

CURRENT STATUS OF MUNICIPAL PLANNING ACTIVITIES FOR THE REVITALIZATION OF FUKUSHIMA PREFECTURE: SPECIAL FOCUS ON NON-STATUTORY MUNICIPAL DECONTAMINATION PLANS

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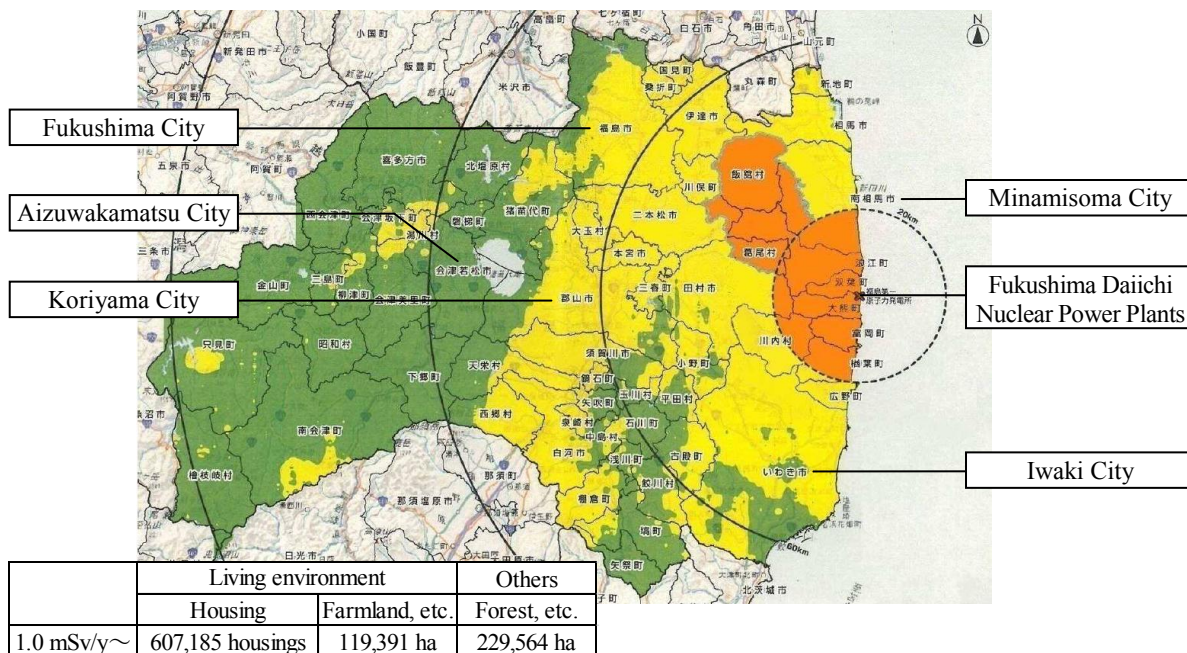
The Great East Japan Earthquake caused the Fukushima Daiichi nuclear disaster, and many places in Fukushima Prefecture were greatly contaminated by a large amount of radioactive materials. The revitalization of Fukushima must start with the decontamination of areas exposed to radioactive materials. This paper discusses the current status of planning activities by the 59 municipalities in Fukushima Prefecture and the contents of non-statutory decontamination plans. By clearly reporting the initial planning efforts, for decontamination in particular, this paper hopes to push forward the revitalization of Fukushima Prefecture, a process which will last at least several decades.

Key Words: Decontamination Plan, Recovery Plan, Reconstruction Plan,
Radioactive Contamination, Fukushima Daiichi Nuclear Disaster

INTRODUCTION

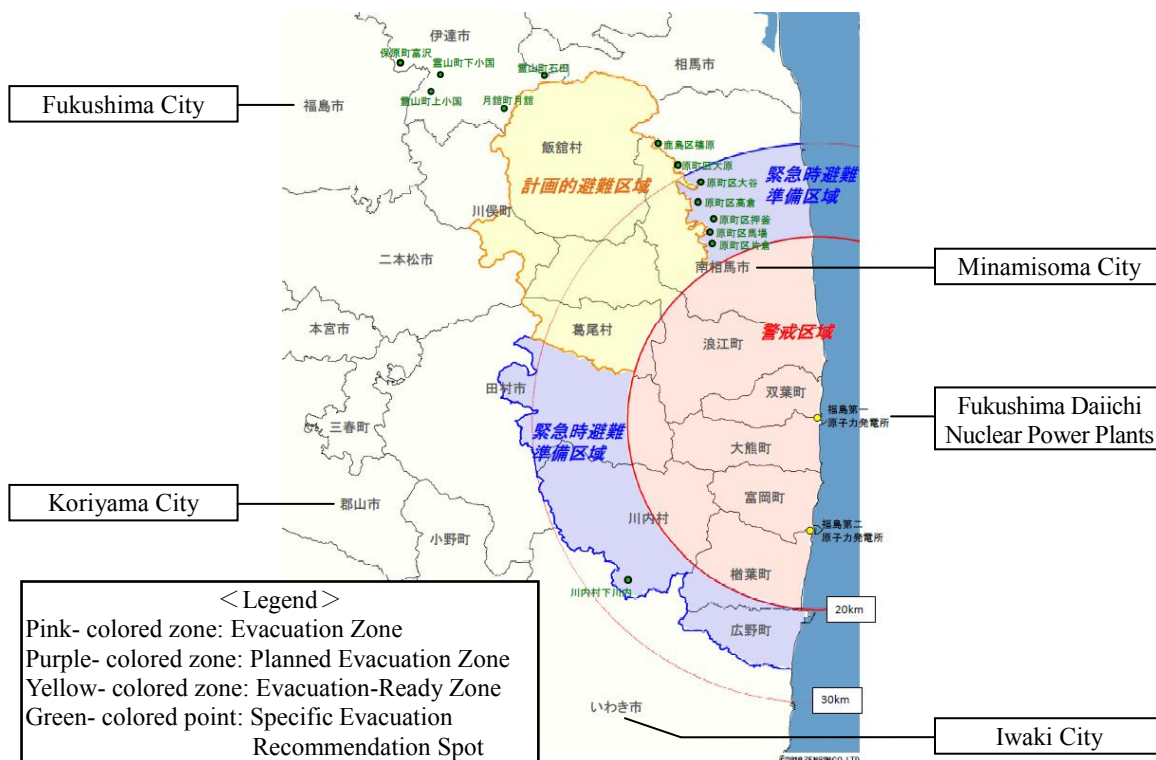
The Great East Japan Earthquake on March 11, 2011 caused the Fukushima Daiichi nuclear disaster, and water, air and land in many places of Fukushima Prefecture were greatly contaminated by a large amount of radioactive materials (Figure 1). Since then, safety and security, the most basic values of our living environment, have been lost to a large extent in Fukushima, and people have been obliged to evacuate their homes or lead their daily lives under the fear of effects of colorless, transparent, tasteless and odorless radioactive materials (Figure 2). Although it is very difficult to envision the revitalization of Fukushima under such conditions, it is absolutely essential to decontaminate areas exposed to radioactive materials in order to revitalize Fukushima.

To cope with radioactive contamination, the Act on Special Measures Concerning Radioactive Material Management was passed on August 30, 2011, and the Basic Policy based on the Act was formulated on November 11, 2011. In the Basic Policy, which was formulated by taking into consideration the principles of the 2007 Recommendations of the International Commission on Radiological Protection (ICRP), the specific goals were set as follows: 1) in the areas where the additional exposure dose excluding natural background exposure dose and medical exposure dose is



Legend: Orange- colored zone: Evacuation Zone or Planned Evacuation Zone
 Yellow- colored zone: Zone of 1 mSv/y or more
 Source: Fukushima Prefecture, *The Revitalization Plan of Fukushima Prefecture (First Draft)*, 2011. (Some information has been added to the original map.)

Figure 1. Zones where the estimated amount of radiation exposure is 1 mSv/y or more



Note : The Evacuation-Ready Zone was lifted on September 30, 2011.
 Source: Ministry of Economy, Trade and Industry, *A Map of Areas Zoned as Evacuation Zone, Planned Evacuation Zone, Evacuation-Ready Zone or Specific Evacuation Recommendation Spot (before the lift of the Evacuation-Ready Zone)*, 2011. (Some information has been added to the original map.)

Figure 2. Evacuation zones and spots

20 mSv/y or more, that is, in the areas designated as the Evacuation Zone¹ and the Planned Evacuation Zone,² reducing the range of the areas stepwise and rapidly, and 2) in the areas where the additional exposure dose is less than 20 mSv/y, a) reducing the additional exposure dose to less than 1 mSv/y longitudinally, b) reducing estimated annual exposure for the general public by 50% and for children by 60% compared with the end of August 2011³ by the end of August 2013.

In the Act that is scheduled to be fully enforced on January 1, 2012, the above-mentioned goals are legally intended to be achieved through two kinds of plans: (1) the Special District Decontamination Plan for areas designated as the Evacuation Zone and the Planned Evacuation Zone that is formulated by the Minister of Environment, and (2) the Decontamination Plan for areas where additional exposure dose is 1 mSv/y (0.23 μ Sv/h) or more that is formulated by governors or mayors of municipalities. However, it is widely known that several municipalities have formulated non-statutory decontamination plans⁴ prior to the enforcement of the legal framework by the Act,⁵ and they have tried to decontaminate schools, school roads, or neighborhood parks in collaboration with residents in the middle of difficulties.



Photo 1. Decontamination work at an elementary school (Fukushima City, June 2011).

PURPOSE AND METHOD

This paper gives an overview of the current status of planning activities about decontamination, disaster recovery, and reconstruction by the 59 municipalities in Fukushima Prefecture and the contents of non-statutory decontamination plans which are not based on the Act. The analysis and results are based on interviews with the persons in charge in each municipality, field surveys and Web searches for the period from October to November 2011. By clearly reporting the initial planning efforts, for decontamination in particular, this paper hopes to push forward the revitalization of Fukushima Prefecture, a process that will last at least several decades.

DECONTAMINATION PLANS, RECOVERY PLANS, AND RECONSTRUCTION PLANS

Table 1 shows the current status of planning activities by the 59 municipalities in Fukushima Prefecture. Findings are as follows:

1. Current status of the formulation of decontamination plans, disaster recovery plans, reconstruction plans varies according to the existence or the kind of evacuation zonings. Many municipalities in

Table 1. Current status of municipal planning activities in Fukushima Prefecture

Municipalities	Area (km ²)	Population (a)		Evacuation Zoning or Spot (b) 【◆: Corresponding】					Plan (c) 【●: Formulated, ○: Formulating, △: Intending to formulate, ×: No intention to formulate】				New address of town hall	
		March 1, 2011	September 1, 2011	EZ	PEZ	FERZ	SERS	NZOS	DP	DRP		RP		
										G-DRP	DRP-R			
Fukushima Prefecture	13,782.76	2,024,401	1,991,506	—										
Kenpoku Region	1,753.42	495,867	489,977	—										
Fukushima City	767.74	291,992	288,406	—	—	—	—	◆	●	×	—	○	—	
Nihonmatsu City	344.65	59,665	58,787	—	—	—	—	◆	●	×	—	●○	—	
Date City	265.10	65,749	64,981	—	—	—	◆	◆	●	×	—	○	—	
Motomiya City	87.94	31,507	31,266	—	—	—	—	◆	○	×	—	○	—	
Koori Town	42.97	12,784	12,662	—	—	—	—	◆	●	×	—	×	—	
Kunimi Town	37.90	10,029	9,985	—	—	—	—	◆	○	×	—	○	—	
Kawamata Town	127.66	15,505	15,244	—	◆	—	—	◆	●	×	—	○	—	
Otama Village	79.46	8,636	8,646	—	—	—	—	◆	●	×	—	×	—	
Kentyu Region	2,406.29	551,169	543,304	—										
Koriyama City	757.06	338,882	333,279	—	—	—	—	◆	○	×	—	○	—	
Sukagawa City	279.55	79,109	78,298	—	—	—	—	◆	●	×	—	●○	—	
Tamura City	458.30	40,234	39,637	◆	—	◆	—	◆	●	×	●	○	—	
Kagamiishi Town	31.25	12,811	12,711	—	—	—	—	◆	△	×	—	○	—	
Ten-ei Village	225.56	6,247	6,150	—	—	—	—	◆	○	×	—	×	—	
Ishikawa Town	115.71	17,717	17,612	—	—	—	—	◆	△	×	—	△	—	
Tamagawa Village	46.56	7,231	7,160	—	—	—	—	◆	△	×	—	△	—	
Hirata Village	93.53	6,888	6,809	—	—	—	—	◆	○	×	—	×	—	
Asakawa Town	37.43	6,839	6,814	—	—	—	—	◆	△	×	—	×	—	
Furutono Town	163.47	5,981	5,885	—	—	—	—	◆	△	×	—	△	—	
Miharu Town	72.76	18,089	17,935	—	—	—	—	◆	○	×	—	×	—	
Ono Town	125.11	11,141	11,014	—	—	—	—	◆	○	×	—	×	—	
Kennan Region	1,233.24	149,694	148,633	—										
Shirakawa City	305.30	64,602	64,212	—	—	—	—	◆	○	×	—	○	—	
Nishigo Village	192.32	19,729	19,692	—	—	—	—	◆	○	×	—	○	—	
Izumisaki Village	35.40	6,771	6,690	—	—	—	—	◆	△	×	—	×	—	
Nakajima Village	18.91	5,121	5,110	—	—	—	—	◆	△	×	—	×	—	
Yabuki Town	60.37	18,365	18,143	—	—	—	—	◆	×	×	—	△	—	
Tanakura Town	159.82	15,011	14,883	—	—	—	—	◆	○	×	—	△	—	
Yamatsuri Town	118.22	6,318	6,251	—	—	—	—	◆	×	×	—	×	—	
Hanawa Town	211.60	9,811	9,734	—	—	—	—	◆	△	×	—	×	—	
Samekawa Village	131.30	3,966	3,918	—	—	—	—	◆	○	×	—	○	—	
Aizu Region	2,802.68	238,422	237,266	—										
Aizuwakamatsu City	383.03	125,872	125,505	—	—	—	—	◆	×	×	—	○	—	
Kitakata City	554.67	52,180	51,784	—	—	—	—	◆	×	×	—	×	—	
Kitashiobara Village	233.94	3,193	3,147	—	—	—	—	◆	×	×	—	×	—	
Nishiaizu Town	298.13	7,283	7,216	—	—	—	—	◆	×	×	—	×	—	
Bandai Town	59.69	3,734	3,744	—	—	—	—	◆	×	×	—	×	—	
Inawashiro Town	395.00	15,734	15,698	—	—	—	—	◆	○	×	—	×	—	
Aizubange Town	91.65	17,266	17,176	—	—	—	—	◆	△	×	—	×	—	
Yukawa Village	16.36	3,343	3,302	—	—	—	—	◆	△	×	—	×	—	
Yanaizu Town	176.07	3,986	3,920	—	—	—	—	◆	×	×	—	×	—	
Mishima Town	90.83	1,907	1,883	—	—	—	—	◆	×	×	—	×	—	
Kaneyama Town	293.97	2,437	2,408	—	—	—	—	◆	×	×	—	×	—	
Syowa Village	209.34	1,487	1,483	—	—	—	—	◆	×	×	—	×	—	
Minamiaizu Region	2,618.01	52,324	51,863	—										
Aizumisato Town	276.37	22,612	22,430	—	—	—	—	◆	△	×	—	×	—	
Shimogo Town	317.09	6,413	6,353	—	—	—	—	◆	×	×	—	×	—	
Hinoemata Village	390.50	630	630	—	—	—	—	◆	×	×	—	×	—	
Tadami Town	747.53	4,896	4,850	—	—	—	—	◆	×	×	—	×	—	
Minamiaizu Town	886.52	17,773	17,600	—	—	—	—	◆	×	×	—	×	—	
Soso Region	1,737.77	195,462	185,806	—										
Soma City	197.67	37,721	36,636	—	—	—	—	◆	●	×	—	●	—	
Minamisoma City	398.50	70,752	66,687	◆	◆	◆	◆	◆	●	×	●	●○	—	
Hirono Town	58.39	5,386	5,166	—	—	—	—	—	○	—	—	○	Iwaki City	
Naraha Town	103.45	7,676	7,372	◆	—	◆	—	—	△	×	●	○	Aizumisato Town	
Tomioaka Town	68.47	15,959	14,852	◆	—	—	—	—	×	×	—	○	Koriyama City	
Kawauchi Village	197.38	2,819	2,695	◆	—	◆	◆	—	●	×	●	●	Koriyama City	
Okuma Town	78.70	11,570	11,054	◆	—	—	—	—	×	×	—	△	Aizuwakamatsu City	
Futaba Town	51.40	6,891	6,436	◆	—	—	—	—	×	×	—	△	Kazo City (Saitama Pref.)	
Namie Town	223.10	20,854	19,485	◆	◆	—	—	—	×	×	—	○	Nihonmatsu City	
Katsurao Village	84.23	1,524	1,483	◆	◆	—	—	—	×	×	—	○	Miharu Town	
Shinchi Town	46.35	8,178	7,956	—	—	—	—	—	○	×	—	●○	—	
Iitate Village	230.13	6,132	5,984	—	◆	—	—	—	●	×	—	○	Fukushima City	
Iwaki Region	1,231.35	341,463	334,657	—										
Iwaki City	1,231.35	341,463	334,657	—	—	—	—	◆	△	●	—	●○	—	

(a) The source is the basic resident registers.

(b) EZ: Evacuation Zone, PEZ: Planned Evacuation Zone, FERZ: Former Evacuation-Ready Zone, SERS: Specific Evacuation Recommendation Spot, NZOS: No Zoning or Spot.

(c) DP: Decontamination Plan, DRP: Disaster Recovery Plan, G-DRP: General DRP, DRP-R: DRP required as a necessary precondition to lift Evacuation-Ready Zones, RP: Reconstruction Plan.

Fukushima Hamadori, composed of Soso Region and Iwaki Region which were designated as evacuation zones over a wide area, have formulated or are formulating reconstruction plans rather than decontamination plans. This is partly because the national government is in charge of the decontamination of areas inside the Evacuation Zone and the Planned Evacuation Zone in these municipalities. They have established visions toward revitalization in their reconstruction plans although their long term future is still uncertain. On the other hand, many municipalities in Fukushima Nakadori, composed of Kenpoku Region, Kentyu Region and Kennan Region which were scarcely designated as evacuation zones or spots in spite of relatively high air radiation dose rate, have formulated or are formulating decontamination plans prior to reconstruction plans. This is due to their judgment that they first have to address to decontamination work to achieve their revitalization. Lastly, most municipalities in Fukushima Aizu, composed of Aizu Region and Minamiaizu Region which were scarcely damaged directly by the earthquake and radioactive contamination, have not formulated or are not formulating any plans.

2. As for the decontamination plans, 12 municipalities have formulated, 14 municipalities are formulating, and 13 municipalities intend to formulate one. Six of 12 municipalities that have formulated a plan were designated as evacuation zones or spots. Iitate Village, designated as the Planned Evacuation Zone throughout the village, has formulated an original plan although the national government is in charge of the decontamination of areas inside its zone. Motomiya City, Kunimi Town, Miharu Town and others that are formulating a plan intend to formulate it as a statutory one based on the Act, and Minamisoma City is revising its non-statutory plan into a statutory one.

3. As for the disaster recovery plans, there are two kinds of plans in Fukushima Prefecture. One is the disaster recovery plan specific to the Fukushima Daiichi nuclear disaster which was required as a necessary precondition to lift the Evacuation-Ready Zone on September 30, 2011,⁶ and it was formulated in 5 municipalities where the Evacuation-Ready Zone was designated. The other is the general disaster recovery plan, and it was formulated only in Iwaki City. This is partly because damage by the earthquake or tsunami in Fukushima Prefecture was not so significant there. Many municipalities that have formulated or are formulating a reconstruction plan incorporate recovery plan elements into it.

4. As for the reconstruction plans, 7 municipalities have formulated, 18 municipalities are formulating, and 7 municipalities intend to formulate one. Municipalities which have formulated a “reconstruction vision,” such as Nihonmatsu City, Sukagawa City, Minamisoma City, Shinchi Town and Iwaki City, are formulating a “reconstruction plan” on the basis of their vision, and Soma City which formulated a reconstruction plan is in the process of revising it.

5. Koori Town, Miharu Town and others are revising a comprehensive plan toward revitalization although they do not intend to formulate the above plans. In addition, some municipalities such as Ono Town are revising their disaster prevention plans.

CONTENTS OF DECONTAMINATION PLANS

Table 2 shows the contents of non-statutory decontamination plans formulated in 12 municipalities which are not based on the Act. The main points are as follows:

1. All municipal decontamination plans cover all administrative areas regardless of their designation as evacuation zones or spots. However, Kawamata Town where the Planned Evacuation Zone is designated, for instance, stipulates that parts of its zone will be incorporated as soon as the national government which is in charge of decontamination of areas inside its zone formulates the policy.

2. While the plan period is not set in municipalities that formulated the “decontamination policy,” many such municipalities specify the first 2 or 3 years as the focus period to decontaminate the living environment of pregnant women, babies, children and others sensitive to radiation effects. Although several municipalities specify their decontamination period for farmland or forests, most municipalities intend to make concrete plans for decontamination work of farmland, forests, rivers, etc. after the way and the standard to decontaminate them have been established by the national government, as the scientific and technical methods for decontaminating such areas have not yet been fully established and the affected area is extremely vast.

3. While municipalities that formulated a plan before the Nuclear Emergency Response Headquarters

Table 2. Contents of municipal non-statutory decontamination plan (1/4)

Municipalities		Minamisoma City	Soma City	Sukagawa City	Kawamata Town
Basic Data	Population (a)	Before 70,752 After 66,687	37,721 36,636	79,109 78,298	15,505 15,244
	Radiation Dose (b)	Before 0.05 After 0.29, 1.56*, 1.80	— 0.18, 0.19, 0.30, 1.24	— 0.22, 0.91, 0.94	— 0.53, 1.56*
	Evacuation Spot (c)	EZ PEZ	— —	— —	— —
	Zoning or Spot (c)	FERZ SERS NZOS	— — —	— — —	— — —
	Title	Radioactive Materials Decontamination Policy in Minamisoma City	Radioactive Materials Decontamination Policy	Radioactive Materials Decontamination Policy in Sukagawa City	Radioactive Materials Decontamination Plan in Kawamata Town
	Date	July 2011	August 2011	August 2011	August 2011
	Area	Throughout the city	Throughout the city	Throughout the city	Throughout the town
	Period	—	—	—	●For the time being, from September 1, 2011. ●As for school roads, neighborhood parks and the like, from September 2011 to February 2012.
Goals	●In the 2011 fiscal year, reducing radiation dose of decontaminated facilities by 50%. ●In the long term, air dose rate is less than 1mSv/y.	●Reducing radiation dose of decontaminated facilities by 50%. ●In the long term, reducing air dose rate to almost pre-disaster rate.	●Decontamination of all land.	●Reducing radiation dose by 50% compared with the current level. ●In the long term, reducing exposure dose to 0.3 μSv/h.	
Implementer (Role Sharing) (c)	●Although each administrator of each facility is basically responsible for decontamination work, it is promoted in collaboration with volunteers and community groups.	●Although each administrator of each facility is basically responsible for decontamination work, it is promoted in collaboration with volunteers and community groups.	●For the time being, decontamination work is promoted in collaboration with community groups in each district.	●Decontamination work is promoted in collaboration with community groups in each district.	
Order of Priority (c)	●Areas of FERZ, SERZ and NZOS where residents live at present are prioritized. Areas of EZ and PEZ are followed in accordance with the national policy. ●The order of priority of public facilities: 1) Facilities for children (kindergartens, nurseries, schools, etc.) 2) Facilities open to the public (libraries, etc.) 3) Others ●Decontamination plan for farmland, forests, rivers, etc. will be added to this plan as soon as the national government sets its policy for such decontamination.	●Areas where air dose rate is high are prioritized. ●The order of priority of public facilities: 1) Facilities for children (kindergartens, nurseries, schools, etc.) 2) Facilities open to the public (community centers, etc.) 3) Others ●Decontamination plan for farmland, forests, rivers, etc. will be added to this plan as soon as the national government sets its policy for such decontamination.	●The order of priority: 1) Removal of surface soil of school playgrounds and the like, 2) Washing school buildings and the like, 3) Decontamination of "hot spots" on school roads, 4) Decontamination of neighborhood parks, children's playgrounds and public facilities, 5) Decontamination of houses, 6) Decontamination of lots. ●Areas where radiation dose is high are prioritized. ●A demonstration test will be implemented in the decontamination model district. ●Decontamination of farmland and forests will be implemented with technical assistance from the national government, the prefecture and others.	●Decontamination work is immediately implemented in the NZOS where residents live at present. ●Decontamination work of farmland and forests is implemented on the basis of findings through the demonstration test by the national government, the prefecture and others.	
Temporary Storage Sites of Contaminated Soil (c)	●Basically, in each lot (described in "Manual of Radioactive Materials Decontamination" formulated in July 2011).	●Basically, in each lot (described in "Manual of Radioactive Materials Decontamination" formulated in August 2011).	●For the time being, temporary storage sites are secured in some public sites.	●Contaminated soil is stored in each implementer's site until the national government and the prefecture formulate the policy.	
Notes (c)	—	—	—	●It is intended that the plan about PEZ will be incorporated as soon as the national government formulates the policy.	

(a) "Before" is the population on March 1, 2011, and "After" is the population on September 1, 2011. Both are based on the basic resident registers.
 (b) "Before" is the result of measurement on February 16, 2010 based on "A list of results of measurement of environmental radioactivity level in Fukushima Prefecture in the 2010 fiscal year" by Fukushima Prefecture. "After" is the result of measurement on August 31, 2011 based on "Provisional results of measurement of environmental radioactivity level in each municipality in Fukushima Prefecture (the 178th report)" by Fukushima Prefecture and the result of measurement on August 31, 2011 based on "Results of measurement of environmental radioactivity level of 20km- 50km zone of Fukushima Daiichi NPP and results of environmental radioactivity monitoring by telemetry system (inside 20km zone)" by Fukushima Prefecture. The unit is μGy/h ≈ μSv/h. Asterisks are attached to the results based on the latter source of "after."
 (c) EZ: Evacuation Zone. PEZ: Planned Evacuation Zone. FERZ: Former Evacuation-Ready Zone. SERS: Specific Evacuation Recommendation Spot. NZOS: No Zoning or Spot.

Table 2. Contents of municipal non-statutory decontamination plan (2/4)

Municipalities		Otama Village	Kawauchi Village	Fukushima City
Basic Data	Population (a)	Before 8,636	2,819	291,992
		After 8,646	2,695	288,406
	Radiation Dose (b)	Before —	—	0.04
		After 0.47	0.20*	0.36, 0.45, 0.62, 0.99, 1.20*
	Evacuation	EZ —	◆	—
		PFZ —	—	—
	Zoning or Spot (c)	FERZ —	◆	—
		SERS —	◆	—
		NZOS ◆	—	◆
	Title	Decontamination Plan in Otama Village	Decontamination Plan in Kawauchi Village	Hometown Decontamination Plan in Fukushima City (version 1)
Date	September 2011	September 2011	September 2011	
Area	Throughout the village	Throughout the village	Throughout the city	
Period	—	<ul style="list-style-type: none"> ● From early October 2011 to December 30, 2032. ● Structures: 2 years. Farmland: 3 years. Grassland: 3 years. Forests: 20 years. Roads: 5 years. Rivers, ponds, marshes and dams: 5 years. Others: needed periods. 	<ul style="list-style-type: none"> ● 5 years. ● The focus period is the first 2 years. 	
Goals	<ul style="list-style-type: none"> ● Reducing radiation dose of decontaminated facilities by 50%. ● Reducing additional exposure dose of pregnant women, babies and infants to less than 5 mSv/y (excluding natural background exposure and medical exposure dose). 	<ul style="list-style-type: none"> ● Reducing additional exposure dose to less than 1 mSv/y. 	<ul style="list-style-type: none"> ● Reducing air dose rate in living environment throughout the city to 1 μSv/h or less in two years. ● In areas where air dose rate is 1 μSv/h or less at present, reducing it by 60% in two years. ● In the long term, reducing estimated exposure dose to 1 mSv/y or less. 	
Implementer (Role Sharing) (c)	<ul style="list-style-type: none"> ● Decontamination work is promoted in collaboration with community groups in each district. 	<ul style="list-style-type: none"> ● EZ: national government. ● FERZ: village. ● SERS: village. ● Outside EZ: State-owned land → national government. Prefecture-owned land → prefecture. Private land and village-owned land → village. 	<ul style="list-style-type: none"> ● Houses, building lots and private lands: owners. ● Houses and building lots where air dose rate is 2.5 μSv/h or more, or where people under 18 years old or pregnant women live and air dose rate is 2.0 μSv/h or more: city. ● School roads and community roads: city, prefecture, national government. ● Other roads and children's playgrounds: city, prefecture, national government. ● Schools, nurseries, parks, public facilities and the like: city, prefecture, national government. ● Rental houses, offices, factories and others: facility managers. ● Satoyama, banks, farmland, forests and rivers: owners. 	
Order of Priority (c)	<ul style="list-style-type: none"> ● School roads or living environment, or areas where radiation dose is relatively high are prioritized. 	<ul style="list-style-type: none"> ● Although it is best to reduce exposure dose in forest areas first, decontamination work will be implemented in both forest areas and living areas in parallel because it is difficult to cut down trees in a short period. ● Decontamination work is prioritized to keep health of children and pregnant women who are sensitive to radiation throughout the village. 	<ul style="list-style-type: none"> ● For the time being, decontamination work is implemented immediately in the following: <ul style="list-style-type: none"> ○ Living environment: houses, condominiums, etc. ○ Public facilities: schools, nurseries, roads, parks, etc. ● The order of priority is set in terms of air radiation dose and land use. <ul style="list-style-type: none"> ○ Air radiation dose: <ul style="list-style-type: none"> → Most prioritized district (investigation spots of 2 μSv/h or more are approximately over 50% of all): 2. → Prioritized district (investigation spots of 2 μSv/h or more are approximately over 10% of all): 8. → Other district: 9. ○ Land use: <ul style="list-style-type: none"> → High priority: schools, houses, school roads, public facilities, etc. → Others: offices, shops, other roads, farmland, forests etc. ● Decontamination work of farmland, forests, rivers, etc. is started within the period of this plan after the way is established. 	
Temporary Storage Sites of Contaminated Soil (c)	<ul style="list-style-type: none"> ● Contaminated soil removed from public facilities such as school roads and gutters: in temporary storage sites secured in each administrative district. ● Contaminated soil removed from private lands: in each lot. 	<ul style="list-style-type: none"> ● Although it is the first option to secure temporary storage sites in national forests inside EZ, it is necessary to take into account the possibility of securing them in the village-owned lands or private lands until the national government decides when and where. ● It is necessary to take into account the possibility to secure the temporary- temporary storage sites because the national government does not explicitly show the installment of temporary storage sites. ● It is assumed that contaminated soil in temporary storage sites will be transported to the intermediate storage facility within 5 years. 	<ul style="list-style-type: none"> ● Public facilities: basically, in each lot. ● Private land: basically, in each lot. ● Roads, gutters, etc.: in temporary storage sites secured by the city in each administrative district. ● Combustible waste (fallen leaves, weeds, etc.): incineration at the waste incineration plant and storage by the city. 	
Notes (c)	—	<ul style="list-style-type: none"> ● This plan was formulated with an intent to be revised as a statutory plan based on the Act on Special Measures Concerning Radioactive Material Management. ● Decontamination standard of farmland exceeds the national temporary farmland soil standard of 5,000 Bq/kg. 	<ul style="list-style-type: none"> ● This plan was formulated as an implementation plan of Reconstruction Plan intended to be formulated in the future. ● Formulation of District Decontamination Plan and establishment of District Committee on Decontamination are recommended to promote decontamination work in each district. 	

(a) Same as above Table 2 (1/4).

(b) Same as above Table 2 (1/4).

(c) Same as above Table 2 (1/4).

Table 2. Contents of municipal non-statutory decontamination plan (3/4)

Municipalities		Iitate Village	Nihonmatsu City	Date City
Basic Data	Population (a)	Before 6,132	59,665	65,749
		After 5,984	58,787	64,981
	Radiation Dose (b)	Before —	—	—
		After 2.41*, 8.74*	0.40, 0.51, 1.00*	0.69*, 1.55, 1.91, 1.95, 2.15
	Evacuation	EZ —	—	—
		PEZ ◆	—	—
	Zoning or Spot (c)	FERZ —	—	—
		SERS —	—	◆
	NZOS —	◆	◆	
Title	Decontamination Plan in Iitate Village	Decontamination Plan in Nihonmatsu City (version 1)	Basic Decontamination Plan in Date City (version 1)	
Date	September 2011	October 2011	October 2011	
Area	Throughout the village	Throughout the city	Throughout the city	
Period	<ul style="list-style-type: none"> ● Living environment: 2 years. ● Farmland: 5 years. ● Forests: 20 years. 	<ul style="list-style-type: none"> ● Living environment: 5 years. ● The focus period is 3 years from the 2011 fiscal year to the 2013 fiscal year. 	<ul style="list-style-type: none"> ● The period of the plan is set as soon as the size of whole project is grasped. ● Living environment: 2 years. Farmland: 5 years. Forests: 30 years. 	
Goals	<ul style="list-style-type: none"> ● Living environment: reducing additional exposure dose to 1 mSv/y or less. ● Farmland: reducing concentration of Cesium in the soil to 1,000 Bq/kg or less. ● Forest: reducing concentration of Cesium in the soil in food production areas to 1,000 Bq/kg or less, and reducing additional exposure dose in buffer zones to 1 mSv/y or less. 	<ul style="list-style-type: none"> ● Reducing additional exposure dose for the general public by 50% and for children by 60% compared with the current level. ● Reducing additional exposure dose to 1 mSv/y or less as early as possible. 	<ul style="list-style-type: none"> ● In the long term, reducing additional exposure dose to 1 mSv/y or less. ● Goals of each object: <ul style="list-style-type: none"> ○ Living environment: reducing annual cumulative dose in areas where air dose rate is high such as SERS to 5 mSv/y (1 μSv/h) or less, and reducing radiation dose even in areas where air dose rate is 1 μSv/h or less to as low a level as possible. ○ Public facilities: reducing annual cumulative dose to 1 mSv or less. ○ Farmland: reducing annual cumulative dose to 5 mSv or less, reducing radioactivity concentration in the soil to 5,000 Bq/kg or less, and reducing radioactive materials to undetectable levels in farm crops. ○ Forest and wilderness: in the long term, reducing air dose rate to 1~1.5 μSv/h. 	
Implementer (Role Sharing) (c)	<ul style="list-style-type: none"> ● Decontamination work is promoted in collaboration with the national government, the prefecture, the village, residents and others. 	<ul style="list-style-type: none"> ● State-administered and prefecture-administered public facilities, roads, forests and the like: national government and prefecture. ● City-administered public facilities and the like: city with the assistance of residents. ● School roads and community roads: city and residents. ● Private houses, lots and the like: city with the assistance of residents. 	<ul style="list-style-type: none"> ● Implementer of decontamination follows the Act on Special Measures Concerning Radioactive Material Management (public facilities, roads and the like: each administrator). ● City decontaminates public houses and lots as well as city-administered public facilities, and assists decontamination work by citizens. 	
Order of Priority (c)	<ul style="list-style-type: none"> ● Schedules of decontamination work to be implemented by the village, the national government and the prefecture in living environment, farmland and forests are shown separately (Details are omitted). 	<ul style="list-style-type: none"> ● Decontamination work of living environment first of all, then decontamination work of shops, factories, etc. is implemented. Furthermore, the order of priority is decided on the basis of both the air dose rate and the household composition. ● The order of priority in terms of land use: <ul style="list-style-type: none"> ○ Private houses: households with pregnant women and/or children living in areas where air dose rate is high are prioritized. <ul style="list-style-type: none"> → First: 3 districts (10 mSv/y or more) → Second: 12 districts (5 mSv/y or more) → Third: 11 districts (1 mSv/y or more) ○ School roads and community roads: school roads and shopping streets are prioritized. ○ Public facilities: firstly, facilities for children, babies and pregnant women, and secondly, main facilities of city, community centers, etc. ● Decontamination work of farmland, forests, etc. is started after the effective way is shown by the national government. 	<ul style="list-style-type: none"> ● Basically, decontamination work is prioritized in high radiation dose areas and the living environment. However, even in low radiation dose areas, schools and public facilities are decontaminated immediately. Farmland and forests are decontaminated throughout the city for a longer time on the basis of the implementation plan formulated for each fiscal year because their area is so vast. ● The order of priority: <ul style="list-style-type: none"> ○ First: areas where estimated exposure dose might exceed 20 mSv/y. ○ Second: areas where estimated exposure dose might exceed 10 mSv/y. ○ Third: areas where estimated exposure dose might exceed 5 mSv/y. ○ Fourth: areas where estimated exposure dose might exceed 1 mSv/y. ● The Implementation Plan of the 2011 fiscal year: <ul style="list-style-type: none"> ○ Living environment: Approximately 300 households in the communities where radiation dose is relatively high and the temporary storage site is secured. ○ Public facilities: All schools, kindergartens, nurseries, etc. Approximately 55 parks. ○ Farmland and forests: As for farmland, a demonstration test will be implemented by the prefecture, the city and others. As for forests, deforestation of the city-owned forestland will be implemented experimentally. ○ Organization of implementation system: A project team will be created to discuss an incinerator to reduce the amount of contaminated soil. And a decontamination support center will be created. 	
Temporary Storage Sites of Contaminated Soil (c)	<ul style="list-style-type: none"> ● Securing sites in national forests in the village is under discussion. 	<ul style="list-style-type: none"> ● Public facilities: basically, in each lot. ● Private lands: basically, in each lot. ● School roads, community roads, etc.: basically, in temporary storage sites secured by the city. ● The period of storage in temporary storage sites secured by the city in each neighborhood association or administrative district is limited to within approximately 5 years. ● The construction of a well-managed temporary storage facility is under discussion. 	<ul style="list-style-type: none"> ● Well-managed temporary storage facilities will be secured in each former town. Their location may be decided in this fiscal year. However, contaminated soil is to be stored temporarily in each lot or community for the time being because their construction needs some years. 	
Notes (c)	<ul style="list-style-type: none"> ● This plan was formulated as one which represented the thought of the local government. ● Total cost of decontamination work is calculated at 322 billion yen. 	<ul style="list-style-type: none"> ● This plan was formulated on the basis of "Radiation Dose Reduction Policy in Nihonmatsu City" formulated in August 2011. 	<ul style="list-style-type: none"> ● Formulation of District Decontamination Plan in each administrative district is recommended to promote decontamination work in each district or community. 	

(a) Same as above Table 2 (1/4).

(b) Same as above Table 2 (1/4).

(c) Same as above Table 2 (1/4).

Table 2. Contents of municipal non-statutory decontamination plan (4/4)

Municipalities		Koori Town	Tamura City
Basic Data	Population	Before 12,784	40,234
	(a)	After 12,662	39,637
	Radiation	Before —	—
	Dose (b)	After 0.81	0.17*, 0.19*
	Evacuation	EZ —	◆
		PEZ —	—
	Zoning or Spot (c)	FERZ —	◆
		SERS —	—
		NZOS ◆	◆
	Title	Decontamination Plan toward Revitalization in Koori Town (version 1)	
Date	October 2011		November 2011
Area	Throughout the town		Throughout the city
Period	<ul style="list-style-type: none"> ● 5 years from November 1, 2011. ● The focus period is the first 2 years. 		<ul style="list-style-type: none"> ● As for living environment, by the end of March 2014.
Goals	<ul style="list-style-type: none"> ● In the long term, reducing additional exposure dose to 1 mSv/y or less. ● In the short term, reducing additional exposure dose for the general public by 50% and for children by 60% compared with the end of August 2011, including radioactive decay and decay by natural factors by August 2013. 		<ul style="list-style-type: none"> ● Reducing additional exposure dose to 1 mSv/y (0.23 μSv/h) or less.
Implementer (Role Sharing) (c)	<ul style="list-style-type: none"> ● Houses, lots, shops and private lands: town and owners. ● School roads and community roads in areas where radiation dose is high: town, prefecture and national government. ● School roads and community roads in areas where radiation dose is low: community groups. ● Other roads, neighborhood parks and the like: town, prefecture, national government, etc. ● Schools, nurseries, parks, public facilities and others: town and prefecture. ● Rental houses, offices, factories and the like: facility managers. ● Satoyama, banks, farmland, forests and rivers: owners. 		<ul style="list-style-type: none"> ● EZ: national government. ● Outside EZ: <ul style="list-style-type: none"> ○ Kindergartens and schools: city, in part residents. ○ Public facilities: city, in part residents (national roads and prefectural roads: prefecture; private roads: owners, in part city). ○ Roads near schools and public facilities: city, in part residents. ○ Houses and lots in the prioritized district: residents, in part city. ○ Houses and lots in the other districts: residents, in part city. ○ Shops and factories: owners. ○ Other roads: city, in part residents. ○ Farmland, forests and rivers: decontamination plan will be formulated after the guidance and standard about their decontamination are established by the national government.
Order of Priority (c)	<ul style="list-style-type: none"> ● For the time being, decontamination work is implemented immediately in the following: <ul style="list-style-type: none"> ○ Living environment: houses, condominiums, etc. ○ Public facilities: schools, nurseries, roads, parks, etc. ● The order of priority is set in terms of air radiation dose and land use. <ul style="list-style-type: none"> ○ Air radiation dose: <ul style="list-style-type: none"> → High dose areas are prioritized. → Immediate decontamination areas are decided on the basis of results of measurement in the future. ○ Land use: <ul style="list-style-type: none"> → High priority: schools, houses, school roads, public facilities, etc. → Others: offices, shops, other roads, farmland, forests, etc. ● Decontamination work of farmland, forest, rivers, etc. will be started within the period of this plan after the way is established by the national government. 		<ul style="list-style-type: none"> ● The order of priority is set in terms of air radiation dose and land use. <ul style="list-style-type: none"> ○ Air radiation dose: <ul style="list-style-type: none"> → High priority area: areas of FERZ or where air radiation dose is 1 μSv/h or more. → Other area: areas where air radiation dose is 0.23 μSv/h or more except the above areas. ○ Land use: <ul style="list-style-type: none"> → High priority use: schools, public facilities, roads near schools and the like, houses or lots in the high priority area. → Other use: houses or lots in other areas, shops, factories, other roads. → Farmland, forests and rivers: the order of priority will be decided after the way and the standard to decontaminate is established by the national government. ● Decontamination work is proceeded in each administrative district.
Temporary Storage Sites of Contaminated Soil (c)	<ul style="list-style-type: none"> ● For the time being, in temporary storage sites secured by the town. 		<ul style="list-style-type: none"> ● Although the first option is to secure a temporary storage site in the national forest, contaminated soil is stored temporarily in each administrative district for the time being because its construction needs some years. ● It is assumed that temporary - temporary storage sites secured in each administrative district may start to be used in winter 2012, and that temporary storage sites may start to be used in summer 2012.
Notes (c)	<ul style="list-style-type: none"> ● This plan was formulated as an implementation plan of Comprehensive Plan intended to be revised. 		<ul style="list-style-type: none"> ● It is intended that decontamination work of farmland, forests and rivers will be planned after the way and the standard to decontaminate are established by the national government. ● It is intended that additional short-term schedules are formulated.

(a) Same as above Table 2 (1/4).
 (b) Same as above Table 2 (1/4).
 (c) Same as above Table 2 (1/4).

decided the “Basic Policy for Emergency Response on Decontamination Work” on August 26, 2011 set diverse goals, most municipalities that formulated a plan after its decision set goals in conformity with the Basic Policy like “Reducing additional exposure dose to 1 mSv/y or less as early as possible.” But, Iitate Village and Date City set unique goals for forests.

4. Municipalities that formulated a plan before the Basic Policy was decided set municipalities, residents and community groups as implementers. Municipalities that formulated a plan after its decision basically set implementers in conformity with the Basic Policy. That is, the national government is the implementer of the areas designated as the Evacuation Zone and Planned Evacuation Zone, and municipalities are the implementers of other areas.⁷ However, as the area is so vast, many municipalities plan to address decontamination work in collaboration with residents or landowners in order to expedite the process.

5. Many municipalities set the order of priority of decontamination work in terms of land use or air dose rate. In terms of land use, decontamination work is planned to prioritize the living environment, especially public facilities for children like schools, school roads and neighborhood parks, or housings of households with children, babies or pregnant women. In terms of air dose, decontamination work is planned to prioritize high air dose areas, for instance, in areas designated as the Evacuation-Ready Zone or the Specific Evacuation Recommendation Spot.⁸ Fukushima City and Nihonmatsu City set the order of all districts in terms of air dose.

6. Kawauchi Village, Iitate Village and Tamura City which have areas designated as the Evacuation Zone or the Planned Evacuation Zone plan to install temporary storage sites for contaminated soil in the national forests inside those areas. On the other hand, municipalities that do not have those areas basically plan to store contaminated soil that has been removed from private land in each lot and contaminated soil that has been removed from roads or gutters, etc. in temporary storage sites secured by the municipalities in each administrative district.⁹

7. Furthermore, it is only Kawauchi Village that formulated the plan in conformity with the items based on the Act.



Photo 2. A temporary storage site for contaminated soil (Date City, November 2011).

CONCLUSIONS

Most people in Fukushima Prefecture have a desperate desire to decontaminate their environment without delay. Several municipalities have strenuously forwarded their decontamination plans in

collaboration with residents and volunteers. However, the reality of the situation is that they are, at best, only reaching the first stage of the decontamination of schools, school roads and neighborhood parks. The crucial housings are left untouched in most places.

Why? Certainly, it is evident that politics and administration do not work well. And as is often pointed out, it is also evident that difficulty securing temporary storage sites,¹⁰ shortage of workers or uncertainty of finances inhibit decontamination work. However, I cannot but think that mental factors rather than those external factors are fundamental. In other words, I feel that most people in Fukushima Prefecture have in some respects unconsciously come to a mental state of accepting their contaminated living environment as a given condition, forced by Japanese or Asian mentality, though they feel uneasy about their future.

Furthermore, it is difficult to decontaminate radioactive Cesium on roofs of houses or on asphalt of roads, and it is hard to reduce air dose rates just by removing surface soil and raking up fallen leaves in gardens, as farmland and forests around the houses are still untouched. In addition, air dose rates often increase a short time later even after decontamination work has been done, as radioactive Cesium moves to communities through streams of rainwater from surrounding forests. Under such adverse conditions, people may find themselves at a loss in the midst of the overwhelming project of decontamination. They may return to the question, “Why should we be the ones to do this decontamination work?” However, their children still live in Fukushima.

The Act is scheduled to be fully enforced on January 1, 2012. It is impossible to change Fukushima Prefecture significantly by just one act. It is clear from the start that there are innumerable hardships on the path toward the revitalization of Fukushima Prefecture.¹¹



Photo 3. Citizen volunteers of decontamination work at a private house (Fukushima City, November 2011).

NOTES

1. The Evacuation Zone was designated on April 22, 2011 in the whole area of Tomioka Town, Okuma Town and Futaba Town and in the parts of Tamura City, Minamisoma City, Naraha Town, Kawauchi Village, Namie Town and Katsurao Village that are located within a 20 kilometer radius of the Fukushima Daiichi nuclear power plants.
2. The Planned Evacuation Zone was designated on April 22, 2011 in the whole area of Iitate Village and in the parts of Minamisoma City, Kawamata Town, Namie Town and Katsurao Village where the estimated annual

- exposure dose might reach 20 mSv/y or more.
3. Reduction rate of estimated annual exposure dose by decontamination work is estimated at 10% both for the general public and for children; the rest of the reduction comes from estimated radioactive decay and natural factors.
 4. While the term “plan” is basically used to include the meaning of “vision” or “policy” in this article, each is distinguished as needed.
 5. It is true that the “Basic Policy for Emergency Response on Decontamination Work” decided by the Nuclear Emergency Response Headquarters on August 26, 2011 is a factor that promoted municipalities to formulate non-statutory decontamination plans.
 6. The Evacuation-Ready Zone was designated in the whole area of Hirono Town and in parts of Tamura City Minamisoma City, Naraha Town, and Kawauchi Village. It was lifted on September 30, 2011 on the grounds that safety in those areas was secured in terms of the situation of the nuclear power plant and air dose rate.
 7. Similarly, the Act provides that the implementer of areas designated as the Evacuation Zone and the Planned Evacuation Zone is the national government and that the implementer of areas where additional exposure dose is 1 mSv/y (0.23 μ Sv/h) or more is basically municipalities.
 8. The Specific Evacuation Recommendation Spot is designated for housing sites in areas outside the Evacuation Zone and the Planned Evacuation Zone where estimated annual exposure dose might reach 20 mSv/y or more. It was designated for 104 sites (113 households) of Date City on June 30, 2011, for 57 sites (59 households) of Minamisoma City on July 21, for 65 sites (72 households) of Minamisoma City and for 1 site (1 household) of Kawauchi Village on August 3, and 20 sites (22 households) of Minamisoma City and 13 sites (15 households) of Date City on November 25. The total is 260 sites (282 households).
 9. While the Basic Policy formulated on the basis of the Act provides that municipalities that have areas where additional exposure dose is 1 mSv/y or more secure temporary storage sites for contaminated soil in each municipality or community for the time being, the Act provides that municipalities may have land owners keep contaminated soil in each lot. In this context, the national government decided it would start the service of an interim storage facility and begin to transfer contaminated soil from each lot or temporary storage site in or around 2015 and would complete final disposal outside Fukushima Prefecture in 2045 at the latest.
 10. So far, the following temporary storage sites for contaminated soil have been secured in Fukushima Prefecture: 1 site in Fukushima City, 1 site in Kawauchi Village and 3 sites in Date City.
 11. I became aware of “Decontamination Plan in Minamisoma City (version 1)” formulated in November 2011 and “Decontamination Plan in Miharu Town (version 1)” formulated in December 2011 after I finished writing this paper. They are intended to be transferred to the statutory plan based on the Act.

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