were conducted by the Japan Agency for Marine-Earth Science and Technology, the Central Research Institute of Electric Power Industry, and the Japan Atomic Energy Agency. The results of the abovementioned numerical models revealed high concentrations of radioactive materials to have diffused mainly in the south direction from the Fukushima Daiichi Nuclear Power Plant with a weak southward current in the coastal area of Fukushima Prefecture in late March, and that the major part of them would have been diffused further south or in a southeast direction due to the effects of the subsequent local wind and offshore current. By the middle of May part of them would have been transported into the northern edge of the Japan Current and then rapidly transported to the east. However, the results of the numerical models revealed a difference to be observable in the conditions of the offshore current of Ibaraki Prefecture with different models (Figure A3-6), and this also affected the assessment of the distribution routes of the radioactive materials. More detailed simulation research will therefore be needed in the future, including more precise numerical models and study on data assimilation methods, etc.

The results of numerical simulations consistently being conducted reveal that part of the radioactive materials will have reached the international date line around six months after the accident, but to have been diluted to a considerably lower level and with a concentration of approximately 0.01 Bq/L.

Effects on marine organisms were detected in sand eels that live in the surface layer of the ocean during April to May. Generally the concentration factor (simple ratio

of radioactive nuclear species in sea water to that in organisms) of radioactive cesium in fish is 30 to 100 times, but the routes of transfer of radioactive materials from sea water to organisms vary and the biological concentration sometime takes place with the intake of bait or through the food chain, although depending on the nuclear species (Radioactive Waste Management Funding and Research Center, 1996). Accumulation of metal elements through their gills was observed with some types of fish. In addition, the concentration inside the body depends on the balance between intake and emission with cesium, etc., and thus the concentration inside the body is reduced by half within a time scale of a few days to several ten-days, although once again depending on the type of fish, when the concentration in sea water drops. According to the results of a survey on marine sediment, which has been fully implemented since around May, radioactive cesium contained in sediment in shallow water off the coast near Fukushima Daiichi Nuclear Power Plant has been gradually decreasing, but the rate of decrease is very slow when compared to radioactive cesium in sea water. From summer through to autumn high concentrations were also observed in offshore marine sediment in some cases. The possibility of that sediment affecting benthic organisms living there cannot be denied. In addition, the accident of concern can be characterized by the varying level of accumulation, and even with the same type of fish sampled from the same oceanic area. With flounders caught in the ocean around Fukushima Prefecture concentrations of over 4,500 Bq/Kg were observed in some, but almost none in others, and thus the concentration of nuclear species inside the body is considered to significantly vary depending on the biotope and route of transfer.

In addition to observations made of the radioactive nuclear species in seawater observations of the radioactivity concentration in marine soil have also been conducted since April 29, although mainly in coastal areas. A relatively high concentration has tended to be observable in clayey or silty fine particle sediment, with locally high radioactivity concentrations being observed in some cases. The observation points were limited in number, however, and hence details on the distribution in the air could not be obtained. However, examining the temporal changes in radioactive cesium at 12 fixed points along the coast reveals some locations offshore of Ibaraki Prefecture and offshore of Miyagi Prefecture away from the nuclear power plant to have had their concentrations in the surface of marine sediment increasing over time, thus suggesting the possibility of concentrations and transfer taking place evens after accumulation. In addition, no unified standards exist for the sampling of marine sediment, and the results of different sampling methods were intermixed, thus requiring care be taken with

interpreting that data (Kanda, 2011).

Possible routes of the inflow of radioactive materials into the sea, other than the abovementioned direct discharge and falling from the air, include inflows from river and ground water systems. Of these observation data from rivers has been gradually becoming available, but not sufficient enough to include in the oceanic distribution simulation. No data is available for ground water systems.

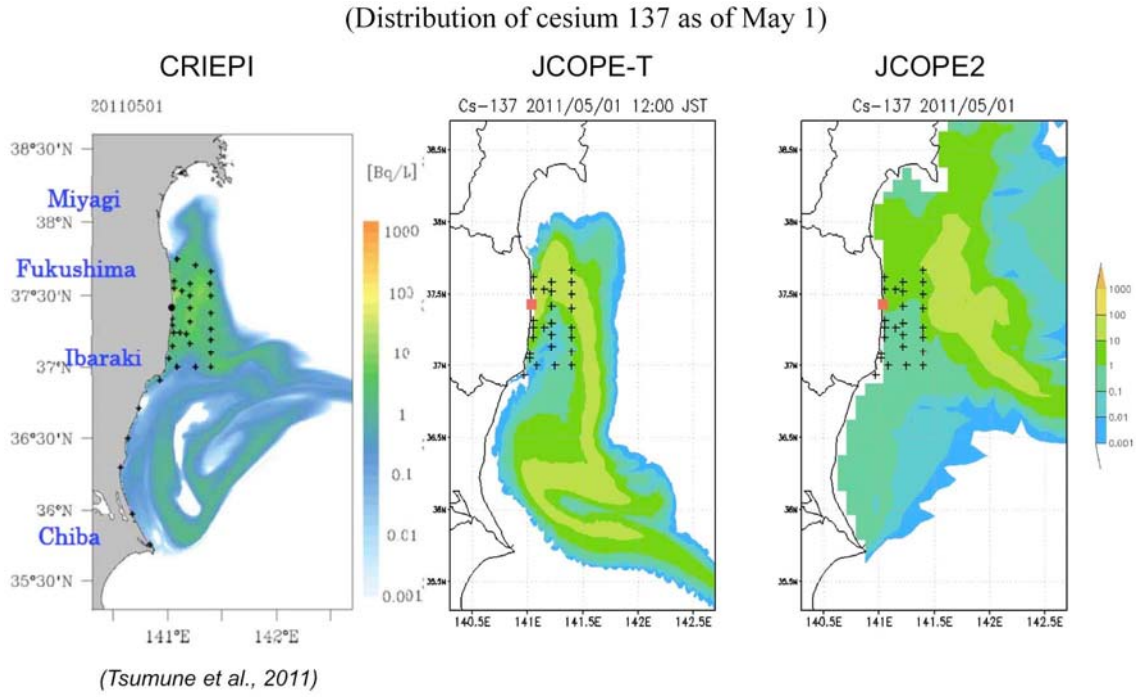

Figure A3-6. Simulation of distribution of cesium 137 concentration using oceanic model（Tsumune et al., 2012）

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Recommendations

On Cross-regional Processing of Disaster Wastes

April 9, 2012

Science Council of Japan

Committee on Supporting Reconstruction
after the Great East Japan Earthquake

These recommendations compile and publish the results of deliberations of the Committee on Supporting Reconstruction after the Great East Japan Earthquake, Science Council of Japan.

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Summary

1. Background of the Recommendations

The Great East Japan Earthquake resulted in a large amount of disaster wastes due to the subsequent large scale Tsunamis. As of March 12, 2012, the amount was estimated to be 4.76 million tons in Iwate Prefecture, 15.69 million tons in Miyagi Prefecture, and 2.08 million tons in Fukushima Prefecture, or a total of 22.53 million tons in the three prefectures which were the major disaster-stricken areas. The goal was set of completing the processing/disposal of the disaster wastes by the end of March 2014. However, at present only 7.1%, or 1.60 million tons, of the disaster wastes have been processed/disposed of.

The disaster wastes should be, in principle, processed within the prefectures through reuse, including being used in disaster prevention facilities in the disaster-stricken areas, etc., but proceeding as scheduled with the cross-regional processing will be an issue with processing the wastes. The present governmental policy is to proceed with the cross-regional processing of the disaster wastes in Iwate and Miyagi Prefectures but limiting it to that in which the concentration of radioactive materials has been verified to be sufficiently low.

These recommendations therefore discuss ways of processing the disaster wastes in Iwate and Miyagi Prefectures. These recommendations then 1) examine a method of cross-regional processing from the point of view of safety and verifying whether it is a safe processing method or not, 2) point out matters requiring special attention with monitoring, the provision of information, and explanations in thereby obtaining sufficient understanding from the disaster-stricken areas, the municipalities involved in the cross-regional processing, and all the residents, and 3) point out the necessary recommendations.

2. Present situation and issues

At present a standard value for the concentration of radioactive cesium in the disaster wastes to be processed by municipalities has been set within guidelines on promoting the cross-regional processing of disaster wastes, etc., and as long as all the workers work in conditions below that standard value their additional annual exposure dose can be expected to below the the standard value provided by the ICRP. In addition, with sufficient care, for example not engaging in excavation work, etc. the additional annual exposure dose of the general public can be retained at less than 1/100 of the exposure dose from background radiation that people are normally exposed to. The exposure dose of the residents living in the neighborhood of furnaces through inhaling dust and the exposure dose through intake of agricultural products, stock farm products, and cultured fish from the neighborhood have been

estimated to be less than 1/10,000.

In addition, the monitoring methods/procedures used to measure the concentration of radioactive material established by the Ministry of the Environment are in line with the cautious approach of verifying it not only at the time of shipment but also at the time of receipt. The processing of the disaster wastes is considered to not adversely affect people's health as long as it is carried out in accordance with the present procedures.

The processing of the disaster wastes will, however, require significant consideration with respect to eliminating the worries of the residents of the recipient municipalities about both health effects from the radioactive materials and the basic principles of managing radioactive materials to a sufficient extent. The processing of the disaster wastes will also significantly affect municipalities concerned in all the aspects of the cost, people's health, and employment, etc. Enabling the disaster-stricken municipalities and recipient municipalities to reach an agreement in a convincing manner and then proceed with the cross-regional processing will therefore require consideration being given to [1] seriously respecting the general rule of processing the wastes within the prefecture concerned, [2] making the effort to precisely identify the amount of the disaster wastes, [3] ensuring accountability via information being thoroughly disclosed to the residents of the recipient municipalities, and [4] constant monitoring of possible radioactive material leaks.

3. Content of the recommendations

Recommendation 1:

The disaster-stricken municipalities should precisely identify the composition and amount of the disaster wastes, reuse as much as possible within the region, and then renew their disposal plans from the stance of disposing/incinerating the residue or implementing cross-regional processing. The government should strengthen their technical advice and financial support in thereby supporting formulation of the plan and its implementation.

Recommendation 2:

The government should provide financial support for the additional expense of removing impurities, etc. when the disaster wastes will be used in the development of bases for disaster-prevention forests and higher ground that thus functions as tidal protection, and make the effort to enhance sorting technologies, etc. in thereby increasing the amount of reusable disaster wastes.

Recommendation 3:

The processing/disposal standards, which are based on the Act on Special Measures concerning the Handling of Contamination caused by Radioactive Materials and Guidelines on the Promotion of cross-regional processing of disaster wastes, are fulfilled by the concentration of radioactive materials contained in the disaster wastes in Iwate and Miyagi Prefectures and of a sufficiently low level that will not pose any health hazard in many cases, and thus either processing within the prefecture of concern or cross-regional processing is possible. The standards, however, do differ depending on the processing methods used such as whether the disaster wastes will be reused or not. To proceed with cross-processing, therefore, the government will need to develop an environment in which cross-regional processing can smoothly progress through making the necessary arrangements to ensure that the requests of the disaster-stricken regions match the conditions of the recipient regions with regard to type of disaster wastes and the concentration of radioactive materials.

Recommendation 4:

With the processing of the disaster wastes, and regardless of whether it is processed within the prefecture or cross-regionally processed, the government and municipalities should constantly confirm whether the content of radioactive materials and other hazardous materials is below the safety standards or not both before delivery and after disposal, while also ensuring to disclose that data. In enabling municipalities to provide sufficient risk communication to residents, in particular, the government should 1) completely disclose all relevant information, including the processes used to establish standards, etc., 2) provide technical and financial support with regard to measurement of the content, including radiation dose measurements, etc., and 3) guarantee opportunities for process verification to take place by neutral experts, etc.

1 Large amount of disaster wastes and the necessity of processing them

The Great East Japan Earthquake resulted in an extremely large amount of disaster wastes due to the subsequent large scale Tsunamis. As of March 19, 2012, the amount was estimated to be 4.76 million tons in Iwate Prefecture, 15.69 million tons in Miyagi Prefecture, and 2.08 million tons in Fukushima Prefecture, or a total of 22.53 million tons in the three prefectures which were the major disaster-stricken areas [27]* [28] When compared to the amount of general wastes generated in a normal year in each prefecture the amount of disaster wastes can be considered to be the equivalent of the amount of general waste generated in 10.5 years in Iwate Prefecture, 18.7 years in Miyagi Prefecture, and 2.7 years in Fukushima Prefecture[29]. With regard to these disaster wastes governmental guidelines ("Guidelines (Master Plan) for Disaster Waste Management after the Great East Japan Earthquake", May 2011, Ministry of the Environment) and prefectural/municipal implementation plans were formulated with the goal of completing their processing/disposal by the end of March 2014 through being utilized in the development of disaster prevention bases (being reused, as embankment, or as landfill), incineration within their own jurisdiction and disposal of the ash, or via cross-regional processing, etc.

However, the present situation is that at present only 7.1% or 1.60 million tons of the disaster wastes have been processed/disposed of, although a large amount of the disaster wastes in the three prefectures were delivered to temporary storage sites in 288 regions. It was pointed out that the presence of the disaster wastes could interfere with the relocation of villages, land readjustments, fishing port developments in some cases, result in fires or hygiene problems in the summer, or reduce the vitality of the disaster victims in their new lives when they make them recall memories of the disaster. For these reasons proceeding with their smooth processing while responding to these problems is of course necessary. In doing so, and as described later, utilization in the development of disaster prevention facilities within the disaster-stricken prefectures and placing higher priority on incineration, etc. within the prefecture where it can then generate industrial vitality and employment are considered appropriate. In contrast to this, however, cross-regional processing outside the disaster-stricken prefectures is also expected to occur. Cross-regional processing outside the disaster-stricken areas was carried out with 14% of the total amount of the disaster wastes resulting from the

[27] *: The original was written in Japanese and SCJ provides informal English translation for non-Japanese readers.
[28] Progress Status of the Disaster Waste Processing in Coastal Municipalities (March 18, 2012, Ministry of the Environment) *
[29] "Waste disposal in Japan" (February, 2012, Survey on Disposal of General Waste, FY 2011 edition, Ministry of the Environment) *

Great Hanshin-Awaji Earthquake. The most recent public opinion poll also showed the understanding of the majority of the public to be 75-85% in support of the idea of "municipalities of their residence outside the disaster-stricken areas accepting the processing of debris from the disaster-stricken areas"[30].

In proceeding with that cross-regional processing, however, worries about the possibility of the wastes containing radioactive materials released due to the Fukushima Daiichi Nuclear Power Plant accident, in particular, are obstructing the progress of the cross-regional processing. The results of airborne monitoring by the Ministry of Education, Culture, Sports, Science and Technology[31] revealed that areas with a radiation dose rate in the air of 0.1 μSv/h or higher are mostly distributed over the region extending from Fukushima Prefecture to the northern Kanto Region, and a few areas with a higher radiation dose rate in Iwate and Miyagi Prefectures excluding some areas in the northern part of Miyagi Prefecture. A map of the concentration of radioactive cesium also indicates low contamination in the peripheral areas within a 100-kilometer radius of the Fukushima Daiichi Nuclear Power Plant[32]. The abovementioned data suggests the possibility of the disaster wastes containing radioactive materials to significantly vary between both Iwate/Miyagi Prefectures and Fukushima Prefecture. The present government policy is to proceed with cross-regional processing of the disaster wastes in Iwate and Miyagi Prefectures, but to limit it to that in which the concentration of radioactive materials has been verified to be sufficiently low[33].

These recommendations therefore discuss ways of processing the disaster wastes in Iwate and Miyagi Prefectures. These recommendations then aim to 1) examine a method of cross-regional processing from the point of view of safety and verifying whether it is a safe processing method or not, 2) pointing out matters requiring special attention with the monitoring, provision of information, and explanations in thereby obtaining sufficient understanding within the disaster-stricken areas, the municipalities involved in the cross-regional processing, and the residents, and 3) then providing the necessary recommendations.

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[30] National public opinion poll of the Yomiuri Shimbun ,March 3, 2012, etc. *

[31] "Results of Fourth Airborne Monitoring Survey by MEXT", press release document provided by the Ministry of Education, Culture, Sports, Science and Technology, December 16, 2011.

[32] FY 2011 Strategic Funds for the Promotion of Science and Technology "Results of Study on Distribution of Radioactive Substances due to the accident at the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Co., Inc.", March 13, 2012. *

[33] The government policy excludes disaster waste in Fukushima Prefecture from being subjected to cross-regional processing. The government is responsible for processing disaster wastes within Fukushima Prefecture with a high concentration of radioactive materials and municipalities for processing those with a low concentration.

2 Evaluation of radioactive materials contained in the disaster wastes

As described above the status of the deposition of radioactive materials in Iwate/Miyagi Prefectures significantly differs from that in Fukushima Prefecture. However, radioactive materials were also deposited in both these prefectures, although at low concentrations, and are therefore contained in the disaster wastes as revealed by measured data from the respective regions. It is also possible that wastes containing radioactive materials would get transferred or mixed with other wastes during the course of their classification or transportation. Standards and procedures for managing the wastes to be processed with regard to radioactive materials have therefore been established.

At present guidelines used to promote cross-regional processing of the disaster wastes, etc.[34] classify disaster wastes subject to cross-regional processing into the following three types:

[1] incombustible,

[2] combustible, and

[3] recyclable.

Standard values for the total concentration of radioactive cesium for each type are set to be:

[1] 8,000 Bq/kg or less,

[2] 240-480 Bq/kg or less (however, consideration shall be given to retaining the concentration of ash resulting from the concentration due to incineration at 8,000 Bq/kg or less), and

[3] 100 Bq/kg or less (in the final product), respectively.

The standard value of 8,000 Bq/kg will be commonly applied to both type [1] and [2] wastes that are processed and stored outside the disaster-stricken areas. With this concentration the annual exposure dose of workers working at processing sites near wastes with this concentration for eight hours a day and half their work hours of 250 days per year is estimated to be 0.78 mSv. This is the result of a calculation that involves multiplying the standard concentration value by the dilution factor of the radiation source, the shielding factor with external exposure, annual work hours, the radiation dose scale factor per unit concentration/hour, and the decay rate[35]. The annual work hours used here are assumed to be the maximum work hours when in contact with maximum standard value wastes, and thus the

[34] The "Act on Special Measures for Handling Environmental Contamination by Radioactive Materials Emitted due to the Nuclear Power Plant Accident caused by the Tohoku Region Pacific Offing Earthquake on March 11, 2011" (Act No. 110 of 2011), Ordinance for Enforcement of the said Act (Ordinance of the Ministry of the Environment No. 33 of 2011), and "Promotion of Cross-Regional Processing of Disaster Wastes (Guidelines for Promoting Cross-Regional Processing of the Disaster Wastes Caused by the Great East Japan Earthquake)" (August 11, 2011, Ministry of the Environment). *

[35] A Disaster Waste Safety Evaluation Committee document (9th), November 15, 2011. *

annual exposure dose of 0.78 mSv can also be regarded as being the maximum value.

The Japanese people are considered to be normally exposed to background radiation of 1.5 mSv (the global average being 2.4 mSv) from radioactive materials in cosmic rays or originally existing in the soil or the human body. ICRP established a radiation dose limit of 1 mSv/year as the limit of additional dose of anthropogenic radiation, including that of industrial origin, etc., that people can be exposed to[36]. Workers working under the conditions described above therefore will not exceed the standard additional annual exposure dose.

In contrast to this, a similar calculation being used for the external exposure of the above mentioned workers after setting the depth of soil cover and volume of buried wastes, etc. results in the estimated annual exposure dose of the residents living in the former final disposal sites, with sufficient care including not to make any excavation, being 0.01 mSv[37], which is less than 1/100 of the exposure dose due to background radiation that people are normally exposed to. In addition, the exposure dose of the residents living in the neighborhood of furnaces through inhaling dust and the exposure dose through intake of agricultural products, stock farm products, and cultured fish from the neighborhood are estimated to be less than 1/10,000[35].

When combustible disaster wastes are incinerated, cesium originally contained in the wastes is concentrated in ash (fly ash, in particular) and molten materials produced. When the amount of fly ash produced is equivalent to 3% of the amount of disaster wastes in mechanical stoker type incinerators the concentration factor is 33.3 times, and thus disaster wastes with a cesium concentration of 240 (or approximately 8,000/33.3) Bq/kg will not produce any ash with a cesium concentration of over 8,000 Bq/kg. However, ash may get concentrated by up to 100 times at maximum through being melted and the volume reduced in thereby extending the lifespan of landfill sites. The precautionary clause of “consideration shall be given to retaining the concentration of ash resulting from the concentration due to incineration at 8,000 Bq/kg or less” therefore needs to be carefully observed.

In addition, thorough monitoring using appropriate procedures is essential in proving that radioactive materials contained in the disaster wastes will not pose any health hazards. Because of this the Ministry of the Environment established monitoring methods/procedures for measuring the concentration of radioactive materials at the respective times of shipping, incineration, and landfill by combining nuclear species analysis and radiation dose rate

[36] Japanese translated edition of the ICRP recommendations, March 2011, http://www.scj.go.jp/ja/info/jishin/pdf/t-110405-3j.pdf; “For a Better Understanding of Measures for Radiation Protection” (Comment of the President of Science Council of Japan), June 2011, http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-21-d11.pdf

[37] A Disaster Waste Safety Evaluation Committee document (12th), March 12, 2012. *

measurements and with the composition of the wastes taken into account[38]. As long as the present procedures are carefully followed the concentration of radioactive materials in the disaster wastes processed will remain low, even when compared to the normal concentration level in the natural environment, and thus can be considered to be at a level that will not pose any health hazards.

In contrast to this the standards in [3] are referred to as the clearance standards for recycling and the requirement of managing the effective radiation dose to be below 0.01 mSv/year applies when distributing products in which the disaster wastes were used.

At present greater attention is being attached to monitoring cesium, but the public also worries about strontium and other nuclear species. The results of measuring nuclear species in the soil have revealed their contribution to the radiation dose to be estimated to be small[39]. However, verification through actual measurements at the representative facilities is also worth discussing.

[38] "Promotion of Cross-Regional Processing of the Disaster Wastes" (August 11, 2011, Ministry of the Environment; latest revision of January 11, 2011) *.

[39] According to the FY 2011 Strategic Funds for the Promotion of Science and Technology "Results of Study on Distribution of Radioactive Substances due to the accident at the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Co., Inc." (March 13, 2012) a soil sample in which strontium 90 was detected the average proportion of the deposited amount of strontium 90 to that of cesium was 2.6×10^{-3}.

3 Matters requiring special attention with the cross-regional processing

The processing of the disaster wastes, however, will also require consideration being paid to eliminating the worries of the residents of recipient municipalities about both the health effects of radioactive materials and the basic principles which are used to manage radioactive materials to a sufficient extent. Certainly the processing of the disaster wastes will significantly affect the municipalities with regard to the expense, people's health, and employment, etc. Discussion of these points must therefore take place and attention paid to the following in thereby enabling the disaster-stricken municipalities and recipient municipalities to reach an agreement in a convincing way before proceeding with the processing.

[1] Seriously respect for the general rule of processing within the prefecture

The government shall respect the general rule of subjecting disaster wastes that cannot be processed within the prefecture only to cross-regional processing, and give consideration to not regarding cross-regional processing as a prerequisite. In addition, the necessary technical/financial support will need to provided in thereby enabling the disaster-stricken municipalities to effectively reuse the disaster wastes or incinerate it at the disaster sites. Attempts, such as application of advanced selection technologies, that enable reducing the amount of the disaster wastes that will be subjected to incineration or used as landfill to facilitate rapid processing and reusing the disaster wastes to the fullest extent possible are expected to occur. Use of the disaster wastes in disaster prevention facilities, including disaster prevention forests and embankments for thus creating higher ground, etc., can be considered effective and therefore actively promoted.

[2] Making the effort to precisely identify the amount of disaster wastes

At present an estimate of the amount of disaster wastes in the respective regions is being used, but the amount of disaster wastes that are present by type needs to be precisely identified in the future in parallel with the processing work. This will then enable the prefectural processing plans and the overall disaster waste processing plans to be refined. At present the amount being requested by Iwate and Miyagi Prefectures to be cross-regionally processed is 4.01 million tons (0.57 million tons by Iwate Prefecture and 3.44 million tons by Miyagi Prefecture), or which is 12.0% and 21.9%, respectively, of the entire amount. If the percentage reused or processed/disposed of within the prefectures can be raised as a result of the processing plans being refined in the future the cross-regional processing could be further limited. In addition, cross-regional processing can also proceed according to plans that better conform to the actual situation.

[3] Ensuring accountability via thorough information disclosure to the residents of recipient municipalities

Taking into consideration the possibility of the disaster wastes containing radioactive materials, asbestos, and other hazardous materials the government will need to: 1) completely disclose all relevant information, including the processes used to establish standards, etc., in thereby enable municipalities to provide sufficient risk communication to residents, 2) provide technical and financial support with regard to measurement of the content, including radiation dose measurements, etc., and 3) guarantee opportunities for process verification by neutral experts, etc. As described in 2 the concentration of radioactive materials in the disaster wastes processed is considered to be low as long as the present procedures are followed. However, the government needs to ensure accountability in thereby enabling the residents of recipient municipalities to precisely understand its content and avoid any undue worry.

[4] Constant monitoring for radioactive material leaks

The government and recipient municipalities will need to constantly monitor the possible reemission (leakage) of radioactive materials from incineration facilities and landfill facilities and ensure to disclose that data to the public. In addition, methods of rapidly controlling the situation where wastes with a concentration exceeding the standard value is mixed in or the concentration of ash is high with respect to standards based on the Act on Special Measures also need to be established in advance.

4 Recommendations

Science Council of Japan recommends the following with respect to the processing/disposal of disaster wastes in disaster-stricken Iwate and Miyagi Prefectures.

Recommendation 1:

The disaster-stricken municipalities should precisely identify the composition and amount of the disaster wastes, reuse them as much as possible within the region, and then renew their disposal plans from the stance of disposing/incinerating the residue or implementing cross-regional processing. The government should strengthen their technical advice and financial support in thereby supporting formulation of the plans and their implementation.

Recommendation 2:

The government should provide financial support for the additional expense of removing impurities, etc. when using the disaster wastes in the development of bases for disaster-prevention forests and higher ground that functions as tidal protection, and make the effort to enhance sorting technologies, etc. in thereby increasing the amount of reusable disaster wastes.

Recommendation 3:

The processing/disposal standards, which are based on the Act on Special Measures concerning the Handling of Contamination by Radioactive Materials and Guidelines on the Promotion of cross-regional processing of disaster wastes, are satisfied by the concentration of radioactive materials contained in the disaster wastes produced in Iwate and Miyagi Prefectures and which is sufficiently low that it will not pose any adverse health hazard in many cases, and thus either processing within the prefecture concerned or cross-regional processing is possible. The standards, however, do differ depending on the processing methods used such as whether the disaster wastes will be reused or not. In proceeding with cross-processing, therefore, the government will need to develop an environment in which cross-regional processing can smoothly progress through making arrangements that ensure requests of the disaster-stricken regions match the conditions of the recipient regions with regard to the type of disaster wastes and the concentration of radioactive materials.

Recommendation 4:

In processing with the disposal of the disaster wastes, and regardless of whether the processing takes place within the prefecture or is cross-regional processing, the government

and municipalities should constantly confirm that the content of radioactive substances and other hazardous substances is below the safety standards both before delivery and after disposal, and then ensure to disclose that data. In enabling municipalities to provide sufficient risk communication to residents the government should 1) completely disclose all relevant information, including the processes used to establish standards, etc., 2) provide technical and financial support with regard to measuring the content, including radiation dose measurements, etc., and 3) guarantee opportunities for process verification by neutral experts, etc.