

Decontamination Projects for Radioactive  
Contamination Discharged by Tokyo Electric  
Power Company Fukushima Daiichi  
Nuclear Power Station Accident

March 2018

(Tentative Translation)

Editorial Committee for the Paper on Decontamination Projects

Ministry of the Environment, Japan

ISBN978-4-600-00139-1



## Foreword

The Great East Japan Earthquake on March 11, 2011 and ensuing accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station resulted in the release of a large amount of radioactive materials and environmental contamination. Consequently, the central government and municipalities undertook measures for the decontamination of the soil, etc. (hereinafter "Decontamination Projects"), which was contaminated by the radioactive materials, with the aim of quickly reducing the impacts on human health and the living environment. At the end of March 2017, the "Whole Area Decontamination" was generally completed, and evacuation orders were lifted in many areas.

On this occasion, this project paper has been compiled with the aim of documenting the experiences, knowledge and lessons gained through the implementation of the decontamination projects, to be shared inside and outside of Japan. An additional aim was to describe for the general public the significance and conditions of the decontamination efforts, which were carried out on an unprecedented scale.

This project paper is based on the "Decontamination Report of FY2014", which was completed in March 2015. It is a compilation of information on the circumstances and details of the decontamination projects within the series of measures taken until then to deal with radioactive contamination, mainly under the lead of the Ministry of the Environment. The report covers the background, challenges and lessons, and includes basic policies, the project frameworks, the establishment of decontamination methods, the work and management on site, the effects and verification of the decontamination, and communication with local residents. In terms of evaluating the implementation and technical aspects of the decontamination projects, outcomes from separate review committees have been included in this report.

It was decided that this report would not provide extensive coverage of the clearance of Temporary Storage Sites (TSS), the treatment of specified waste, the status of Interim Storage Facility (ISF), and decontamination initiatives in the Areas where Returning is Difficult, as those measures to deal with the contamination by radioactive materials are still works in progress.

This project paper is composed of six chapters:

Chapter 1: History and Overview of Decontamination Projects

Chapter 2: Characteristics and Significance of Decontamination

Chapter 3: Framework and Methods of Decontamination Projects

Chapter 4: Implementation of Decontamination Projects

Chapter 5: Effects, Verification, and Risk Communication of Decontamination

Chapter 6: Lessons Learned and Future Challenges

Chapter 1 offers an overview of the history, background, and situation of the implementation of decontamination measures. Chapter 2 covers the characteristics and significance of this decontamination, based on radioactive contamination and the Japanese societal background, the standards for radiation protection, and the objectives of decontamination. Chapter 3 explains the organizational framework and implementation system, the history of the establishment of decontamination methods, and their details. Chapter 4 describes decontamination methods used at actual decontamination sites, and the management

of work by the decontamination providers. Chapter 5 describes the effects of the decontamination and verified outcomes, and the details of various risk communication initiatives carried out at each stage of the project. Chapter 6 covers the challenges and the knowledge gained from this experience of decontamination, and lessons for the future.

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- Motoyuki Suzuki, Chair of Editorial Committee for the Paper on Decontamination Projects

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## Preface

### ◇ On the Publication of this Paper on Decontamination Projects

Masaharu Nakagawa  
Minister of the Environment

Due to the accident at Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station that occurred with the Great East Japan Earthquake in March 2011, a large amount of radioactive materials was released into the environment, and an unprecedented situation occurred, with contamination over a wide area.

In order to quickly reduce the effects of this environmental contamination caused by radioactive materials on human health and living environments, the Act on Special Measures was enacted in August of the same year. The central government undertook the necessary measures regarding means of handling the contaminated soil and waste materials, taking into account the social responsibility accompanying the fact that until the accident occurred it had promoted nuclear energy policies. At the same time, the institutions involved, including each government office, relevant municipalities, and research institutions, as well as business operators, worked together in concert to carry out measures to deal with the environmental contamination as quickly as possible.

Here, the "decontamination" (i.e., removal of the contaminated soil, etc.) that took place involved internationally unprecedented measures on a large scale in areas where people were living. Initially, our technological knowledge was insufficient, and complicated by the fact that we were dealing with invisible radiation. Great difficulties arose in implementing projects and alleviating residents' concerns. In these circumstances, we established methods for implementing decontamination through a process of trial and error. To implement decontamination, by the time of this report workers had already been engaged a total of more than 30 million person-days. Through cooperation of the Ministry of the Environment, municipal organizations, and business operators, they have done their utmost to carry out decontamination work aiming to meet the residents' hopes and expectations. As a result, all planned "whole area decontamination" was completed in March 2018. On behalf of the Ministry of the Environment, I offer sincere appreciation to everyone involved in the decontamination, and also to all the residents who cooperated in these efforts.

We believe it was important to record the experiences, knowledge and lessons gained through the decontamination implemented on such an unparalleled scale, and to share this information inside and outside of Japan. It is important not just from the perspective of accountability for these projects, but also as a message for the future.

Thus, upon the occasion of completion of the planned whole area decontamination, we have compiled this paper on the decontamination projects. When this paper was being compiled, experts involved in establishing decontamination methods, and people from the interim storage and decontamination section of the Japan

Federation of Construction Contractors, which was engaged in decontamination projects, participated as members of the editorial committee through energetic discussions on three occasions. I extend my gratitude to everyone involved in the creation of this project paper, in particular the committee members.

After the completion of the planned whole area decontamination, it is necessary to continue proceeding steadily with initiatives for recovery from the environmental contamination caused by radioactive materials, including the Interim Storage Facility projects and contaminated waste treatment projects. In addition, in terms of Areas where Returning is Difficult, work has begun for the dismantling and decontamination of houses, etc. in the Zones Designated for Reconstruction and Recovery, based on the “Act on Special Measures for the Reconstruction and Revitalization of Fukushima” amended in May 2017. Through such initiatives, we desire to contribute to the further acceleration of reconstruction of the affected areas in the future.



## ◇ On the Editing of this Decontamination Project Report

Motoyuki Suzuki

Chair of Editorial Committee for the Paper on Decontamination Projects

The severe accident that occurred at the TEPCO Fukushima Daiichi nuclear power station, alongside the Great East Japan Earthquake and ensuing tsunami, caused reactors to melt and buildings to explode, and the dispersal of radioactive materials over a wide area outside that of the power plant. Nuclear power stations have to date been designed and operated under strict criteria, and there was no assumption that any situation would arise whereby radioactive materials would be discharged into the environment in Japan, much less that when such an accident occurred, as a country and as an area, we would not be prepared in terms of what is needed in an emergency, and what kind of response is desired when aiming for long-term environmental remediation.

The radioactive materials dispersed into the environment were a “bolt out of the blue” for residents in the area. They brought about natural fears about direct damage to human health, and also fears concerning how any radioactive materials accumulating in surrounding farmland, residential areas, and natural ecosystems that were caught up in the accident would affect people’s lives and work in the future, through the soil and crops, etc. In relation to these fears, specific responses were discussed for the first time after the accident occurred.

In terms of restoring the damage caused by the accident to the way things were before, everything should be the responsibility of the persons who caused the damage. However, when we considered the enormity of the damage, and the urgency and variety of necessary responses and policies, it was necessary to plan comprehensive environmental remediation policies as a country, and move ahead to concrete implementation, including that by local governments.

An extraordinary general meeting of the Central Environmental Council was held in April 2011, after the accident, the chairman’s statement emphasized that the Ministry of the Environment should play a leading role in responses to the environmental contamination caused by the “radioactive materials dispersed into the environment”. Until this point, the “Basic Environment Law” stipulated that environmental contamination caused by radioactive materials was covered under the “Atomic Energy Basic Act” (Article 13) and related laws, and those materials were not among the target substances in the “Basic Environment Law”.

After the accident, after the passage of more than five months the “Act on Special Measures” was enacted (officially named “Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District Off the Pacific Ocean Earthquake that Occurred on March 11, 2011”). The Minister of the Environment was made responsible for various plans and their execution in relation to decontamination. Further, certain exclusionary clauses (Article 13) were removed from the “Basic Environment Law” and along with this, other amendments removed exclusionary clauses related to radioactive materials from acts such as the “Water Pollution Prevention Act” and the “Air Pollution Control Act”.

In terms of the decontamination of the Fukushima region, in accordance with the “Act on Special Measures”, the central government takes direct responsibility for carrying out the decontamination (direct control of decontamination) of “areas where there is considerable contamination and the central government specifies that decontamination measures for waste and the soil are necessary (Special Decontamination Areas)”, and over 5 years, in addition to the 22,000 instances of residential land, decontamination was to be carried out on 15,700 hectares of farmland, roads, and forests in residential neighborhoods, to be completed by March 2017. The targeted region spanned 11 municipalities, and of course, in each area the contamination situation was different, and the hardships experienced by the residents were all diverse and severe. With all this considered, there is surely great significance in Japan’s experiences of completing the plans with the cooperation of areas undergoing decontamination work, overcoming various problems, accomplishing the work, and achieving the provisional goals.

In order to achieve the final “environmental remediation”, further efforts from areas are necessary, and, local communities, the people who have lived there, their relatives, and their homes will be greatly transformed over a long period of time. There may never be a time when it can be clearly determined that remediation is complete. At the current stage, it may be just that a major time-limited national project was executed and completed—the decontamination work under direct control by the central government. Nevertheless, we hereby systematically organize the records related to the period when the work was carried out, and the knowledge and wisdom gained during the course of this uphill task. There may have been errors caused by deficiencies in planning or a lack of understanding and grasp of the situation, but whatever the case, it is also our responsibility to the world and for posterity to leave behind some clear lessons learnt from the records of this environmental remediation work, which tackled the first major accident of its kind in human experience.

As a report on the decontamination projects, this document is organized based on the facts of the actual consolidation of regulations, allocation of decontamination work by the central government and local governments, and the form taken by the specific decontamination work directly controlled and carried out by the central government after the accident. Based on these records, we have attempted to organize these as lessons on how the decontamination progressed and achieved results, and what people with various standpoints in relation to this have learned. This paper was planned with the idea of collecting the wisdom learned by the people involved – wisdom such as considering the survival of humanity in the future and what preparations we should make if any situation where radioactive materials are released into the environment occurs in the future, not just a nuclear power station accident. What should we consider in order to guarantee the health of the people and ecosystems? What management systems will be necessary?

This variety of lessons may be numerous when viewed with hindsight. There are lessons that come from the inherent characteristics of the specific area affected, and so may be difficult to generalize. However, we can say that this was our first experience, and we believe it is one of our responsibilities to the people who have suffered, faced hardship, or are still evacuated, to create records of the challenges of dealing with the situation to this point in time (i.e., the dispersal of radioactive materials into the environment in a region with a high population density) and to leave behind a meaningful account. We have compiled this paper in the

hope that it may also be of benefit elsewhere in the world, and through this will help to realize the sustainability of human activities.

In closing, I must mention that we asked some of the key persons who committed themselves to the evolving work of these widespread decontamination projects to describe their thoughts, and we included their words in this report in the form of contributed columns. I hope that their words will add to the reader's understanding of the extent of the decontamination efforts.



## **Chapter 1 : History and Overview of Decontamination Projects**

### **1.1. TEPCO Fukushima Daiichi Nuclear Power Station Accident and Establishment of Areas under Evacuation Orders**

#### **(1) Accident and Evacuation Orders**

On March 11, 2011, the Great East Japan Earthquake struck, and the ensuing tsunami damaged the facilities of Fukushima Daiichi Nuclear Power Station (hereinafter referred to as “TEPCO Fukushima Daiichi NPS”) and Nuclear Power Station of Tokyo Electric Power Company Holdings (TEPCO). This led to a nuclear accident in which large amounts of radioactive materials were released from TEPCO Fukushima Daiichi NPS, with extremely serious effects over a wide area.<sup>1</sup> The magnitude of the earthquake was 9.0 and the earthquake and tsunami left about 20,000 dead, 2,600 missing, and 6,000 injured, with about 120,000 houses totally destroyed and one million partially destroyed or damaged.<sup>2</sup>

In response to this situation, the Prime Minister declared a nuclear emergency situation and established the Nuclear Emergency Response Headquarters (NERHQ) at the Prime Minister’s Office, in accordance with the “Act on Special Measures concerning Nuclear Emergency Preparedness”. The Fukushima Prefectural Government also established the prefectural headquarters for disaster control and in response to the declaration of a nuclear emergency situation at TEPCO Fukushima Daiichi NPS, the Governor of Fukushima ordered the evacuation of residents of the towns of Okuma and Futaba living within a 2 km radius of the power station.

The NERHQ then issued orders to the Governor of Fukushima and other municipal governments concerned to evacuate residents living within a 3 km radius of TEPCO Fukushima Daiichi NPS and to instruct residents living within a 10 km radius to shelter indoors. These instructions were followed by further instructions on March 12, 2011, in which the NERHQ issued orders to the Governor of Fukushima and other municipal governments concerned to evacuate all residents living within a 20 km radius of the power station.

Following the hydrogen explosion at Unit 3 of TEPCO Fukushima Daiichi NPS on March 14, 2011, the NERHQ issued orders on March 15, 2011 to the Governor of Fukushima and other municipal governments concerned to instruct residents living within a radius of between 20 km and 30 km from the power station to shelter indoors.

On March 17, 2011, the Ministry of Health, Labor and Welfare (MHLW) set the index values<sup>3</sup> for food and drink intake limits of radioactive materials as provisional regulation values under the Food Sanitation Act, and began monitoring of food and drink.

On March 19, 2011, radioactive materials exceeding the provisional regulation values of radioactive materials in foods were detected in certain areas in spinach and raw milk, among others, and on April 4, 2011 the NERHQ compiled a “Monitoring plan and policy on setting and lifting of restrictions for food items and areas to be subjected to shipment restrictions, etc.”

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<sup>1</sup> Final Report of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (July 23, 2012).

<sup>2</sup> Fire and Disaster Management Agency “Report on the Tohoku Pacific Ocean Earthquake (Great East Japan Earthquake) (Report No. 156)” (September 8, 2017).

<sup>3</sup> Ministry of Health, Labor and Welfare (MHLW), “Handling of radioactively contaminated food” (March 17, 2011).

In addition, due to concerns about the planting of rice, which is a staple food item in the Japanese diet, on April 8, 2011, the NERHQ issued a “Policy on planting of rice”, and took food-related measures, including the implementation of rice planting restrictions, in areas where there was a high possibility that the rice produced would exceed the provisional regulation values.

On April 21, 2011, aiming to ameliorate the risk of residents being exposed to large single doses of radiation if the situation were to deteriorate, based on the “Act on Special Measures concerning Nuclear Emergency Preparedness”, the NERHQ issued orders to the Governor of Fukushima and other municipal governments concerned to designate the area within a 20 km radius of TEPCO Fukushima Daiichi NPS as a “Restricted Area”.<sup>4</sup>

Furthermore, on April 22, 2011, orders were issued that certain areas beyond the 20 km radius were to be newly designated as “Deliberate Evacuation Areas”, and that, of those areas within a radius of between 20 km and 30 km that had been previously designated as areas for sheltering indoors, all areas other than those newly designated as “Deliberate Evacuation Areas” were to be designated as “Evacuation-Prepared Areas in Case of Emergency”.<sup>5</sup>

Due to this new designation, residents in Deliberate Evacuation Areas were required to evacuate within the space of about one month, and residents in Evacuation-Prepared Areas in Case of Emergency were instructed to make preparations so that they could always be ready to shelter indoors or evacuate in the case of an emergency.

As there were certain pockets outside the Deliberate Evacuation Area and Restricted Area where air dose rates persisted so that the annual cumulative exposure dose one year after the accident was anticipated to exceed 20 mSv/y, on June 16, 2011, the NERHQ designated such locations (individual residential areas) as “Specific Spots Recommended for Evacuation”, and set out a response policy that called for awareness-raising measures for residents, and assistance for and promotion of the evacuation of residents.<sup>6</sup> Thereafter Nuclear Emergency Response Local Headquarters (local NERHQ) designated the following areas as specific spots recommended for evacuation: Minamisoma City (142 spots (152 households)), Date City (117 spots (128 households)) and Kawauchi Village (1 spot (1 household)). Subsequent monitoring was conducted and once it was confirmed that the annual cumulative dose in these

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<sup>4</sup> NERHQ, “Regarding the Establishment of a Restricted Area” (April 21, 2011).

<sup>5</sup> NERHQ, “Regarding the Establishment of a Deliberate Evacuation Area and Evacuation-Prepared Area in Case of Emergency” (April 22, 2011).

<sup>6</sup> NERHQ, “Regarding Response to the Specific Spots Estimated to Exceed an Integral Dose of 20 mSv Over a One Year Period After the Occurrence of the Accident” (June 16, 2011).

spots would be below 20 mSv/y, the designation was lifted on December 14, 2012 for Date City and Kawauchi Village, and on December 28, 2014, for Minamisoma City.



Figure 1-1 TEPCO Fukushima Daiichi NPS after the accident (From left: Units 1, 2, 3 and 4)  
(Photograph taken March 15, 2011)

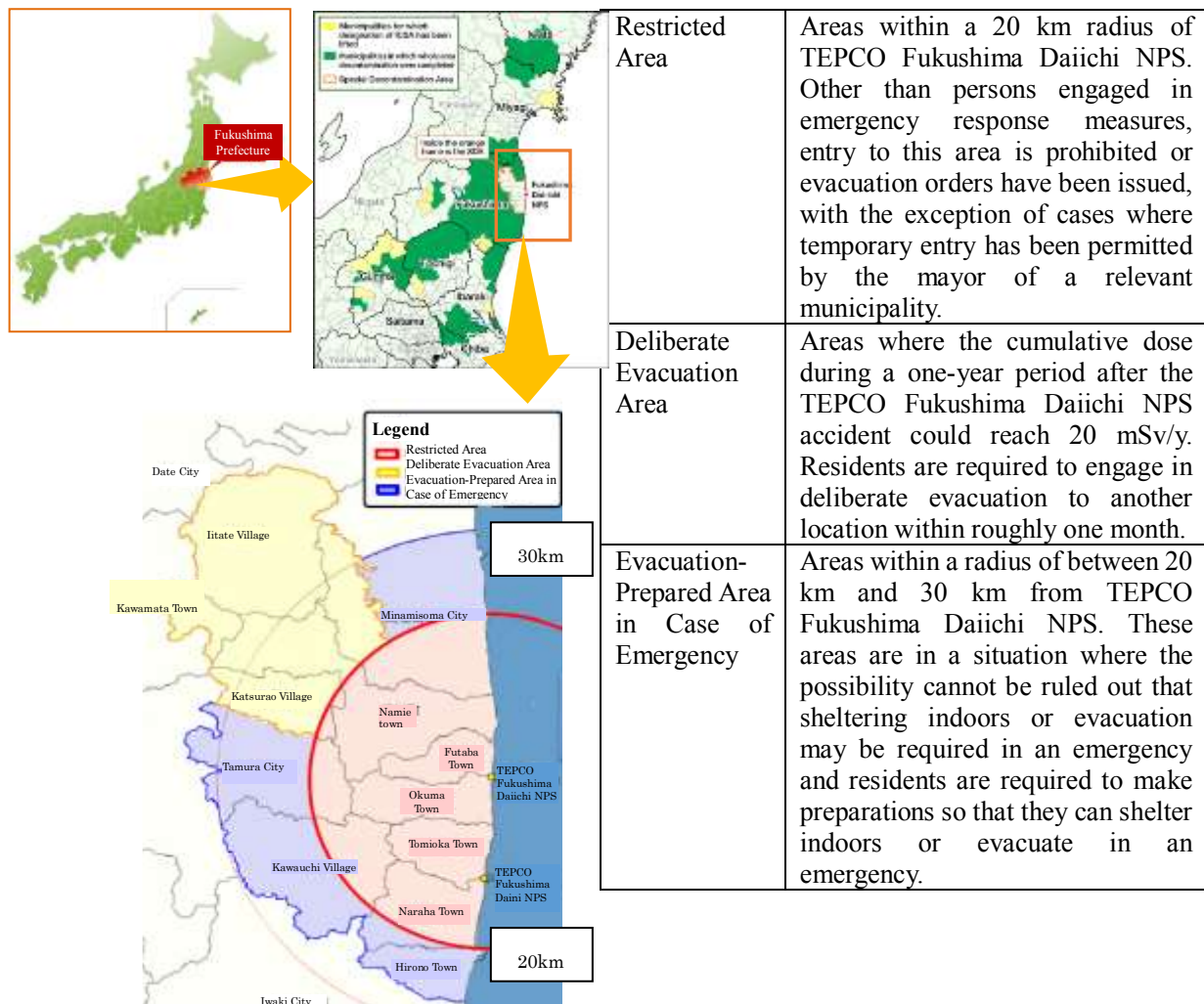


Figure 1-2 Establishment of Evacuation Areas (As of April 22, 2011: Establishment of areas immediately following the accidents)<sup>4,5</sup>

**Table 1-1 Initial Response Immediately Following the Accident**

Date & Time	Occurrence / Action
Mar. 11 14:46 15:27 19:03 20:50 21:23	Great East Japan Earthquake occurs First tsunami hits TEPCO Fukushima Daiichi NPS (second wave hits at approx. 15:35) Nuclear emergency situation declared and NERHQ established Residents of Okuma and Futaba Towns living within a 2 km radius ordered to evacuate Residents living within a 3 km radius ordered to evacuate and residents within a 10 km radius ordered to remain indoors
Mar. 12 15:36 18:25	Hydrogen explosion at Unit 1 of TEPCO Fukushima Daiichi NPS Orders to evacuate within a 20 km radius of the power station
Mar. 14 11:01	Hydrogen explosion at Unit 3 of TEPCO Fukushima Daiichi NPS
Mar. 15 about 6:14 11:00	Hydrogen explosion at Unit 4 of TEPCO Fukushima Daiichi NPS Residents within a radius between 20 and 30 km from the power station ordered to shelter indoors
Mar. 17	Initiation of food monitoring by MHLW
Apr. 8	Announcement of policy on planting of rice and implementation of rice planting restrictions
Apr. 21	Designation of the area within a 20 km radius as a Restricted Area
Apr. 22	Designation of certain areas outside a 20 km radius and within a 30 km radius as Deliberate Evacuation Areas and Evacuation-Prepared Areas in Case of Emergency
Jun. 16	Announcement about the designation of individual areas as Specific Spots Recommended for Evacuation



## **(2) Situation of Resident Evacuations**

The result of these designations was that all residents in the Restricted Area made emergency evacuations, with almost all residents in the Evacuation-Prepared Areas in Case of Emergency also evacuating. In the Deliberate Evacuation Areas, although a period was allocated to allow residents to prepare for evacuation, almost all residents evacuated (however, out of consideration for losses that may be incurred as a result of evacuation, there were some facilities that were exempted from evacuation on the condition that measures to reduce radiation dose were in place). Similarly, in the Specific Spots Recommended for Evacuation, the residents in the designated residential areas were evacuated. In addition, in Minamisoma City residents living in areas more than a 30 km radius from the power station were encouraged to evacuate, with many choosing to heed this advice. Many residents living in areas neighboring these evacuation areas also chose to evacuate voluntarily.

## **(3) Establishment of New Areas following Review of Areas under Evacuation Orders**

Given that the evacuation orders had a major impact on the lives of residents, it was judged to be appropriate to review the orders in the event of any significant changes to the original reason for the implementation of the orders, such as the safety of nuclear reactor facilities being confirmed, or a demonstrable reduction in dose rates being ascertained as a result of continuous detailed monitoring. It was therefore decided to revise the areas under evacuation orders with a view to ensuring recovery and reconstruction, based on the results of monitoring and evaluation of the safety of TEPCO Fukushima Daiichi NPS.

### **1) Lifting of Evacuation-Prepared Areas in Case of Emergency**

With regard to the Evacuation-Prepared Areas in Case of Emergency, which had been designated in areas within a radius between 20 km and 30 km from TEPCO Fukushima Daiichi NPS, where the possibility could not be ruled out that evacuation may be required in an emergency, on August 9, 2011, after a safety assessment of the power station and in view of the results of detailed radiation monitoring, the NERHQ decided on a policy of lifting the designation of Evacuation-Prepared Areas in Case of Emergency at a point in time when the restoration of public services and infrastructure could be expected.<sup>7</sup>

Based on this policy, on September 30, 2011, the NERHQ made a decision and instructed relevant municipalities that after giving due consideration to the wishes of residents and working in cooperation with Fukushima Prefecture, they should formulate recovery plans, covering such matters as facilitated relocation support for residents, the resumption of public services such as schools and medical facilities, the restoration of public infrastructure, and decontamination of school grounds and gardens, and at the point when the compilation of these recovery plans had been completed, the designation of Evacuation-Prepared Areas in Case of Emergency would be lifted at once.<sup>8</sup>

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<sup>7</sup> NERHQ, “Basic Concept on the Review of Evacuation Areas” (August 9, 2011).

<sup>8</sup> NERHQ, “Lifting of Evacuation-prepared Area in Case of Emergency” (September 30, 2011).

## 2) Revision of Restricted Areas and Areas under Evacuation Orders

On December 16, 2011, the NERHQ judged that the safety of the entire power station had been comprehensively secured by the achievement of the “cold shutdown state” of the reactors. It was thus confirmed that the target of Step 2 in the roadmap, a state where “the release of radioactive materials came under control and the radiation dose was significantly suppressed”, had been achieved.<sup>9</sup>

Following this, on December 26, 2011, the NERHQ compiled the “Basic Concept and Future Tasks in Review of the Restricted Areas and Areas Under Evacuation Orders After the Completion of Step 2”. This set out a basic concept concerning review of Restricted Areas and areas under evacuation orders, including preparations for lifting evacuation orders in areas with low dose rates by further advancing decontamination work. The basic concept also set March 30, 2012, as a target date for completion of the review of areas under evacuation orders.

Based on this basic concept, it was decided that the areas under evacuation orders would be revised on the basis of radiation dose and re-designated as follows: Areas where Returning is Difficult, Habitation Restricted Areas, and Preparation Areas for Lifting of Evacuation Orders. Policies for the lifting of evacuation orders were set out for Habitation Restricted Areas and Preparation Areas for Lifting of Evacuation Orders. In addition, three conditions for lifting the evacuation orders were set forth as follows: (1) It is certain that the annual cumulative dose estimated by the air dose rate will be less than 20 mSv/y, (2) Infrastructure essential for everyday life such as electricity, gas, water and sewerage, main transportation networks and communications, as well as living-related services such as medical care, nursing care and postal services, are generally restored, in addition to which decontamination with a focus on children’s living environment progresses sufficiently, and (3) The prefecture, municipalities and residents are sufficiently consulted. These conditions made it clear that the lifting of evacuation orders would be the major target of the decontamination in “Special Decontamination Areas (SDA)”.

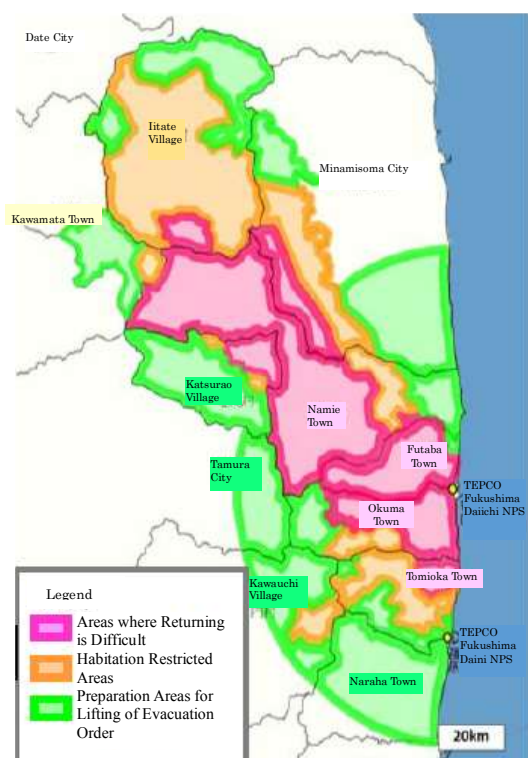
The revision of the designation of areas under evacuation orders was conducted by individual municipal governments, some of which required a great deal of time in order to engage in coordination efforts with local residents. The revision to the areas under evacuation orders was initiated in April 2012 and implemented gradually, finally being completed for all areas in August 2013. Initially it was planned that in order to confirm the areas for decontamination, the re-designation of areas under evacuation orders and the formulation of decontamination implementation plans would be conducted in parallel, but in reality the timing of formulation differed according to the individual circumstances of each municipality.

As of August 2013, there were a total of approximately 146,000 evacuees in the whole of Fukushima Prefecture, of whom approximately 81,000 were from areas under evacuation orders.<sup>10</sup>

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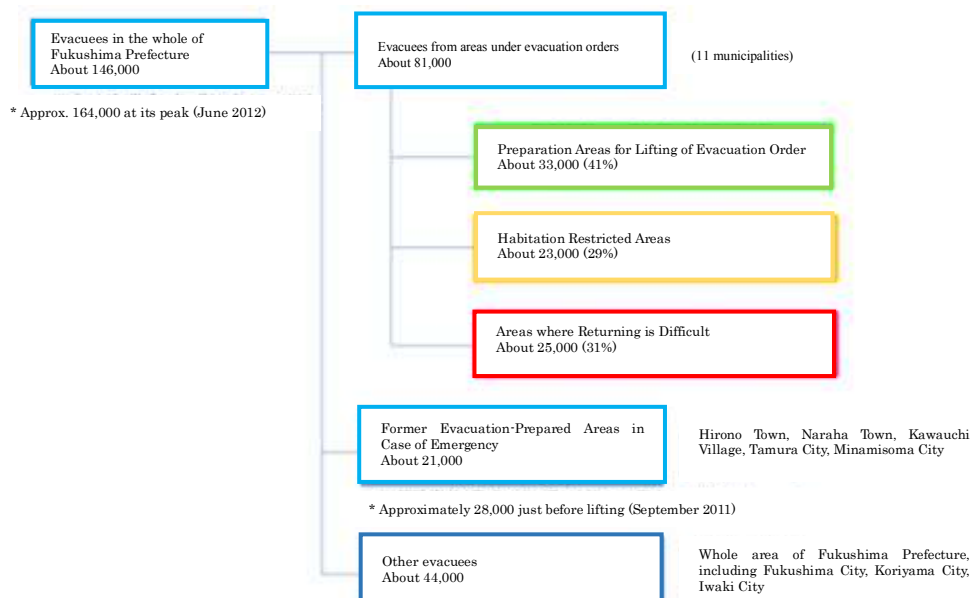
<sup>9</sup> NERHQ “About the Basic Concept and Tasks for Future regarding the reconsideration of Warning Area and Evacuation Order Area after completion of Step 2 work” (December 26, 2011) get.

<sup>10</sup> Cabinet Office, “Review of Areas Under Evacuation Orders” (October 2013).



Areas where Returning is Difficult	<p>Areas where the annual cumulative radiation dose may not fall below 20 mSv/y even five years after the accident and areas where the annual cumulative radiation dose exceeds 50 mSv/y.</p> <p>In principle, habitation will be restricted in the future and the designation of this area will be fixed for five years.</p>
Habitation Restricted Areas	<p>Areas where as of December 26, 2011, the annual cumulative radiation dose may exceed 20 mSv/y and where it is therefore necessary to maintain the evacuation from the perspective of reducing residents' exposure to radiation.</p> <p>With the aim of realizing the return of residents and the rebuilding of communities in the future, decontamination and infrastructure recovery are to be implemented systematically.</p>
Preparation Areas for Lifting of Evacuation Order	<p>Areas that as of December 26, 2011, have been confirmed as having an annual cumulative radiation dose that is clearly less than 20 mSv/y.</p> <p>Although evacuation orders will remain in place, support measures for recovery and reconstruction, including decontamination, infrastructure recovery, and employment measures will be expedited, with the aim of achieving the return of residents as soon as possible.</p>

**Figure 1-3 Establishment of Areas under Evacuation Orders (August 2013, following revision to areas) <sup>10</sup>**



(Notes)  
 1. Numbers for evacuees from the whole of Fukushima Prefecture are based on the Fukushima Prefecture "FY2011 Tohoku-Pacific Ocean Earthquake Damage Information Bulletin," (No. 1031) (September 17, 2013).  
 2. The number of evacuees from areas under evacuation orders was calculated by the Support Team for Residents Affected by Nuclear Incidents, based on information compiled from interviews with municipalities (the number of registered residents as of August 8, 2013).  
 3. The number of evacuees from the former evacuation-prepared areas in case of emergency was calculated by the Support Team for Residents Affected by Nuclear Incidents, based on information compiled from interviews with municipalities (as of September 17, 2013).

**Figure 1-4 Number of evacuees from areas under evacuation orders (As of August 2013)**

Source: Cabinet Office "Review of Areas Under Evacuation Orders" (October 2013).

Column	<p>"Implementing evacuation orders"</p> <p>Mr. Norio Kanno, Mayor of Iitate Village</p>
<p>Never in my wildest dreams did I believe that an accident like the TEPCO nuclear power station accident could happen in Japan. It was truly an "unforeseen event" in every way. I never imagined that this accident would cause the total evacuation of Iitate Village, which lies between 40 and 50 km away from the power station.</p> <p>About one month after the accident I received orders from the central government to this effect: "As annual exposure exceeds 20 mSv/y in Iitate Village, it has been designated as a Deliberate Evacuation Area. Make preparations to evacuate all residents within approximately one month."</p> <p>My immediate thoughts upon receiving these orders were that as we were fighting radiation there was no choice but to evacuate all residents, but on the other hand, there must also be some way of ensuring that Iitate did not become a ghost town. I also thought that the reason for using the term "deliberate evacuation" must be because the relatively lengthy period of "one month" had been set for the implementation of evacuation. I still remember now how the meeting that was initially scheduled to last one hour stretched out for two-and-a-half hours.</p> <p>Shortly after, the radiation dose in the vicinity was measured, and it was found that the dose rate was quite low indoors. This meant that if people were to evacuate, but were also to return to facilities and offices where work was conducted indoors, the annual dosage would not exceed 20 mSv/y. As a result of negotiations with the government, it was decided that such indoor operations and work would be permitted.</p> <p>With regard to the method of evacuation, I applied a balanced way of thinking. In other words, I</p>	

recognized that evacuation must be achieved as soon as possible in view of the risk of radiation, but so too, thought must be given to the risks that could arise from changes in people's living circumstances.

The result of this approach was that although evacuation took almost two months, in the end it was possible to achieve the evacuation of 90% of all residents to areas within one hour of Iitate. In so doing, we were able to benefit from vigorous support activities from residents' associations in the areas where Iitate residents evacuated. In addition, thanks to the fact that residents evacuated to locations close to the village, it was also possible for the original 20 administrative districts of Iitate to engage in various activities too. Naturally, there were many problems and challenges to face, including decontamination, compensation and the division of districts, but all administrative districts of the village came together twice or three times as many as those of other municipalities did, enabling us to share a common recognition about how to respond to evacuation.

It is also thanks to such circumstances that we were able to achieve the unprecedented step of constructing a temporary incinerator in Warabidaira in the village, which is also used to incinerate waste from outside the village. With the aim of reusing decontaminated removed soil, we were also able to advance an environmental restoration project in Nagadoro district.

As of midnight on March 31, 2017, the evacuation order for Iitate Village was lifted after six long years, although with the regrettable exception of Nagadoro district. This lifting of the evacuation order was what we had waited for with anticipation for so long. However, the lifting of the evacuation order is not the ultimate goal. We are now merely at the start line for reconstruction.

However, just the fact that we are now standing at the start line is a source of incredible pleasure. That we have got to a point where we can begin reconstruction is thanks to the support of so many people, and I would like to use this opportunity to express in words my most heartfelt appreciation.

During the six years leading to the lifting of the evacuation order, what remains etched in our hearts and minds is the passionate wishes of so many people that we would not normally experience, including the strong desire of the central government for us to achieve reconstruction, the much-appreciated support from the prefecture, the warm and kind support and thoughts of so many people around the country, the understanding of the village assembly, and of course the determination and hard work of village residents.

Now that the evacuation order has been lifted, I would like to make three pledges on behalf of our modest village of Iitate.

Firstly, we will transcend attitudes of "perpetrators" and "victims." In order to proceed with reconstruction, it is very important in the days ahead to continue to face the situation with an even-handed and equal approach in dealings with the central government.

Secondly, instead of continuing to grumble and express dissatisfaction about having experienced this disaster, we will seek to make our village one that takes up the challenge of realizing one, two or even more challenges that would normally be thought to be impossible as we look to creating a new village for the future. We are fortunate to already have proof before our eyes that reconstruction is advancing with so many projects having been completed that would normally be impossible, including the opening of the "Fureai-kan" exchange center and the "Iitate Village Road Station Madeikan", as well as the reconstruction of houses.

Thirdly, and above all else, it is imperative that reconstruction is firmly based on a "self-help mindset" shared by all village residents. We must never forget that what we can do ourselves we should do ourselves.

We will continue to make further efforts in this direction, but regrettably, due the specific nature of a radiation disaster, there will probably be many things that we are unable to do for ourselves.

We therefore hope for even greater support and encouragement from the central and prefectural governments and many people around the country for Iitate Village.

## **1.2. Emergency Response against Radioactive Materials**

(Emergency response period: From the accident to before the establishment of the “Act on Special Measures (March to August 2011)”)

### **(1) Situation at the Time of the Accident**

Once it became clear that contamination by radioactive materials had spread beyond areas under evacuation orders to areas where people were living their daily lives, it was necessary to implement an emergency response to deal with radioactive materials in such areas too.

However, as it had previously been stated that nuclear power stations in Japan were safe, the “Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Act No. 166 of 1957)”, did not make provisions for contamination outside the reactor areas. Neither did the “Basic Environment Law (Law No. 91 of 1993)”, which excluded regulation of radioactive materials for atmospheric and water environments, stipulating that, “The measures to prevent air pollution, water pollution and soil contamination caused by radioactive substances shall be implemented under the Atomic Energy Basic Law (Law No. 186 of 1955)” and other related legislation.” Furthermore, as there had been no accidents in Japan that had led to widespread leakage of radioactive materials outside the area of nuclear power stations, and also in view of the fact that the only serious situation on a worldwide basis had been the Chernobyl nuclear accident, it was never assumed that radioactive materials would be released into the environment causing widespread contamination.

The “Act on Special Measures concerning Nuclear Emergency Preparedness (Act No. 156 of 1999)” had stipulated what emergency response measures and measures for restoration from a nuclear emergency would need to be taken in order to prevent the expansion of a nuclear disaster and realize recovery, and the International Atomic Energy Agency (IAEA) and the International Commission on Radiological Protection (ICRP) had issued advisories and standards to the governments of member states concerning the concepts for dealing with environmental contamination and how to prevent public exposure to radiation in the event of an accident. However, due to the reasons mentioned above, until the time the accident actually occurred no practical framework had been sufficiently formulated that covered specific methods and the division of duties for responding to contamination caused by the release of radioactive materials into the general environment.

### **(2) Implementation of Radiation Monitoring**

Immediately following the accident, organizations concerned, such as Fukushima Prefecture and the Ministry of Education, Culture, Sports, Science and Technology (MEXT) started monitoring radiation doses outside in order to understand the situation of contamination by radioactive materials. In the vicinity of TEPCO Fukushima Daiichi NPS, monitoring cars were used to measure radiation doses and from March 25, 2011, MEXT started airborne monitoring, which was extended from April to cover a wide area within an 80 km radius of the power station.<sup>11</sup> In addition, monitoring of soil, food, and tap water, etc., was conducted.

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<sup>11</sup> Interim Report of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (December 26, 2011).

On August 2, 2011, the Monitoring Coordination Meeting formulated the Comprehensive Monitoring Plan, in order to integrate the radiation monitoring activities implemented by various organizations concerned up to that point and to implement them systematically and efficiently with a view to sharing and disclosing the results.

### **(3) Formulation of Guidelines for Radiation Protection and Disposal of Disaster Waste**

Based on the monitoring results it became necessary to first take swift measures to protect children from the effects of contamination by radioactive materials.

With regard to the use of schools, on April 19, 2011, MEXT issued a document titled “Preliminary approach in deciding how to use school buildings and schoolyards in Fukushima Prefecture,” which stipulated that outdoor activities would be restricted on school premises and also outside school premises for schools where the air dose rate in the schoolyard or outdoor premises was 3.8  $\mu\text{Sv/h}$  or more. Based on the subsequent situation, on August 26, 2011, MEXT released a document on “Dose reduction for school buildings and grounds in Fukushima Prefecture,” setting out a policy that the dose received by students and others at schools should in principle be less than 1 mSv/y annually, and that taking into account the typical behavior of students, the aim was to achieve an air dose rate of less than 1  $\mu\text{Sv/h}$  in schoolyards and gardens.

With regard to concepts for radiation protection for general residents, on July 19, 2011, the Nuclear Safety Commission (NSC) announced its “Basic Policy on Radiation Protection for Termination of Evacuation and Reconstruction.”

In addition, an immediate challenge was the necessity to promptly dispose of disaster waste that had been generated by the Great East Japan Earthquake. However, given the risk of disaster waste having been contaminated by radioactive substances, following the advice received from the NSC on April 27, 2011, the Ministry of the Environment (MOE) announced on May 2, 2011 a policy on the “Handling of Disaster Waste in Fukushima Prefecture for the Time Being”. The MOE established a Review Meeting on Safety Assessment of Disaster Waste to engage in deliberations on the disposal methods for disaster waste in the Hama-dori and Naka-dori districts of Fukushima Prefecture (excluding areas under evacuation orders and deliberate evacuation areas).

Subsequently, on June 3, 2011, the NSC compiled the “Near-term Policy to Ensure the Safety for Treating and Disposing Contaminated Waste around the Site of Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company”. Following deliberations in the Review Meeting on Safety Assessment of Disaster Waste, on June 23, 2011, MOE set out the “Policy on Disposal of Disaster Waste in Fukushima Prefecture”. This policy stipulated that incinerated ash with a radioactive cesium concentration of 8,000 Becquerel per kilogram (Bq/kg) or less would be disposed at controlled final landfill sites, whereas ash with a concentration over 8,000 Bq/kg would be temporarily stored.

In addition, following the detection of more than 8,000 Bq/kg of radioactive cesium in fly ash at a general waste incineration facility in Tokyo, on June 28, 2011, MOE announced the “Measurement and Temporary Handling of Incinerated Ash at Non-Industrial Waste Incineration Plants,” which stipulated interim measures for the handling of such waste at general waste disposal facilities.



#### **(4) Initiation of Decontamination Activities**

Based on the above-mentioned “Preliminary approach in deciding how to use school buildings and schoolyards in Fukushima Prefecture”, from April 21, 2011, Date City started a demonstration test at the school ground of the former Shimo-oguni Elementary School,<sup>12</sup> and from April 28, 2011, Koriyama City began topsoil removal work in school grounds and other areas.<sup>13</sup>

In May 2011, a group of experts on radiation from the Japan Atomic Energy Agency (JAEA), in cooperation with Fukushima University, conducted a “Field survey to verify air dose reduction measures in schoolyards and gardens”, demonstrating two soil treatment methods: “collective burying underground method” and “vertical displacement method (overturning the soil (deep plowing))”.<sup>14</sup>

In addition, experts with knowledge of radiation acted as “decontamination advisers”, working with several municipalities such as Date City, Minamisoma City and Iitate Village to start their decontamination activities.

Although the municipalities lacked knowledge about radiation and were faced with the challenge of having insufficient personnel to engage in decontamination activities, with the assistance of organizations and experts with specialist knowledge of radiation, they conducted dose reduction activities and model decontamination projects themselves, using the tools that were available and also at times with the help of volunteers. On July 15, 2011, Fukushima Prefecture issued “Guidance for Reduction of Air Dose in Living Space” as a manual for measures relating to reduction of the radiation dose. It should be noted that at the time the term “decontamination” was not generally used, and terms such as “dose reduction activity” were more commonly used.

These decontamination activities predominantly targeted pin-pointed facilities such as schools or specified houses, although there was a growing recognition that it would be necessary to engage in decontamination over wide areas in order to obtain a sufficient effect in air dose rate reduction.

Furthermore, although at the time knowledge about radiation and its effects on the human body were not widely known among the public, the environmental contamination caused by radioactive materials raised the need for general knowledge on radiation and information relating to radiation countermeasures relevant to the TEPCO Fukushima Daiichi NPS accident, particularly among the residents in areas that had been contaminated. In response, several academic organizations with expert knowledge of radiation published Q&A-style guidebooks to provide basic knowledge and information on radiation to the public. The central government and Fukushima Prefecture also issued pamphlets containing information on radiation.

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<sup>12</sup> Date City, “Three Years of History of Date City After the Great East Japan Earthquake and Nuclear Power Station Accident” (July 2, 2013).

<sup>13</sup> Koriyama City, “History of Koriyama City After the Great East Japan Earthquake” (February 2, 2017).

<sup>14</sup> Ministry of Education, Culture, Sports, Science and Technology (MEXT), “Air Dose Reduction Measures in School Yards and Kindergarten Yards Based on Fieldwork” (May 11, 2011).

Commentary	Emergency decontamination at schools and other facilities in municipalities
<p>Following the accident, the municipalities of Fukushima Prefecture sought advice from the central government about outdoor activities at schools. On April 19, 2011, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) announced a “Preliminary approach in deciding how to use school buildings and schoolyards in Fukushima Prefecture”. This document stipulated that at schools where the air dose rate had been measured as greater than 3.8 <math>\mu\text{Sv/h}</math>, it would be appropriate to restrict outdoor activities inside and outside school grounds for an interim period, including such measures as restricting activities in school grounds or gardens to approximately one hour per day.</p> <p>In response to this advisory, the cities of Date and Koriyama took swift action (see below for details).</p> <p>On May 27, 2011, MEXT issued an “Immediate response aimed at reducing the dosage level that students receive at schools in Fukushima Prefecture”, in which it was announced that the initial target for the dose received by students and others would be less than 1 mSv/y annually, and that financial assistance would be provided to reduce dose rates at schools and other facilities where the air dose rate was greater than 1 <math>\mu\text{Sv/h}</math>. With the exception of some municipalities with a low air dose rate, this announcement led the majority of municipalities in Fukushima to implement topsoil removal at school grounds and parks and other child-related facilities.</p> <p>(1) Example of Date City</p> <p>On April 19, 2011, Date City restricted outdoor activities at Oguni and Tominari elementary schools, given that the air dose rates at these schools had exceeded the provisional reference value (3.8 <math>\mu\text{Sv/h}</math>) announced by MEXT. On April 21, 2011, a demonstration test of topsoil removal was implemented that confirmed a reduction effect in the radiation dose, which led to the initiation on April 29 of topsoil removal operations at the two facilities that had been instructed to restrict outdoor activities and also at the Tominari Kindergarten yard, which had received instructions from the city to restrict outdoor activities.</p> <p>Following the topsoil removal, a second survey of the air dose rate, conducted on May 7, showed that the dose had fallen below the provisional reference value at all facilities. Accordingly, restrictions on outdoor activities were then lifted.</p> <p>Subsequently topsoil removal was implemented at a total of 60 facilities in the entire city, including elementary and junior high schools, kindergartens and nursery schools. As a provisional measure, the contaminated soil was buried on the premises of each facility until temporary storage facilities could be established.</p> <p>With regard to school buildings and facilities, from July 2, 2011, experimental decontamination was implemented at Tominari Elementary School and Tominari Kindergarten on concrete and asphalt surfaces other than in the school grounds (gardens) and this was confirmed as an effective method of reducing the radiation dose. These decontamination measures were implemented from March to July 2012 at six other facilities, including Oguni and Hashirazawa elementary schools and Hashirazawa Kindergarten. The remaining 54 facilities in the city were subject to monitoring during FY2013, and based on measurement results, decontamination measures were implemented successively in locations with high doses, including hotspots.</p>	

In combination with these measures at school facilities, other decontamination measures were also implemented at swimming pools, including the high-pressure water washing or concrete surface removal, as well as weeding and the pruning of tall trees.

## (2) Example of Koriyama City

On April 27, 2011, Koriyama City began topsoil removal operations in the schoolyards of elementary, junior high schools, and nursery schools. In order to further ensure the safety of children, from April 2012 the city also implemented decontamination operations at elementary and junior high school swimming pools, poolside areas, school building roofs and other external areas on school grounds, with similar operations also being conducted at nursery schools. In July 2012, topsoil removal was also begun at parks in the city.

Column	<p>“Reconsidering the objectives of decontamination”</p> <p>Mr. Shunichi Tanaka, Former Chairman, Nuclear Regulation Authority</p>
	<p>“What is the objective of decontamination?” As decontamination work began for the first time in the Nagadoro district of Iitate Village in May 2011, this was the question we asked ourselves and the answer at that time was to achieve as soon as possible the return of residents who had been forced to flee from their homes due to widespread radioactive contamination following the TEPCO Fukushima Daiichi NPS accident, and enable them to start rebuilding their lives.</p> <p>Traveling to the affected areas and seeing for ourselves the enormous scale of environmental contamination, we tried to cast aside any feelings of despair about whether decontamination would even be possible that would enable residents to return. Instead, with the cooperation of the head of Nagadoro district, who remained in his home, which was under a deliberate evacuation order, we focused on various experimental methods of decontamination for homes, fields (rice paddies, crop fields and grazing land, etc.), plastic greenhouses, roads and mountainous forest areas. These experimental decontamination measures showed that the most effective method was the most primitive, namely the physical removal of decontaminated materials. The experiments also showed that radioactive materials (<math>^{137}\text{Cs}</math>, <math>^{134}\text{Cs}</math>) were most concentrated in topsoil, in grass roots on grazing land, in cut rice stubble in rice fields, and in rainwater drainage channels, but otherwise were not widely spread. We realized that if 1-2 cm of topsoil could be removed promptly, it would be possible to remove approximately 90% of radioactive materials. Something that we had not expected at all was the radioactive cesium attached to branches and leaves of shrubs and trees around houses, and although the initial air dose rate of 10-15 <math>\mu\text{Sv/h}</math> was reduced to 2-4 <math>\mu\text{Sv/h}</math>, we were unable to achieve our target due to the impact of radiation on this foliage surrounding houses.</p> <p>In August, the “Act on Special Measures” entered into force and wide-area decontamination efforts led by MOE began. However, these efforts imposed a tremendous and unachievable burden on decontamination. This change in the initial objective of achieving the lifting of evacuation orders as soon as possible has resulted in the lifting of evacuation orders taking a long time.</p> <p>Directly after the accident the standard for evacuation for Areas where Returning is Difficult was set</p>

at an annual exposure in excess of 50 mSv. It was supposed to be the case that decontamination operations would aim to reduce that dose to below 20 mSv annually, because if the annual dose were to be less than 20 mSv it would be possible to live in those areas, while continuing to engage in efforts to gradually reduce the dose rate. However, in addition to the opinion of certain sectors of the public that insisted that annual exposure should be below 1 mSv, the formula for estimating annual exposure from the air dose rate that was issued by the central government (MEXT) as a means of determining standards for evacuation also overestimated by 3 to 4 times the exposure dose (dose equivalent) compared to actual personal dosimeter readings, which has ultimately resulted in the current extremely difficult situation for decontamination efforts.

While it is also a fact that local governments and residents have a strong desire for decontamination to be implemented, the reason behind this sentiment is unease about exposure to radiation. Addressing such concerns was not the original objective of decontamination, and they cannot be addressed simply through the physical implementation of decontamination alone. Recognizing that the role of decontamination is dependent on various standards relating to radiation protection, and having first reviewed various standards on the basis of scientific rationality, including radiation exposure impacts on health, evacuation standards, dietary reference intakes, and planting standards for agricultural produce, etc., it is now necessary to reconsider the required means of decontamination and how to respond from a long-term perspective to wide-area radioactive contamination now that almost seven years have passed since the TEPCO Fukushima Daiichi NPS accident.

### **1.3. Establishment of a Legal Framework and Decontamination Policy**

**(Decontamination preparation period: From the establishment of the “Act on Special Measures” to the enforcement of the Act: August to December 2011)**

#### **(1) The “Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials”**

In the context of the gradual consolidation of findings regarding radiation and decontamination, etc., the “Act on Special Measures concerning the Handling of Environment Pollution by Radioactive Materials Discharged by the Nuclear Power Station Accident Associated with the Tohoku District Off the Pacific Ocean Earthquake That Occurred on 11 March 2011” (hereinafter referred to as the “Act on Special Measures”) submitted by the Chairman of the Committee on Environment in the House of Representatives was passed and established through lawmaker-initiated legislation in the August 26, 2011 House of Councilors plenary session, promulgated on August 30, and fully enforced on January 1, 2012.

This Act determined that in light of the fact that the national government bears social responsibility arising from its promotion of nuclear policy to date, the responsibility for the national government is to take the necessary actions regarding the response to contamination of the environment caused by radioactive materials discharged by the accident. Furthermore, the responsibility for the local governments is deemed to fulfil an appropriate role based on the natural and social conditions of the said regions, through cooperation with the measures of the national government. Moreover, regarding the responsibility for TEPCO, the Act deemed that the power company has to take the necessary actions in good faith and

cooperate with measures implemented by the national government or the local governments. In addition, it deemed that all action based on the “Act on Special Measures” should be compensated by TEPCO. The basic framework for the decontamination projects was determined by the above.

## **(2) Basic Policy for Emergency Response on Decontamination Work**

Even after the “Act on Special Measures” was established, when enforcing it a certain period was necessary for establishing the areas and drawing up the technical standards, etc. Decontamination was an urgent issue that was necessary to be tackled immediately. Therefore, in parallel with the Diet deliberations on the “Act on Special Measures”, the NERHQ advanced the preparations for decontamination, decided the Basic Policy for Emergency Response on Decontamination Work (hereinafter referred to as the “Basic Policy for Emergency Response”) on August 26, 2011, the day the “Act on Special Measures” was passed and established, and announced its policy for decontamination until enforcement of the “Act on Special Measures”.

The Basic Policy for Emergency Response stated that in regions that had received evacuation orders the national government would implement the decontamination and would provide technological and fiscal support for preparation and implementation of the decontamination plans of the municipalities.

Furthermore, it stated that in regions in the existing exposure situation (under current operation, regions with 20 mSv or less per year), as the long-term goal, the headquarters would aim for 1 mSv or less per year of additional exposure dose in combination with the natural decay of the radiation dose, and would aim to realize a situation in which the estimated annual exposure dose of the general public declined by approximately 50% in two years (in the case of the living environment of children, realize a situation in which it declined by approximately 60%).

Regarding the approach to the division of roles in the Basic Policy for Emergency Response, the conventional approach to disaster response is based on the fact that the “Basic Act on Disaster Control Measures” deems that municipalities shall be responsible for carrying out disaster countermeasures. Furthermore, actually, each municipality is familiar with the conditions in the region, and based on the recognition that this is extremely important when securing a “Temporary Storage Sites (TSS)” and processing decontamination waste, etc.; studies were conducted on the premise that decontamination would basically be implemented by the municipalities. It was decided that in the case that the administrative functions were inside the region, municipalities would implement the decontamination, and in regions in which it was difficult to sufficiently fulfil administrative functions owing to evacuation orders, the national government would implement the decontamination. Note that the “Act on Special Measures” deemed that the drawing up, etc. of decontamination implementation plans for “Intensive Contamination Survey Areas (ICSA)” would be implemented either by prefectural governors or the municipalities stipulated by Cabinet Order, following the examples of other environmental laws and regulations. In reality, however, inheriting the approach of the Basic Policy for Emergency Response, all of the municipalities pertaining to the ICSA were designated by Cabinet Order.

Due to this, the prefectures ended up being expected to bear the coordination functions among municipalities when necessary and to develop the environment such as information provision, when each municipality planned and implemented decontamination.

Regarding fiscal aspects, a fund was created for Fukushima Prefecture using the supplemental budget of the Cabinet Office, and municipalities within Fukushima Prefecture were provided with subsidies from the fund for the decontamination carried out under the decontamination implementation plans drawn up based on the Basic Policy for Emergency Response (subsidy rate of 100%). Furthermore, regarding technological aspects, the national government indicated that it would continuously provide the technical information, etc. necessary for decontamination, such as effective decontamination methods, costs, matters for consideration, etc., through model projects in each region, including the regions with a particularly high dose.

In response to the “Basic Policy for Emergency Response”, on the same day, the NERHQ publicly released the Guidelines for Municipal Decontamination Work to enable municipalities to draw up and implement decontamination plans. Furthermore, the headquarters made two announcements regarding the decontamination methods for forests and farmland in the guidelines on September 30, 2011: the “Announcement of the Appropriate Methods, etc. for Decontamination of Forests” and the “Announcement of the Appropriate Methods for Decontamination of Farmland”. Based on these, the ICSA decontamination implementation plans were drawn up in Fukushima City in September 2011, in Date City in October 2011, and in Koriyama City, etc. in December 2011,<sup>15</sup> and decontamination by the municipalities began.

Furthermore, on November 22, 2011 the Cabinet Office publicly released the Decontamination Technical Catalog to provide the technical information necessary for decontamination.

### **(3) Moves to draw up the Basic Policy for Emergency Response based on the “Act on Special Measures”**

In response to the establishment of the “Act on Special Measures”, MOE launched the Committee on Environmental Remediation on September 14, 2011 with the objective of examining matters pertaining to actions, etc. such as decontamination in line with the role of MOE in the “Act on Special Measures”, and commenced examination of technological points for preparation of the basic policy and guidelines, etc. for decontamination.

In response to the statement that “the national government will take responsibility for allocating repository sites that require long-term management services as well as providing safety at these repository sites. It will develop and disclose a roadmap for constructing repository sites as soon as possible” in the “Basic Policy for Emergency Response”, on October 29, 2011 MOE publicly released the “Basic Policy on Interim Storage and Other Facilities Required for the Handling of the Environmental Pollution from Radioactive Materials Associated with the Accident at the TEPCO Fukushima Daiichi Nuclear Power Station”, which stipulated policies such as having one interim storage facility in Fukushima Prefecture for soil and waste that is in Fukushima Prefecture, and having final disposal outside Fukushima Prefecture within 30 years after interim storage commencement.

Subsequently, on November 11, 2011 the “Basic Policy for the Act on Special Measures concerning the

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<sup>15</sup> Fukushima City “Fukushima City Furusato Decontamination Implementation Plan (1st edition)” (September 27, 2011), Date City “Date City Decontamination Implementation Plan (1st edition)” (October 2011), Koriyama City “Koriyama City Furusato Regeneration and Decontamination Implementation Plan” (December 2011)

Handling of Environment Pollution by Radioactive Materials” was decided by the Cabinet and, inheriting the concept of the “Basic Policy for Emergency Response on Decontamination Work”, the long-term goals of an additional exposure dose of 1mSv or less per year, etc. were stipulated for regions in which the additional exposure dose was less than 20mSv/y.

Furthermore, for regions within the SDA other than the regions in which the additional exposure dose is particularly high, the ministry aimed to take action on the decontamination, etc. of soil, etc. in buildings such as houses, offices, public facilities, etc., roads, agricultural land, forests near living areas, etc. and to gradually transport the removed soil, etc. generated from that process to appropriately managed Temporary Storage Sites (TSS) by the end of March 2014.

Moreover, the “Act on Special Measures” simply deemed that the entity that implemented decontamination of the SDA, where evacuation orders, etc. were issued, was the “national government,” but as a result of the coordination within the government regarding this basic policy, it was decided that “MOE would carry it out while obtaining cooperation from the related government ministries and agencies, including human resources cooperation.”

The MOE promulgated the Ministerial Ordinance stipulating the designation requirements for the regions of SDA and ICSA<sup>16</sup> based on the “Act on Special Measures” on December 14, 2011. Under this Ministerial Ordinance, 11 municipalities were designated as SDA (four municipalities were partial regions) and 104 municipalities were designated as ICSA (four municipalities overlapped with the SDA) on December 28, 2011 and February 28, 2012.

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<sup>16</sup> Ministry of the Environment “Ministerial Ordinance Stipulating the Requirements, etc. for Designation of Contaminated Waste Management Areas” (December 14, 2011, Ministry of the Environment Ordinance No. 34)

<b>Column</b>	<p>“Decontamination projects and the role of MOE”</p> <p>Mr. Hideki Minamikawa, Former Administrative Vice Minister,</p>
	<p>In 1999 under the leadership of Prime Minister Hashimoto, the central government ministries and agencies were reorganized. I was the director of the Public Health Planning Section of the then Environment Agency and happened to be concurrently appointed the director for the Government Ministry and Agency Reorganization, and I endeavored with all of my strength to realize my ideas regarding the best approach for a “new environmental administrative organization”, which I had thought about with a strong awareness of the problems for many years.</p> <p>Based on my belief that it was not reasonable for an environmental administrative organization to be devoid of any authority over the regulatory control of chemical substances, as the director of the section, I strongly lobbied and coordinated for the creation of legislation that would have this ministry be a key entity under the “Pollutant Release and Transfer Register (PRTR) Act”, and also for the shared jurisdiction [with ministries] under the “Chemical Substances Examination and Regulation Act”.</p> <p>There were also many other challenging areas, but here I will discuss the problem of radioactive materials. The fact that all of the problems of radioactive materials were excluded from Japan’s “Basic Environment Law” and a lot of other environmental legislation was difficult for me to accept because I had done studies of overseas governments, so I took this opportunity to make an effort to attempt to incorporate new bureaucratic functions into this ministry. The result of my hard-fought efforts was that MOE would be responsible for the measurement of radioactive materials in the environment. I had to accept that no further measures would be possible at that time. While I was serving in my position, I always had the feeling that I would like to take up the challenge again if I had the opportunity.</p> <p>After March 11, 2011 I visited the coastal areas of Tohoku many times. The first time was a on a mission to consider how to proceed with the processing of up to 30 million tons of disaster waste. Two months passed and the question of how to process the contamination from the radioactive materials generated by the accident at TEPCO Fukushima Daiichi Nuclear Power Station had become a major issue within the government. It had been decided that TEPCO, which had caused the accident, and the Ministry of Economy, Trade and Industry, which had jurisdiction over the industry, would be in charge of the response within the premises of the nuclear power station, but the structure for tackling the contamination caused by the radioactive materials dispersed in the environment could not be decided based on existing laws. I remembered the sequence of events back in the days of the government ministry and agency reorganization, and while looking at the chaotic and bewildering local situation caused by the accident in and around Fukushima Prefecture, I reached the conclusion that I would put my hand up here no matter how difficult it was. I was told that the Prime Minister’s Office would decide which government office to put in charge, but I gained the consent of the [environment] minister and communicated my policy that MOE would like to be involved based on the legislative process. Inside MOE an overwhelming majority were opposed, but I did not concern myself with that. I visited the three top political appointees in MOE and asked for their cooperation. Fortunately, all of them encouraged me, saying “we are behind you so do your best.”</p> <p>There was no time. I acted with the awareness that if the legislation did not pass during the current</p>



Diet session the effort would collapse at some point. Due to the efforts of all of the people involved, fortunately the legislation was passed and established in the plenary session of the House of Councilors on the actual final day of that Diet session. Even after establishment of the legislation, many obstacles stood on the path to enforcement of legislation, and I put an enormous burden on ministry personnel. The struggle to move forward is continuing even now.

What I would like most is for MOE officials to tackle solutions to the problems while directly facing the people who are struggling on the ground and the people who are working hard to tackle the problems. At the time of the launch of the Environment Agency [1971], we faced victims of diseases caused by pollution, in particular Minamata Disease, and while distinguishing between what could be done and could not be done we tackled solutions to the problems even though it was painful. That era passed to some extent, and I felt we were working in areas that were in isolation from real issues in some instances, which was unacceptable. Tackling work while facing the situation on the ground and having a wide perspective is precisely the mission of a national public servant, and I think that is their purpose to exist. So I definitely would like public servants to avoid getting caught up in the sense of being “the establishment” as they execute their work in workshops with experts and people at NPOs (although those are important as well).

#### **(4) Moves to draw up Decontamination Guidelines, etc.**

In order to confirm the practical work and effects of the whole area decontamination techniques, the Cabinet Office commissioned JAEA to implement a Decontamination Model Project starting from November 2011,<sup>17</sup> and Fukushima Prefecture commenced the Fukushima Prefecture Whole Area Decontamination Model Project commenced in November 2011.<sup>18</sup> The findings, etc. obtained through these were left to JAEA and the business operators involved in implementation and incorporated in the guidelines, etc. described below.

Moreover, in advance of implementation of full-scale decontamination in SDA, the top priority was to start by decontaminating municipal offices, the front-line bases of decontamination and the center of the administrative functions of the local governments, and restoring the minimum functions of the municipal offices so that they could make plans and carry out liaison and coordination while advancing the decontamination. For this reason, as a temporary response until the implementation structure was in place, based on a request from the Minister of the Environment, in December 2011 the Japan Self-Defense Forces (approximately 900 personnel led by regiments of the 6th Division of the Japan Ground Self-Defense Force located in Fukushima City and Koriyama City) implemented decontamination of four municipal offices (Naraha Town, Tomioka Town, Namie Town, and Iitate Village) for approximately two weeks.<sup>19</sup>

Before the full enforcement of the “Act on Special Measures” on January 1, 2012, it was necessary to stipulate the techniques, etc. for decontamination in order to unify the decontamination methods being used by the municipalities individually and carry out efficient and effective decontamination, so on December 14, 2011 MOE drew up and publicly released the Decontamination Guidelines which systematically compiled the decontamination methods, etc. based on the “Act on Special Measures”.

These guidelines are for carrying out the survey measurement of the contamination situation, the decontamination, and the collection, transportation and storage, etc. of the removed soil generated as a result of the decontamination based on the “Act on Special Measures”, and they explain these processes specifically and in an easily understood way. Meanwhile, on December 27, 2011 the Guidelines for Waste were drawn up regarding storage and processing, etc. of waste contaminated by radioactive materials discharged by the accident.

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<sup>17</sup> Ministry of the Environment and JAEA “Report on the Decontamination Model Demonstration Project in the Restricted Areas and Deliberate Evacuation Areas, etc.” (June 29, 2012)

<sup>18</sup> Fukushima Prefecture “Report on Implementation of the Fukushima Prefecture Whole Area Decontamination Model Project” (October 26, 2012)

<sup>19</sup> Ministry of the Environment “Report on Decontamination of Municipal Offices by the Japan Self-Defense Forces” (March 27, 2012)

## **1.4. Implementation of Decontamination Projects**

### **1.4.1. Commencement of Decontamination Projects**

(Decontamination commencement period: From the enforcement of the “Act on Special Measures” to the public release of the Decontamination Promotion Package: January to October 2012)

#### **(1) Decontamination in Special Decontamination Area**

In response to the enforcement of the “Act on Special Measures” on January 1, 2012, and also taking into account the approach of the review of the Areas under Evacuation Orders, on January 26, 2012 MOE publicly released the Policy for decontamination in the Special Decontamination Areas (Decontamination roadmap), which specified the series of steps consisting of the model demonstration project, decontamination, etc. in advance (hereinafter referred to as “preliminary decontamination”) , and whole area decontamination and processes, etc. for each of the Areas under Evacuation Orders as the policy for decontamination in the SDA. Furthermore, it deemed that the goal of lifting the evacuation orders is the return of the residents and the rebuilding of their lives, so the development of life infrastructure and the restoration of municipal office functions, etc. were advanced together.

The “Act on Special Measures” designated the 11 municipalities where evacuation orders had been issued (population: approximately 80,000 people (before evacuation),<sup>20</sup> area: approximately 1,150 km<sup>2</sup>) as the SDA. Regarding Naraha Town, evacuation orders had been issued in the majority of areas and access to the areas where evacuation orders had not been issued was only via Areas under Evacuation Orders, so the entire area was designated a Special Decontamination Area.

Following the decontamination of centers by the Japan Self-Defense Forces, from January 2012 MOE in advance of other locations implemented decontamination of facilities that would be the centers for decontamination activities (municipal offices, community centers, etc.), roads for access to regions carrying out decontamination, infrastructure facilities supplying the water, etc. necessary for preliminary decontamination. Preliminary decontamination was commenced gradually in ten municipalities, excluding Futaba Town, and was carried out until January 2014.

Furthermore, in March 2012 it commenced the decontamination model demonstration project inside the Restricted Area of the Joban Expressway,<sup>21</sup> which is important infrastructure.

In addition, in the SDA, in order to provide a reference for drawing up the decontamination implementation plans, etc. from November 2011 the Ministry carried out detailed monitoring centered on residential areas<sup>22</sup> to prepare air dose rate distribution diagrams.

Taking into account the Decontamination Roadmap, in April 2012 in Tamura City, Naraha Town, Kawauchi Village, and Minamisoma City the Ministry cooperated with the said municipalities to draw up decontamination implementation plans, and in July whole area decontamination commenced in Tamura City, Naraha Town, and Kawauchi Village. Decontamination implementation plans were gradually drawn

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<sup>20</sup> Cabinet Office “The Reviews of Areas under Evacuation Orders” (October 2013)

<sup>21</sup> Ministry of the Environment “Overview of the Results of the Model Demonstration Project inside the Joban Expressway Restricted Area” (August 31, 2012)

<sup>22</sup> Ministry of the Environment “Detailed Monitoring in Regions where the National Government Implements Decontamination based on the “Act on Special Measures concerning the Handling of Radioactive Pollution (Final Report)” (May 17, 2012)

up in other municipalities in the SDA, and whole area decontamination began there as well (Table 1-2).

Along with the commencement of large-scale whole area decontamination, securing large numbers of workers and ensuring quality through occupational safety and decontamination work education for large numbers of workers became issues, so each decontamination contractor responded to these issues while carrying out a variety of initiatives. Meanwhile, MOE shared information, as appropriate, about the findings arising from the actual decontamination and reflected the finding that could be made into rules, etc. in the specifications, etc. of the decontamination projects.

However, the decontamination projects became extremely difficult projects because a large number of projects were implemented simultaneously in parallel, in each municipality, over a short period of time. The fact that there had been no remediation of infrastructure in the Hamadori region after the earthquake disaster, and the work that could be done in the Nakadori region in the winter was limited due to snowfall, etc. also had an effect on the progress of the projects.

Moreover, securing Temporary Storage Sites (TSS) and obtaining the consent of the relevant people such as landowners, etc. before implementation of the decontamination had a severe effect on the progress of the project.

Regarding the securing of TSS, there was no mutual understanding regarding what TSS were and why they were necessary did not exist at all. It was not merely a problem of lending and borrowing land; a process of building confidence through risk communication was necessary. In the course of those discussions, many landowners provided their land because they felt that they wanted to cooperate with the remediation and reconstruction.

Regarding obtaining consent, a large number of relevant people were involved such as landowners, etc. so advancing the procedures took time because identification was difficult, and they had evacuated to various regions due to the evacuation orders, etc. Furthermore, when receiving consent, MOE carefully explained about radiation, decontamination, the prospects for return, etc. to gain understanding.

**Table 1-2 State of progress of decontamination in Special Decontamination Areas**

FY Municipality	FY2012					FY2013					FY2014	FY2015	FY2016
	4	7	10	1	3	4	7	10	1	3			
Tamura City	▲ 4/1 4/13	● 7/5	-----	-----	-----	○ 6/28	-----	-----	-----	-----	4/1		
Naraha Town	▲ 4/13	● 4/23	8/10 ▲ (Revised) 10/	-----	-----	-----	-----	-----	○ 3/31	-----		9/5	
Kawauchi Village	▲ 4/1 4/13	● 7/30	-----	-----	-----	-----	-----	-----	○ 3/31	-----	10/1		6/14
Okuma Town	-----	-----	12/10 ▲ 12/28	-----	-----	● 6/4	-----	-----	○ 3/31	-----			
Katsurao Village	-----	▲ 9/28	3/22	-----	-----	● 4/25	-----	8/8	▲ (Revised) 12/26	-----	-----	○ 12/31	6/12
Kawamata Town	-----	▲ 8/10	-----	-----	-----	● 4/25	-----	-----	▲ (Revised) 12/26	-----	-----	○ 12/31	3/31
Futaba Town	-----	-----	-----	-----	-----	5/28	-----	-----	-----	-----	▲ 7/15	● 2/23	○ 3/31
Iitate Village	▲ 5/24	7/17 ● 9/25	-----	-----	-----	-----	-----	-----	▲ (Revised) 12/26	-----	-----	-----	3/31 ○ 12/31
Tomioka Town	-----	-----	3/25	-----	-----	▲ 6/26	-----	-----	▲ (Revised) 12/26	● 1/8	-----	-----	4/1 ○ 1/31
Namie Town	-----	-----	-----	-----	-----	4/1	-----	-----	● 11/27	▲ (Revised) 12/26	-----	-----	3/31 ○ 3/31
Minamisoma City	4/16 ▲ 4/18	-----	-----	11/21	-----	-----	● 8/26	-----	▲ (Revised) 12/26	-----	-----	-----	7/12 ○ 3/31

Note 1: ▲ plan prepared • Decontamination commenced --○ Whole area decontamination completion, Month/Day

Note 2: “(Revised)” indicates months in which a revision was made.

Note 3: Review of Areas under Evacuation Orders

Partial Lifting of Areas under Evacuation Orders

Lifting of evaluation orders

#### Sources:

The Decontamination Information Site of the Ministry of the Environment

<http://josen.env.go.jp/area/index.html>

*TEPCO Fukushima Nuclear Accident: Latest information regarding the Fukushima Nuclear Power Station and Radiation* by the Prime Minister of Japan and His Cabinet

<http://www.kantei.go.jp/saigai/anzen.html>

*Notices regarding Evacuation Orders to Date* by the Ministry of Economy, Trade and Industry

[http://www.meti.go.jp/earthquake/nuclear/hinan\\_history.html](http://www.meti.go.jp/earthquake/nuclear/hinan_history.html)

## **(2) Decontamination in Intensive Contamination Survey Areas**

Based on the “Act on Special Measures”, 104 municipalities in eight prefectures including Fukushima Prefecture (population: approximately 6,900,000 people, area: approximately 24,000 km<sup>2</sup>) were designated as ICSA.

Fukushima Prefecture prepared the “Technical Guidelines for Decontamination Operations” on January 31, 2012 and the “Handbook for Whole Area Decontamination” on March 29, 2012 so that when the municipalities carried out the decontamination they could collaborate regionally and act based on region-wide and unified information.

Furthermore, in response to the discovery of places with a high air dose rate from the surroundings in Kashiwa City, Chiba Prefecture in October 2011, MOE drew up and publicly released “Guidelines on Handling Localized Sites Contaminated by Radioactive Materials” on March 12, 2012. These guidelines summarized efficient methods of discovering localized contaminated sites, the detailed survey methods, and points to be careful about in the handling them.

In the municipalities in the ICSA, the municipalities conduct surveys of the status of contamination of the environment by radioactive materials in the region, and based on the survey results make judgments regarding implementation of decontamination. The municipalities that decided to implement decontamination drew up a decontamination implementation plan stipulating the decontamination policy, implementation areas, implementation techniques, implementing entity, order of priorities for decontamination, implementation timing, etc. after holding consultations with MOE.

There were also many municipalities that drew up a decontamination plan and proceeded with decontamination based on the “Basic Policy for Emergency Response on Decontamination Work” before the “Act on Special Measures” went into force, but most of these municipalities had drawn up a decontamination implementation plan based on the “Act on Special Measures” before enforcement of the Act on January 1, 2012, so they switched to a plan to implement decontamination that was in line with full enforcement of the Act.

Decontamination of the land, facilities, etc. managed by the national government, prefectures, incorporated administrative agencies, and universities is implemented by the managing entities, and decontamination of other housing, etc. is implemented by the municipalities.

Based on the recognition that consensus formation with local residents is important when proceeding with decontamination, Fukushima City increased the involvement of residents starting from the decontamination planning stage; implemented the Countermeasures Committee for Regional Decontamination, etc. comprised of the officers of the Local Government Promotion and Consultation Meeting, Parent-Teacher Associations (PTAs) and the regional city council members, and the Decontamination Implementation Review Meeting comprised of heads of neighborhood associations, etc.; confirmed the flow of rainwater and surface water for each neighborhood association, etc.; and carried out initiatives to examine the decontamination sequence, etc. Furthermore, in Minamisoma City initiatives were seen in which in order to secure TSS the city itself set the selection standards for candidate sites, explained them to the residents, and attempted to gain their agreement, and in Kawauchi Village dosimeters were distributed to all households so that the residents themselves could measure the doses before and after decontamination. In Kashiwa City, Chiba Prefecture, many hours of dialogue were held with the citizens,

and then the decontamination implementation plan was drawn up in March 2012, and it became a plan with strong citizen involvement. For example, it advocated strengthening support for citizens, volunteers, etc. who implement decontamination.

As a result of municipalities close to the residents implementing decontamination, it became easier to obtain the agreement and cooperation of the residents, etc. and decontamination progressed. On the other hand, the extent of the contamination and the population affected by it differed in each municipality, so differences were seen in the extent of the initiatives and the decontamination methods emerged between municipalities, depending on the local government cases in which agreement with the residents, etc. regarding the decontamination scope and decontamination method, etc. did not progress and a decontamination implementation plan could not be drawn up and cases in which it had been decided to prepare a decontamination implementation plan for each municipality.

Originally decontamination in the municipalities began in about April 2011 with the voluntary decontamination that PTAs and neighborhood associations, etc. began in cooperation with municipalities to protect the health of children, when the municipalities that had received requests from residents removed the topsoil of school playgrounds and kindergarten yards of children's facilities such as schools, kindergartens, nursery schools, parks, etc. Subsequently, in response to the establishment of the "Act on Special Measures", each of the municipalities transitioned to doing decontamination based on their decontamination implementation plan. During that period, the municipalities understood the importance of discussions with residents and consensus formation, and in each stage—from drawing up the decontamination implementation plan to selection of the TSS, monitoring, decontamination implementation, management of removed soil, etc., and effects verification—they held repeated dialogue with the residents, and therefore obtained their understanding and cooperation. Naturally, due to differences in the contamination situation and population, the size of the urban areas, etc. in each municipality, the decontamination implementation plan also had different content for each municipality. The decontamination techniques themselves were stipulated in the Decontamination Guidelines, so they never differed greatly but the municipalities resolved the issues while responding to the residents carefully and holding discussions with them, including the extent of the differences in the plans between municipalities.

Regarding the TSS, even if the government selected the candidate sites initially, there was strong opposition from the nearby residents so the plan did not progress. Therefore, the municipalities started by building trust through risk communication, left the decision-making regarding the selection of TSS to the residents, and secured TSS by working together with the residents.

On the other hand, in municipalities where securing TSS within the area was difficult for reasons such as a large number of residents, large urban areas on flat land, etc., it was decided to proceed with the decontamination by locally storing soil in the place such as houses where soil generated.

Regarding the state of progress of decontamination, MOE checks progress with each municipality and posts on its decontamination information site the rate of progress of decontamination for each municipality and the municipalities that have completed whole area decontamination, etc. Furthermore, the amount of removed soil, etc. stored is publicly released on the websites compiling the information, by Fukushima Prefecture within the prefecture and by MOE in other prefectures.

In this way the municipalities played a basic role as the local government, and proceeded with decontamination projects by working together with citizens based on the building of trust through risk communication.

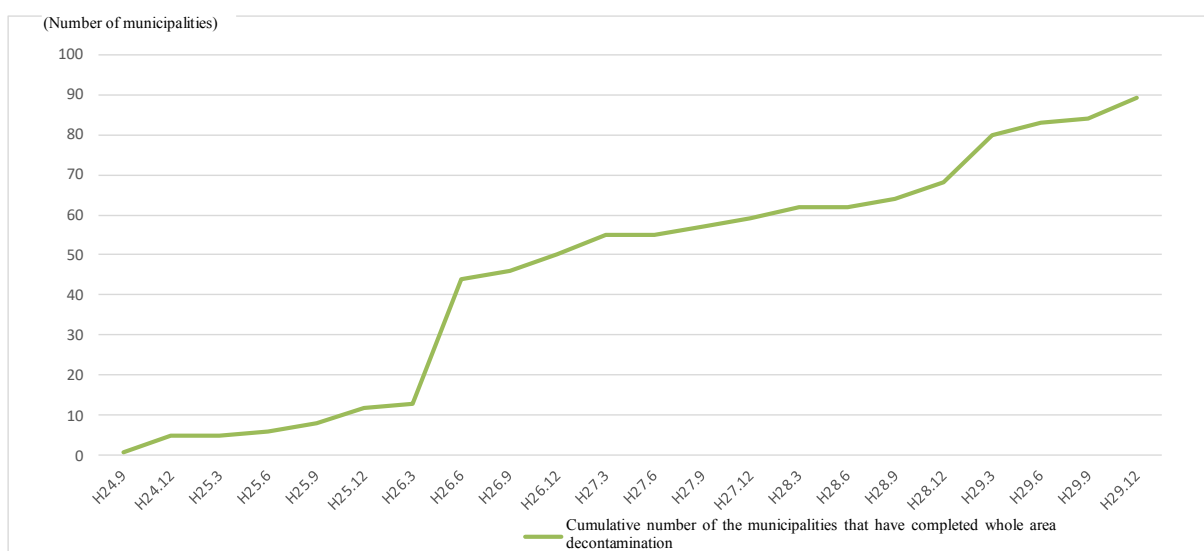

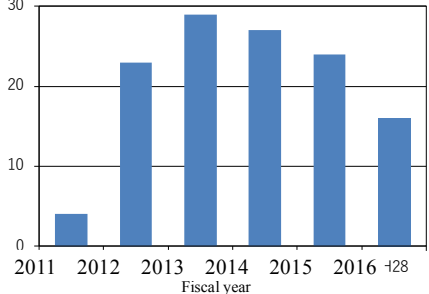
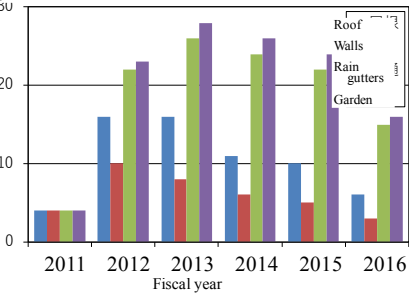


Figure 1-5: Cumulative number of municipalities that have completed whole area decontamination (Intensive Contamination Survey Areas)

Explanation	Decontamination of houses in Intensive Contamination Survey Areas in Fukushima Prefecture
<p>House decontamination of Intensive Contamination Survey Areas (ICSA) within Fukushima Prefecture was commenced in FY2011 and full-scale implementation began from FY2012 (left side of the figure below). Furthermore, the places to be decontaminated when carrying out house decontamination were selected taking into account the findings obtained through trial decontamination, etc. in the municipalities. Most of the municipalities proceeded with decontamination of mainly the gardens and rain gutters (right side of the figure below).</p>	
	<div style="display: flex; justify-content: space-around;"> <div> <p>Number of municipalities</p>  <p>&lt;Number of municipalities implementing house decontamination&gt;</p> </div> <div> <p>Number of municipalities</p>  <p>&lt;Number of municipalities by house decontamination implementation target&gt;</p> </div> </div>
<p>Results of questionnaire survey implemented in FY2016 for 36 municipalities within ICSA in Fukushima Prefecture that drew up a decontamination implementation plan (number of responses: 33 municipalities (response rate: 91%))</p> <p style="text-align: right;">Source: Fukushima Prefectural Centre for Environmental Creation</p>	



Column	“Initiatives to gain the understanding of residents in the decontamination of municipalities, and lessons learned”, Mr. Takahiro Hanzawa, Date City
	<p>In July 2011 along with the unfamiliar word “decontamination” I ended up tackling the reduction of radiation doses. That was the very simple task of removing radioactive materials (currently mostly cesium) from nearby places and taking them far away, to reduce external exposure as much as possible.</p> <p>However, not only were there no precedents, it was not easy getting the residents, who had no knowledge of the radiation protection approach or even any knowledge about radiation, to understand the implementation of rational decontamination. That was also because I realized the difficulty of contamination in places that the residents were actually living, not in an experimental laboratory. I was pressed to respond to the emotions of the residents, the differences in the ways each individual thought about safety and security, and conversely, the way residents sought consistency, and a variety of misunderstandings and demands. The reality was that I could not obtain their understanding or agreement with science and theory alone so the decontamination, which I had expected would be simple, was forced to a standstill.</p> <p>At the time when a response to the radiation disaster caused by the nuclear power station accident in March 2011 was required, it was said that the response to the decontamination, etc. of Date City was comparatively fast. There were several reasons for that and I think it was because of the leadership of the mayor and the fact that the city engaged with the residents at an early stage.</p> <p>In June, Specific Spots Recommended for Evacuation (residences for which the accumulated exposure dose was predicted to exceed 20 mSv/y or higher) were designated in some regions of this city. Prompt reduction of the external exposure due to decontamination was an urgent issue from the perspective of alleviating the health risks of the residents.</p> <p>At a time when there were no laws or guidelines, I used trial-and-error to work on the decontamination. Effects from decontamination were steadily obtained in the decontamination demonstration experiment in a schoolyard that we carried out first, and in the private home decontamination, etc. under the guidance of advisor Shunichi Tanaka (former Chairman of the Nuclear Regulation Authority) and others.</p> <p>I thought that if I explained the effects of decontamination scientifically the residents would also tackle decontamination, so I began briefings starting in July aimed at implementation of the decontamination. However, the decontamination stopped making progress due to the unexpected situation that there was stubborn resistance to the Temporary Storage Sites (TSS) from the residents. “Why do we have to store the radioactive materials temporarily on our land, even though we did nothing wrong?!” “Take the radioactive materials to TEPCO!” “The national government and TEPCO should take responsibility for doing it!” The anger and indignation of the residents in the afflicted areas burst out and the briefings ended in heated disputes day after day.</p> <p>I had to reconsider the briefings, which were centered on verbal scientific explanations. I tenaciously held a series of briefings, introducing innovations such as using models and using familiar examples for illustration, etc. Moreover, I was able to obtain the understanding and cooperation of the residents gradually by accumulating findings from demonstration experiments, etc. to show the residents the</p>

effects of decontamination. As I held the series of briefings, I was made to realize the importance of gaining the residents' understanding of radiation and the correct knowledge of radiation, or in other words radiation protection, rather than appealing to them to create TSS. Having the residents themselves take the first step toward decontamination, rather than pushing decontamination on them, proved to be the fastest way forward.

In October, one area secured a TSS for carrying out decontamination and tackled the decontamination on its own.

This had enormous repercussions and in other areas in which people saw the effects of decontamination with their own eyes the understanding that "OK, if we can find TSS here, then decontamination can be started too" spread. The decontamination of Date City got started in this way. Decontamination centered on the decontamination of living areas accelerated as we secured TSS through initiatives based on working together with the citizens rather than initiatives led by the government.

Source: Journal of Disaster Recovery and Revitalization, *Reconstruction*, No. 6 (Vol.4 No.2), P51-56

#### **1.4.2. Acceleration of Decontamination and Review of the Implementation Plans**

(Decontamination promotion period: From the public release of the Decontamination Promotion Package to the revision of the decontamination implementation plans: October 2012 to December 2013)

##### **(1) Acceleration of Decontamination and Initiatives based on the Experience of Decontamination**

Although a certain degree of progress was seen, for example decontamination in the SDA commenced firstly in Naraha Town from April 2012 and then in other municipalities from July 2012 onwards, it was necessary to further speed up and to take initiatives to eliminate anxiety to achieve the basic policy to “aim to take action on decontamination, etc. of soil, etc. in houses, etc. and gradually transport the removed soil, etc. generated through that process to TSS by the end of March 2014.”

Furthermore, regarding the decontamination carried out by the municipalities, there were cases in which quick responses to the various individual inquiries and requests submitted from the municipalities, etc. to the Fukushima Office for Environmental Restoration newly established in January 2012 (now the Fukushima Regional Environmental Office, the same applies below) were not achieved.

For this reason, on October 23, 2012 in order to further speed up the decontamination and eliminate anxiety MOE compiled and publicly released countermeasures for acceleration of decontamination and elimination of anxiety as the Decontamination Promotion Package. This package recommended as countermeasures for the acceleration of decontamination, regarding the decontamination of the SDA, expansion of outsourcing of negotiation of obtaining residents’ consent to the private sector, securing of decontamination workers from a wide area, creation of specific plans for farmland decontamination on cooperation with the local areas, and strengthening of cooperation with each government ministry and agency, and regarding the decontamination carried out by municipalities it recommended making decisions faster by transferring authority to the Fukushima Office for Environmental Restoration, implementation of payment of subsidies using rough estimates, etc., and comprehensive promotion of decontamination and waste processing. Furthermore, as countermeasures for elimination of anxiety, it recommended measures such as construction of a monitoring structure, disclosure of information about decontamination effects and progress, the strengthening of risk communication about decontamination, etc. and carried out further initiatives to obtain consent and eliminate anxiety, which were issues at that time.

Meanwhile, regarding decontamination of the SDA, on January 4, 2013 media were reporting that there was widespread “negligent decontamination” on some sites, where decontamination was not being carried out properly, etc. In response to this, MOE established the Headquarters for Promoting Proper Decontamination, and implemented a survey of the 15 cases that were described as improper cases. The results were that in many cases it could not be determined that there was improper decontamination, but in order to eliminate doubts about the decontamination projects on January 18, 2013 the ministry publicly announced the Program for Proper Decontamination, comprised of three components - “thorough enforcement of the construction responsibility of the business operators” including the strengthening of no-notice inspections, etc., “construction of a mechanism for wide-ranging management” including effective monitoring utilizing third parties, etc., and “strengthening of the structures of MOE” including the establishment of a dial number 110 hotline to report improper decontamination, etc. - and endeavored to eradicate improper decontamination and recover the trust of the residents.

Regarding the effects of the implemented decontamination, MOE compiled the effects of the decontamination projects implemented mainly in FY2011 by the national government and local governments in Fukushima Prefecture and on January 18, 2013 publicly released a report entitled “Effects of Decontamination Techniques in Decontamination Projects Implemented to Date by the National Government and Local Governments”.

Furthermore, taking into account the findings to that point, MOE revised and expanded guidelines, taking into account the experience of decontamination, drawing up the second edition of the “Guidelines for Waste” in March 2013 and in addition drawing up the second edition of the “Decontamination Guidelines” in May 2013, etc.

Moreover, it accumulated good practices, etc. using advanced initiatives, so from the perspective of encouraging the streamlining of decontamination and the understanding of residents, on May 17, 2013 the Fukushima Office for Environmental Restoration compiled the “Collection of Best Practices in Decontamination” and distributed it to decontamination contractors. This collection of cases gathers together not only technological good practices, namely survey measurement technologies, decontamination technologies, and decontamination project management techniques, but also good practices regarding the nature of the relationship with residents, etc., namely encouraging the understanding of local residents, risk communication, etc., and it contains seven cases of each type.

On June 29, 2013 the whole area decontamination project for the SDA was completed in Tamura City, which had been one of the first among the SDA to commence a whole area decontamination project.

## **(2) Overall Check on Progress of Decontamination and Review of Decontamination Implementation Plans in Special Decontamination Areas**

As the decontamination projects progress through a variety of initiatives, the basic policy of the “Act on Special Measures” stipulated action on decontamination, etc. by the end of March 2014, so in order to confirm the state of progress MOE implemented a comprehensive check of the state of progress of decontamination in the SDA and the ICSA designated based on the “Act on Special Measures”, and on September 10, 2013 publicly released the “Comprehensive Check of the State of Progress of Decontamination”.

The comprehensive check noted that differences in progress occurred in each municipality because securing the TSS and obtaining consent took time and because a variety of circumstances arose including natural impacts such as snowfall, etc., so it was decided to revise the goal set before implementation of the decontamination projects of aiming to uniformly decontaminate and transport to the TSS by the end of March 2014, and to promote decontamination tailored to the situation of each individual municipality and coordinated with the moves toward reconstruction. Due to this, plans more closely matched to the actual circumstances were drawn up taking into account the situation at the time, that the state of progress varied depending on the municipality.

The MOE proceeded with a review of the decontamination implementation plans taking into account the comprehensive check and in December 2013 publicly released the Review of the Decontamination Implementation Plans in Special Areas, and carried out a revision of the decontamination implementation

plans of Iitate Village, Minamisoma City, Katsurao Village, Kawamata Town, Namie Town, and Tomioka Town.

Note that For Accelerating the Reconstruction of Fukushima From the Nuclear Disaster was decided by the Cabinet, and measures, etc. for the acceleration and facilitation of decontamination were presented on December 20, 2013.

Furthermore, on December 26, 2013 MOE publicly released Effects (on Air Dose Rate) of Decontamination in Decontamination Projects Implemented by the National Government and Local Governments, which compiled the results of decontamination projects by the national government and municipalities regarding the extent to which the air dose rate had been reduced by decontamination. Furthermore, the ministry publicly released the Evaluation of the Goals of Basic Policy (Draft) which carried out an evaluation of the goals for actions such as decontamination, etc. in the basic policy of the “Act on Special Measures”. The results of the evaluation were that the additional annual exposure dose of the general public had declined approximately 64% over two years overall, and the additional annual exposure dose of children had declined approximately 65% over two years overall, etc. so the goals had been achieved.

Subsequently, the revision of For Accelerating the Reconstruction of Fukushima From the Nuclear Disaster (June 12, 2015, Nuclear Emergency Response Headquarters) stated “for the Preparation Areas for Lift of Evacuation Order and Habitation Restricted Areas, after taking into account the reconstruction plan, etc. of each municipality the evacuation orders will be lifted by six years after the accident (March 2017) at the latest and, in addition to sufficient implementation of decontamination, efforts will also be made to accelerate the remediation of infrastructure and services closely linked to daily life so that the residents are able to return” and presented a policy of finishing whole area decontamination of the Preparation Areas for Lifting Evacuation Order and the Habitation Restricted Areas by the end of March 2017.

### **1.4.3. Initiatives for the Completion of Whole Area Decontamination and Lifting of the Evacuation Orders**

(Decontamination acceleration period: After the revision of the decontamination implementation plans: January 2014 onwards)

#### **(1) Initiatives and Supplemental for Completion of Whole Area Decontamination**

Based on the aforementioned measures for review and acceleration of the plans for decontamination, decontamination gradually made progress. Against the background of the progress of these plans, the “Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake in the Reconstruction and Revitalization Period (March 11, 2016 Cabinet decision)” also stated that in all of the regions subject to implementation of decontamination under the direct jurisdiction of the national government or by municipalities, whole area decontamination based on the decontamination implementation plans shall be completed by March 2017.

Of the whole area decontamination stipulated in the decontamination implementation plans, regarding the decontamination under the direct jurisdiction of the national government in the SDA, whole area decontamination was completed in Tamura City, Naraha Town, Kawauchi Village, and Okuma Town by March 2014, in Katsurao Village and Kawamata Town by December 2015, in Futaba Town by March 2016, in Iitate Village by December 2016, in Tomioka Town by January 2017, and in Namie Town and Minamisoma City by the end of March 2017, so it was completed in all 11 municipalities by the end of March 2017.

Decontamination by municipalities in the ICSA was completed in 80 municipalities by the end of March 2017. In 12 municipalities the plan period of the decontamination implementation plan was extended for decontamination of some places including roads and forests, etc. the whole area decontamination stipulated in the decontamination implementation plans was completed in all of the 92 municipalities by the end of March 2018.

After the completion of the whole area decontamination, detailed supplemental monitoring will be carried out for the maintenance and confirmation of effects and in the case that places in which the decontamination effects have not been maintained are confirmed supplemental decontamination will be implemented based on the situation in each individual site. On December 21, 2015 MOE publicly released the “Approach to Supplemental Decontamination” and it is implementing supplemental decontamination.

#### **(2) Verification of the Decontamination Projects and Evaluation of the Status of Enforcement of the “Act on Special Measures”**

In municipalities inside the SDA, in order to work toward the lifting of the evacuation orders, decontamination verification committees comprised of knowledgeable persons were established to verify decontamination projects implemented by MOE, and on November 26, 2013 verification was commenced in Naraha Town. The decontamination verification committees were commenced one by one in Kawamata Town, Namie Town, Tomioka Town, and Iitate Village, and reports and recommendations were published. Moreover, in all 11 municipalities MOE gave explanations of the decontamination situation in the assemblies of the municipalities and residents’ gatherings, etc.

Furthermore, the IAEA carried out an international supplemental mission in October 2013, with the main objective of evaluating the progress of the ongoing environmental remediation activities achieved since the previous mission implemented in October 2011, and published the results on January 23, 2014. Furthermore, on August 31, 2015 the “Director General’s Report on TEPCO Fukushima Daiichi Accident” was publicly released.

While the review of Areas under Evacuation Orders and the progress of decontamination, a new stage was entered moving toward realization of early return of residents, anxiety about health effects, etc. due to radiation continued to exist, so on February 18, 2014 the Reconstruction Agency and MOE took the lead in cooperation with the related government ministries and agencies to compile the “Package of Measures for Radiation Risk Communication for Return”. Furthermore, MOE prepared the “Unified Basic Materials regarding Health Effects, etc. Caused by Radiation”.

In the municipalities of the ICSA, three years had passed since the earthquake disaster, and the air dose rate had fallen thanks to the progress of decontamination, physical decay and weathering effects, and the goals as of the end of August 2013 in the basic policy of the “Act on Special Measures” (see Chapter 3) had been achieved. Furthermore, the accumulation of data regarding personal exposure dose progressed and certain findings were obtained. However, due to the perception that the air dose rate must be reduced to 0.23 $\mu$ Sv/h immediately after the decontamination, there were situations in which further decontamination was sought in decontaminated areas, etc. On the other hand, when implementing the decontamination, it was necessary to communicate the findings on the impact of radiation, etc. obtained at that time to the residents accurately and in an understandable manner to deepen the trust and understanding of the regions, while adopting the fastest and most effective techniques possible based on the air dose rate and the actual usage of the land, etc.<sup>23</sup>

Under situation, the national government (MOE and the Reconstruction Agency) and four cities (Fukushima City, Koriyama City, Soma City, and Date City) worked together to hold a workshop that received advice from knowledgeable persons, summarized the findings to date, and carried out examinations of the best approach to decontamination and other radiation protection, etc. going forward. On August 1, 2014 the workshop presented an interim report on the initiatives of the national government and the four cities for the acceleration of decontamination and reconstruction, and prepared a fact book summarizing the findings.<sup>24</sup>

The effects and status of the decontamination have been reported in the Investigative Committee on Remediation and in the “Investigative Committee on the Status of Enforcement of the Act on Special Measures”.

In particular, on September 30, 2015 the “Investigative Committee on the Status of Enforcement of the Act on Special Measures” compiled and publicly released the report “Summary of the Status of Enforcement of the Act on Special Measures concerning the Handling of Environment Pollution by

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<sup>23</sup> Reconstruction Agency, Ministry of the Environment, Fukushima City, Koriyama City, Soma City, and Date City “Interim Report on the Initiatives of the National Government and Four Cities for Acceleration of Decontamination and Reconstruction” (August 1, 2014)

<sup>24</sup> Reconstruction Agency, Ministry of the Environment, Fukushima City, Koriyama City, Soma City, and Date City “Meeting to Exchange Views with Knowledgeable Persons regarding Decontamination – Thinking about Future Approaches based on the Previous Findings of the National Government and four cities – Fact book” (August 1, 2014)

Radioactive Materials”. The evaluation of this summary regarding initiatives to date based on the “Act on Special Measures” was that due to factors such as a lack of technical findings and practical experience, a lack of education about radiation, and the time taken to build relationships of trust with the regions, etc. partial delays in the initial response and current progress have been seen, but there has been an accumulation of findings and know-how, etc. in the national government and the local governments, the implementing entities for the initiatives, and a certain degree of progress has been made.

### **(3) Effects of the Decontamination and the Lifting of the Evacuation Orders**

According to the results of the supplemental monitoring after implementation of decontamination in the SDA, the rate of decline of the air dose rate one meter above the ground surface compared to before the decontamination was 73% for residential area, 68% for farmland, 61% for roads, and 46% for forests, for an overall average of 65% (the average of the measurement results at the approximately 472,000 locations where supplemental monitoring was implemented by June 2017).

Furthermore, the percentage of the decline in the air dose rate 67 months after the accident (as of October 15, 2016) with respect to seven months after the accident (as of November 5, 2011) was computed to be 71% so it was confirmed that the overall trend was a faster decline than physical decay alone.

Regarding the Areas under Evacuation Orders, the evacuation orders were sequentially lifted from regions in which it had been confirmed that the requirements for lifting evacuation orders in the Basic Concept and Issues to be Challenged for Rearranging the Restricted Areas and Areas to which Evacuation Orders Have been Issued where Step 2 has been Completed and the revision of For Accelerating the Reconstruction of Fukushima From the Nuclear Disaster had been satisfied, and on April 1, 2017 in the nine municipalities other than Okuma Town and Futaba Town the evacuation orders of the Habitation Restricted Areas and the Preparation Areas for Lift of Evacuation Order were lifted except in Areas where Returning is Difficult.

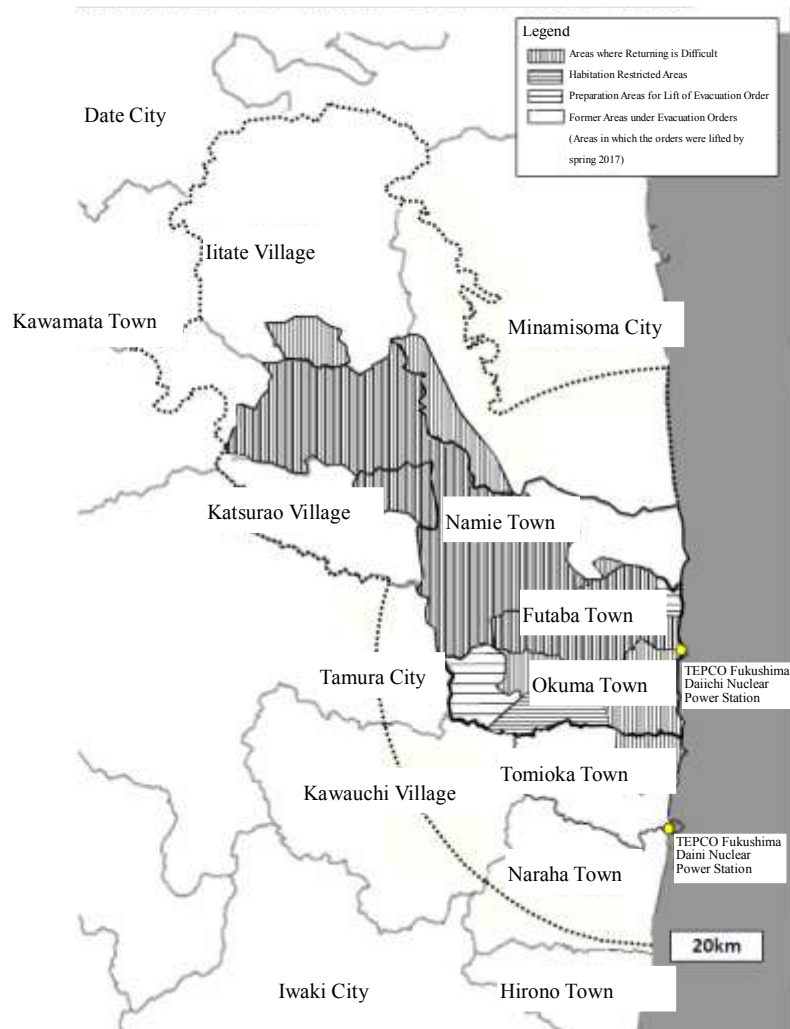
The number of evacuees in all of Fukushima Prefecture was approximately 165,000 people at the peak time in May 2012 but in May 2015 it was approximately 114,000 people and in May 2017 it had declined to approximately 60,000 people.<sup>25</sup>

Regarding the Areas where Returning is Difficult, on August 31, 2016 the NERHQ published the Approach on the Handling of Areas where Returning is Difficult, established reconstruction centers that will aim to lift the evacuation orders and make residence possible in about five years, and decided on a policy of carrying out decontamination and infrastructure development in an integrated manner. It was decided that the national government would bear the decontamination costs of Areas where Returning is Difficult, and on May 12, 2017 the “Act on Partial Revision of the Act on Special Measures for the Reconstruction and Revitalization of Fukushima” was established, thereby developing laws related to reconstruction and decontamination in Areas where Returning is Difficult.

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<sup>25</sup> Fukushima Prefecture Disaster Countermeasures Headquarters monthly final report “Bulletin on Damage Caused by the 2011 Earthquake off the Pacific coast of Tohoku”





**Figure 1-6 Map of Areas under Evacuation Orders (as of April 1, 2017)**