



# Progress on Off-site Cleanup and Interim Storage in Japan

July, 2015

Teruyoshi Hayamizu

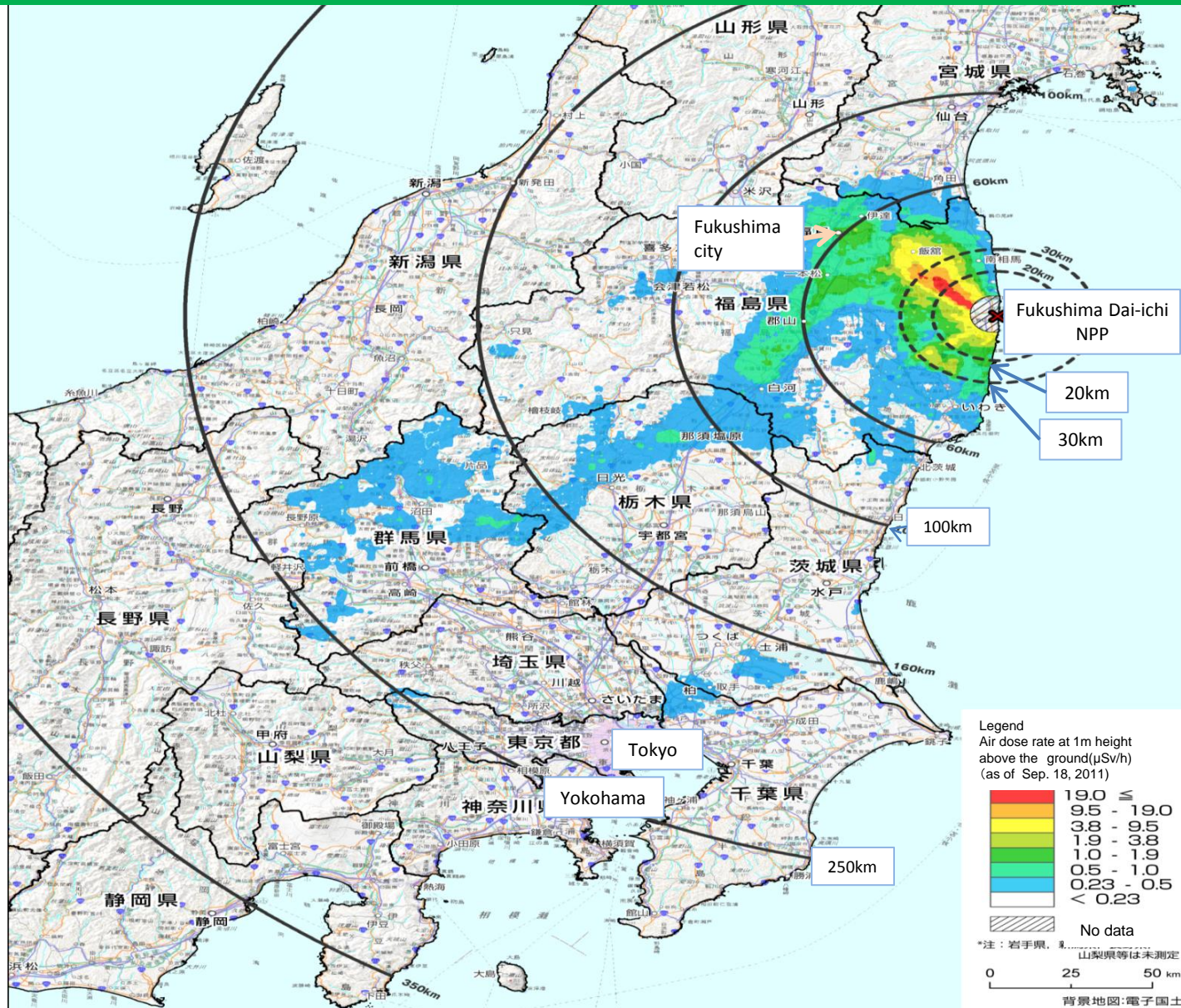
Councillor, Minister's Secretariat,  
Ministry of the Environment, Japan

# Outline

## **1. Policy Framework**

2. Progress in Special Decontamination Area  
(directly conducted by the Government)
3. Progress in Intensive Contamination Survey  
Area (conducted by the municipalities)
4. Decontamination Policies based on Studies  
regarding Radioactive Cesium Behavior
5. Interim Storage Facility
6. Cooperation with International Societies
7. Decontamination Report

# Radioactive Pollution Caused by the Accident at TEPCO's Fukushima Dai-ichi NPP



# Framework of Decontamination

## Legislation for Promoting Decontamination

- ◆ The Act on Special Measures Concerning the Handling of Radioactive Pollution came into force on January 1, 2012.
- ◆ Based on this Act, the following are carried out:
  - Planning and implementation of decontamination work
  - Collection, transfer, temporary storage, and final disposal

## Special Decontamination Area (SDA)

- ◆ 11 municipalities in the restricted zone (former) or the planned evacuation zone (< 20 km from the NPP, or annual cumulative dose is > 20 mSv)
- ◆ Decontamination is implemented by the national government

(\*) Entire areas of Naraha, Tomioka, Okuma, Futaba, Namie, Katsurao, and Iitate.  
Some areas of Tamura, Minami Soma, Kawamata, and Kawauchi.

## Intensive Contamination Survey Area (ICSA)

- ◆ 104 municipalities in 8 prefectures (\*), in which over 0.23  $\mu\text{Sv}/\text{hour}$  of air dose rate (estimated from the long-term target of annual additional exposure dose, 1 mSv/year, under a certain condition) were designated as ICSAs.
- ◆ Decontamination is implemented by each municipality.
- ◆ The national government will finance and provide technical assistance.

(\*) Iwate, Miyagi, Fukushima, Ibaraki, Tochigi, Gunma, Saitama, and Chiba



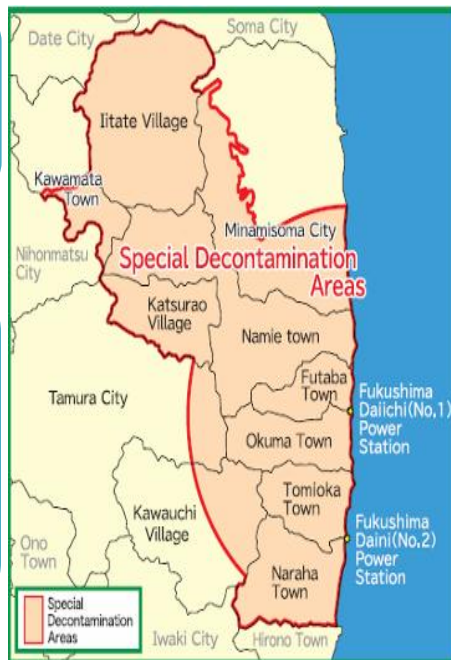
# Decontamination based on the “Act on Special Measures”

## 1) Special Decontamination Area

Designation of SDA by  
the Minister of the  
Environment

Development of the  
decontamination  
implementation plan  
in the SDA  
by the Minister of the  
Environment

Implementation of decontamination  
by the national government



## 2) Intensive Contamination Survey Area

Designation of ICSA by  
the Minister of the Environment  
(Areas where air dose rate is  $0.23\mu\text{Sv/h}$  or more)  
※ $0.23\mu\text{Sv/h}$  is a criterion for designation of ICSA and not a decontamination target

Survey measurement by the mayors of the  
municipalities

Development of the decontamination  
implementation plan by the mayors of the  
municipalities

Implementation of decontamination  
by the municipalities, etc.  
(The national government allocates budgets.)

Note: The air dose rate  $0.23\mu\text{Sv/h}$  corresponds to a cautiously estimated individual exposure dose of  $1\text{mSv/y}$  assuming that people spend  
① 8 hours outside ② 16 hours in a wooden house with a low shielding rate in a day

## Decontamination and disposal of soil at NPP

Implemented by the nuclear power plant operating company in charge (TEPCO)

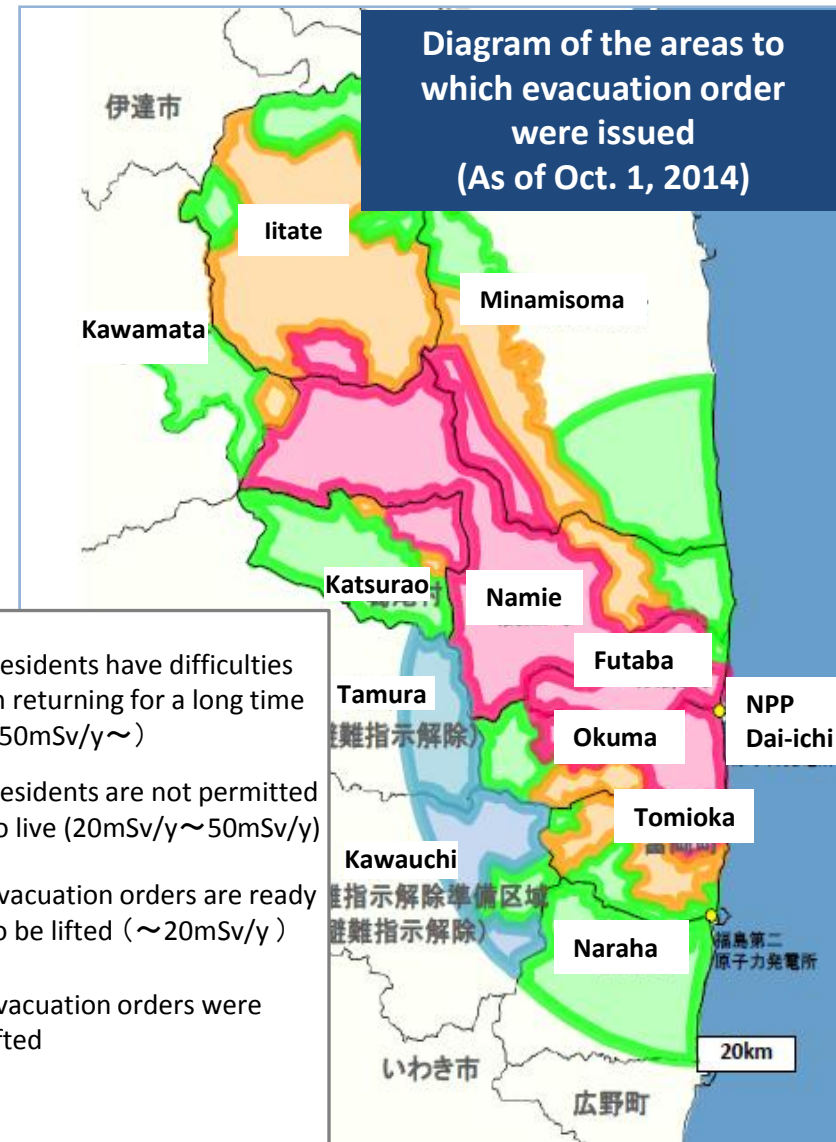
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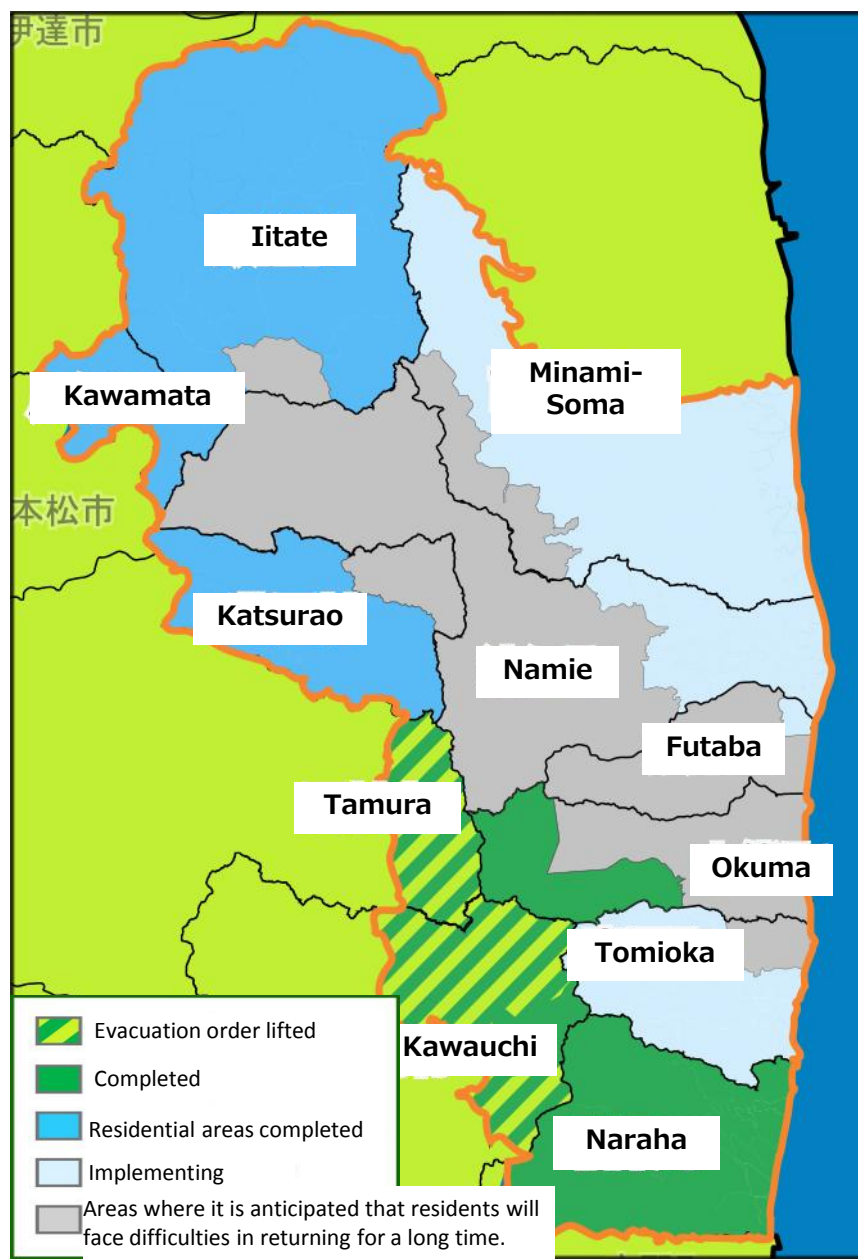
# Decontamination Policy for the Special Decontamination Area

Decontamination efforts are determined by the level of air dose rates based on the decontamination implementation plans.

- ◆ **Area where annual exposure dose is higher than 50mSv (Area where residents have difficulties in returning for a long time):** Policies are determined by radiation dose outlook based on demonstration model projects, residents' intention of returning, and visions for future industry and reconstruction.
- ◆ **Area where annual exposure dose is 20-50mSv (Area where residents are not permitted to Live):** Decontamination, aiming to reduce exposure dose in residential areas and farmlands to less than 20mSv/year.
- ◆ **Area where annual exposure dose is lower than 20mSv (Area where evacuation orders are ready to be lifted):** Decontamination is implemented.



# Progress in the Special Decontamination Area (as of the end of May 2015)



<b>Tamura</b>	Whole area decontamination was completed in June 2013. Evacuation order was lifted on April 1, 2014
<b>Kawauchi</b>	Whole area decontamination was completed in March 2014 Evacuation order in "Areas to which evacuation orders are ready to be lifted" were lifted on Oct. 1, 2014
<b>Naraha</b>	Whole area decontamination was completed in March 2014
<b>Okuma</b>	Whole area decontamination was completed in March 2014
<b>Joban Expressway</b>	Decontamination was completed in June 2013 ※ Reopened between Hirono and Joban-Tomioka on Feb. 22, 2014 ※ Opened between Namie and Minami-Soma on Dec. 6, 2014 ※ Opened between Namie and Joban-Tomioka on March 1, 2015
<b>Katsurao</b>	Decontamination of the residential area was completed in July 2014 Aiming to complete decontamination of the remaining area within 2015
<b>Kawamata</b>	Decontamination of the residential area was completed in Aug. 2014 Aiming to complete decontamination of the remaining area within 2015
<b>Iitate</b>	Decontamination of the residential area was almost completed at the end of Dec. 2014, aiming to complete decontamination of the remaining area within 2016
<b>Minami-soma</b>	Aiming to complete decontamination of the residential area within FY 2015 and of the remaining area within FY 2016
<b>Namie</b>	Aiming to complete decontamination of the remaining area, except for the affected area by tsunami, within FY 2015 For the affected area by tsunami, aiming to complete decontamination of the residential area within FY 2015 and of the remaining area within FY 2016
<b>Tomioka</b>	Aiming to complete decontamination of the residential area within FY 2015 and of the remaining area within FY 2016
<b>Futaba</b>	Aiming to complete decontamination within FY 2015



# Progress in the Special Decontamination Area (as of the end of May 2015)

Progress on decontamination works (executing ratio and ordering ratio) is as follows:

E=Executing rate

O=Ordering ratio

As of the end of May 2017	Tamura		Kawauchi		Naraha		Okuma		Karsurao		Kawa-mata		Iitate		Minami-soma		Namie		Tomioka		Futaba	
	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O	E	O
Residential area	100	100	100	100	100	100	100	100	100	100	100	100	99 (97)	100	14 (11)	99.9	14 (13)	48	36 (30)	100	-	100
Farmland	100	100	100	100	100	100	100	100	74 (68)	100	25 (20)	100	35 (34)	100	12 (11)	65	14	35	6 (5)	100	-	100
Forest	100	100	100	100	100	100	100	100	99.9	100	64 (58)	100	44 (43)	100	44 (41)	79	26 (18)	43	71 (52)	100	-	100
Road	100	100	100	100	100	100	100	100	35 (32)	100	4	100	27 (26)	100	6	65	22	46	70	100	-	100

Note 1: Executing ratio is calculated as follows: ①Areas in which decontamination work (weeding, removal of sediment, and cleaning, etc.) is completed / ②All areas to be decontaminated

Note 2: Ordering ratio is calculated as follows: ③Areas for which MOE has given decontamination contracts to JVs (Joint Ventures)/ ②All areas to be decontaminated

Note 3: ①, ②, ③ might be modified with further review

Note 4: The number in () was the number in last month. When there is no change, it is not listed

# Effects of Decontamination Work in Kawauchi

【Air dose rate at the height of 1m from the ground at entire Kawauchi village\*】

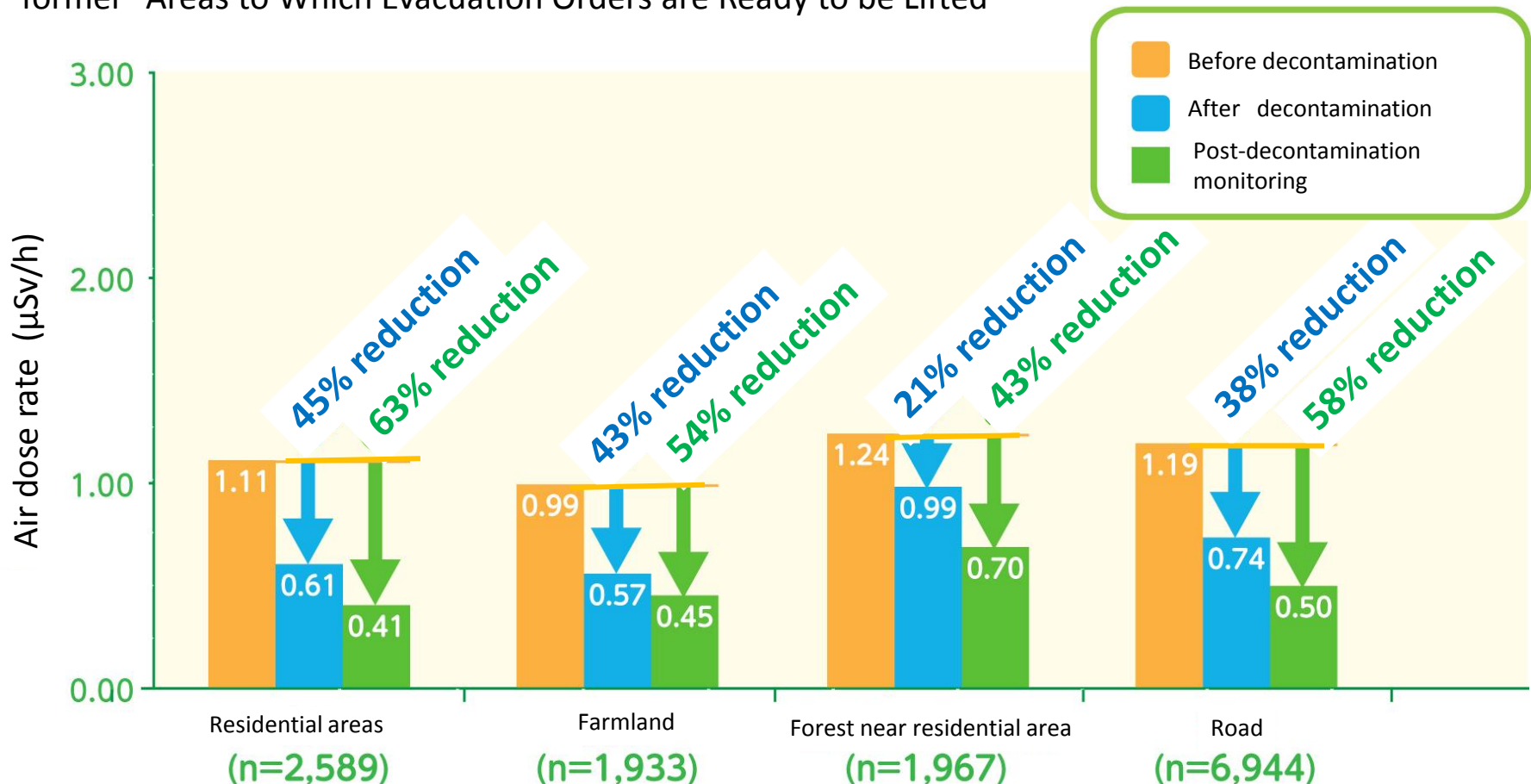
Air dose rates at residential areas :

decreased approx. 45% comparing before decontamination to after decontamination

decreased approx. 63% comparing before decontamination to post-decontamination monitoring

and the effects of decontamination have been retained

\*entire Kawauchi village: indicates both former “Areas in Which Residents are not Permitted to Live” and former “Areas to Which Evacuation Orders are Ready to be Lifted”



# Effects of Decontamination on Joban Expressway

The integrated work of decontamination by MOE and road restoration and construction by East Nippon Expressway Company Limited enabled (i) the decrease in air dose rates, (ii) the minimization of waste, (iii) the shortening of work period, at the same time.

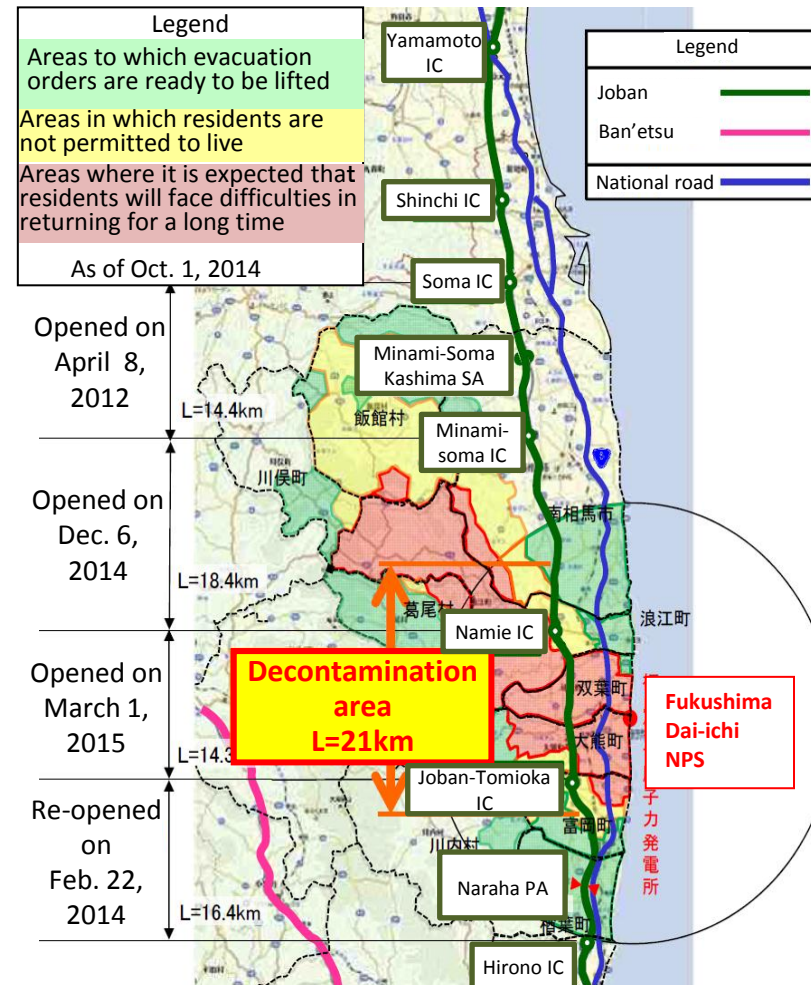
## ● Outline of decontamination

Period	December 2012 ~ June 2013
Decontamination area	Areas where air dose rates exceeded $3.8 \mu\text{Sv/h}$ (equivalent to $20 \text{ mSv/year}$ ) on the roads
Main Decontamination method	<b>Side slope</b> : Weeding (removing vegetation) <b>Road surface</b> : High pressure water jet washing <b>Future site</b> : Weeding, Soil mixture, Surface compaction <b>Bridge (handrail, safety fence)</b> : Wiping out ※Top soil removal of road surface was omitted for the not-yet-opened areas of the main line.

## ● Significant decrease in air dose rates after the integrated work

Section (as of June 2012)	Target ( $\mu\text{Sv/h}$ )	Average air dose rate at the height of one meter ( $\mu\text{Sv/h}$ )			Decreasing rate for Oct. 2014 to pre-decontamination
		Before	After	Oct. 2014	
① $3.8 \mu\text{Sv/h} < \sim \leq 9.5 \mu\text{Sv/h}$	$\leq 3.8$	4.3	2.8	0.9	79%
② $> 9.5 \mu\text{Sv/h}$	$\leq 9.5$	15.7	9.9	2.3	85%

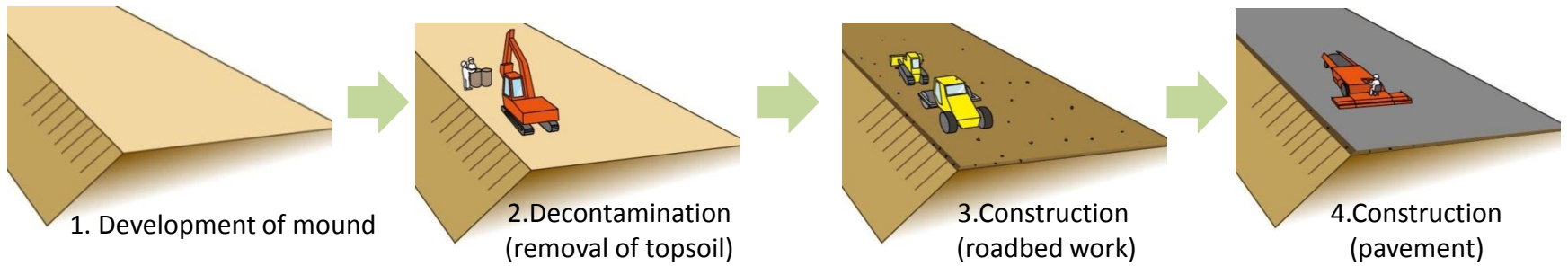
## ● Zones of decontamination on Joban Expressway



# Integrated Work of Decontamination and Road Restoration and Construction

The integrated work enabled (i) the decrease in air dose rates, (ii) the minimization of waste, (iii) the shortening of work period, at the same time.

## A case of separately implementing decontamination and road construction

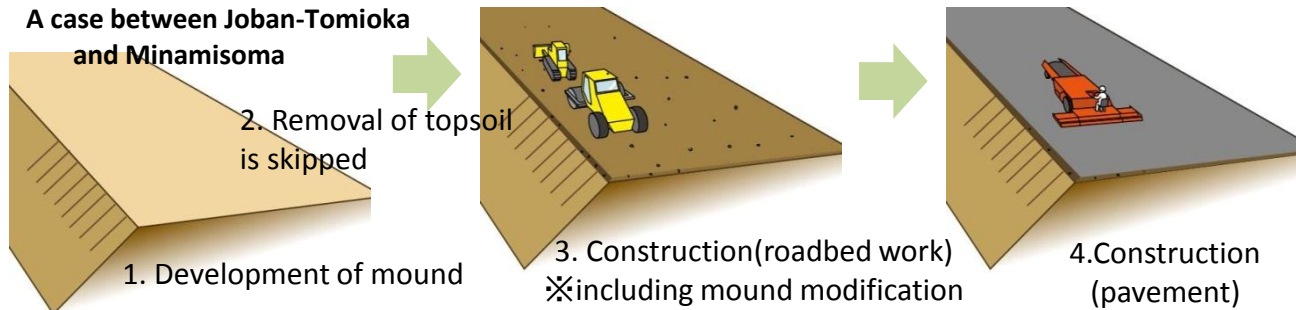


## ① Decrease radiation dose

Through mound modification and shielding with base course material and paving

## A case of integrated work

A case between Joban-Tomioka and Minamisoma



## ③ Shorten work period

By substituting mound modification for topsoil removal and close cooperation for process management

## ② Reduce waste

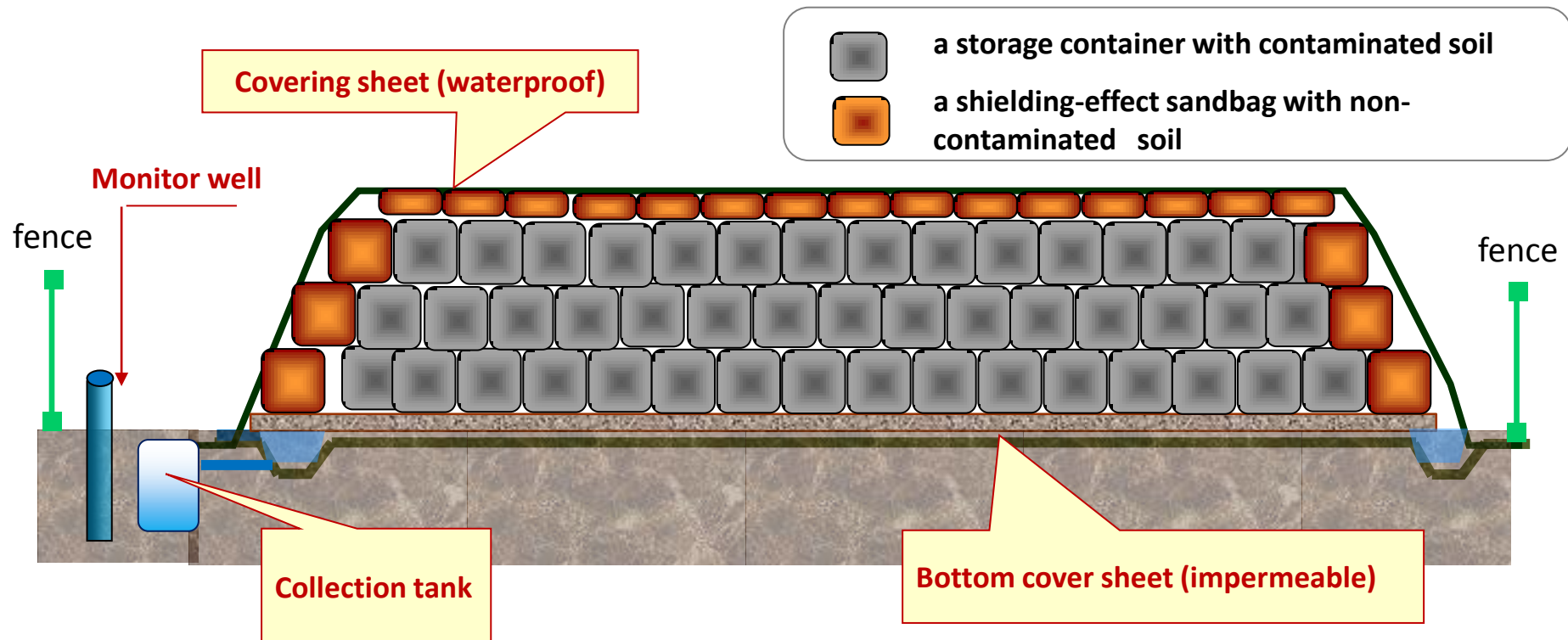
By substituting mound modification for topsoil removal

The volume of generated soil was reduced by 14,000 m<sup>3</sup>.

# Basic Structure of a Temporary Storage Site

## Basic structure of a temporary storage site - A case in Special Decontamination Area -

- Shielding of radiation by sandbags with shielding effect
- Prevention of infiltration of leachate to the ground by bottom cover sheets and collection tanks
- Prevention of ingress of rainwater by covering sheet
- Monitoring of groundwater for unexpected infiltration
- Prevention of entrance and access by outsiders, surrounding with fence





# Safety Management of Temporary Storage Sites

## - Inspection and Measurement -

### Contents of Inspection and Measurement in SDA

Class	Work Item	Contents		Frequency
<b>Normal Situation</b>	Inspection by visual observation	<ul style="list-style-type: none"> <li>▪ To check the damage, deformation, deterioration of important facilities such as sheet, water catchment, fence and signage</li> <li>▪ To provide emergency repair if needed</li> </ul>		Once / week
	Various measurement	▪ Air dose rate ( $\mu\text{Sv/h}$ )		Once / week
		▪ Leachate from the inside	<ul style="list-style-type: none"> <li>▪ Radioactive concentration</li> <li>▪ Drainage from collection tank</li> </ul>	As the occasion demands (essential at drainage)
		▪ Ground water	▪ Radioactive concentration	Once / month
	Environment maintenance	▪ Mowing, clean-up etc.		As the occasion demands
<b>Emergency (unusual weather, etc.)</b>	Inspection by visual observation	▪ Same as in normal situation		At the time of rainfall, wind and earthquake exceeding the standards

### Criteria for “unusual weather, etc. (emergency)”

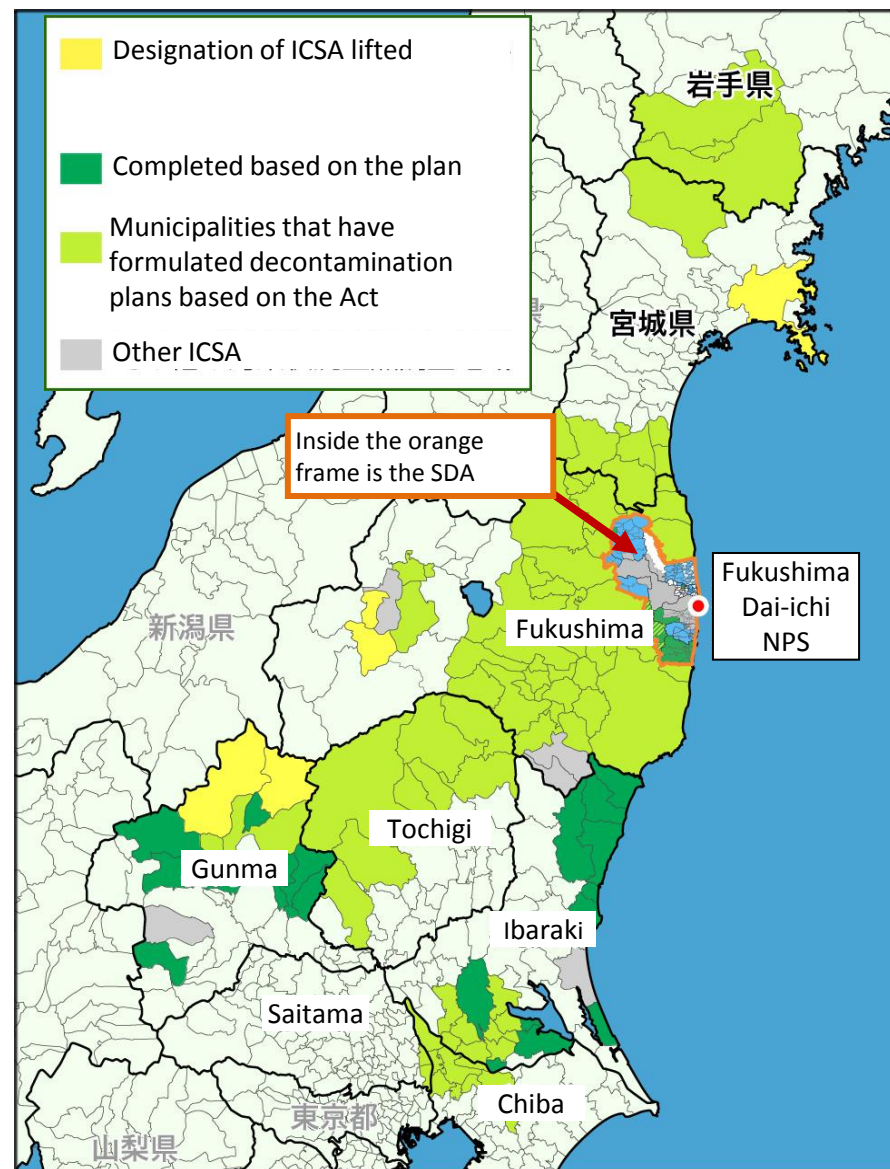
Phenomenon	Standard value
<b>Rainfall</b>	Exceeding 60 mm/day in the most recent data of Automated Meteorological Data Acquisition System or exceeding the value/s for heavy rain warning in the municipalities concerned
<b>Wind velocity</b>	Exceeding 20 m/s at maximum in the most recent data of Automated Meteorological Data Acquisition System
<b>Earthquake</b>	Exceeding the seismic intensity 4 in the municipalities concerned

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# Progress in Intensive Contamination Survey Area

- ◇ Number of municipalities designated as the Intensive Contamination Survey Area:  
104 (at the start) → 99 (at present)  
 The designation was lifted in five municipalities because of the radiation dose decrease, etc.
- ◇ Municipalities that formulated decontamination implementation plans:  
94 municipalities (all that had intended to do)
- ◇ Municipalities that have completed or almost completed their plans (and continued monitoring of air dose rates).  
48 municipalities
- ◇ Municipalities in process of implementing decontamination based on the plans:  
46 municipalities  
 In most of the decontamination plans, ending time period is set between FY2015- FY2016.
- ◇ The progress of decontamination
  - **In Fukushima pref.** (as of the end of May 2015):  
Public facilities: approx. 90%  
Residential houses: approx. 60%  
Roads: approx. 50%
  - **Outside Fukushima pref.** (as of the end of March 2015):  
Schools & nurseries: almost completed  
Residential houses: approx. 90%  
Roads: approx. 90%



As of April 2015

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# Decontamination Policies on Forested Areas

## Forestry Agency

Measures to manage proper forestry 【C】

- Model project for forestry revitalization
- Research & development of technology to prevent the diffusion of radioactive materials

Forestry run in deep forests

- Area A: Around residential area
- Area B: Where workers have daily access
- Area C: Forest in whole

Area where people have daily access 【B】

Clarification of decontamination policy at mushroom farms 【B】

Promote measures with local cooperation

Sharing knowledge

## Ministry of the Environment

Measures to prevent diffusion of radioactive materials from forests to the populated area and to prevent discharges from landslides and to ensure safety and security for the local residents 【C】

- Trial measures to prevent landslides caused by underground decay
- Understanding the current status of radioactive material diffusion from the forest

Removal of organic residuals to prevent sediment runoff 【A】

Around residential area 【A】

Exceptional extension of decontamination area beyond 20 m from the residential place, if a relatively high air dose rate is detected around houses, located at a valley and surrounded with forests 【A】



# Decontamination Policies on Rivers and Lakes

Contaminated sediments in rivers and lakes generally do not impact the air dose rate of the surrounding environment due to the radiation shielding by water. (More than 99% of radiation is shielded at the depth of 1 m). Thus, decontamination will be implemented as necessary only in case that shielding is not effective due to drying up of water, air dose rate is relatively high by the accumulation of radioactive cesium, and there is high-human activity.

Decontamination will be implemented only in reservoirs located at residential areas and parks, and only when water is dried up for a certain period of time and the surrounding air dose rate is significantly increased.

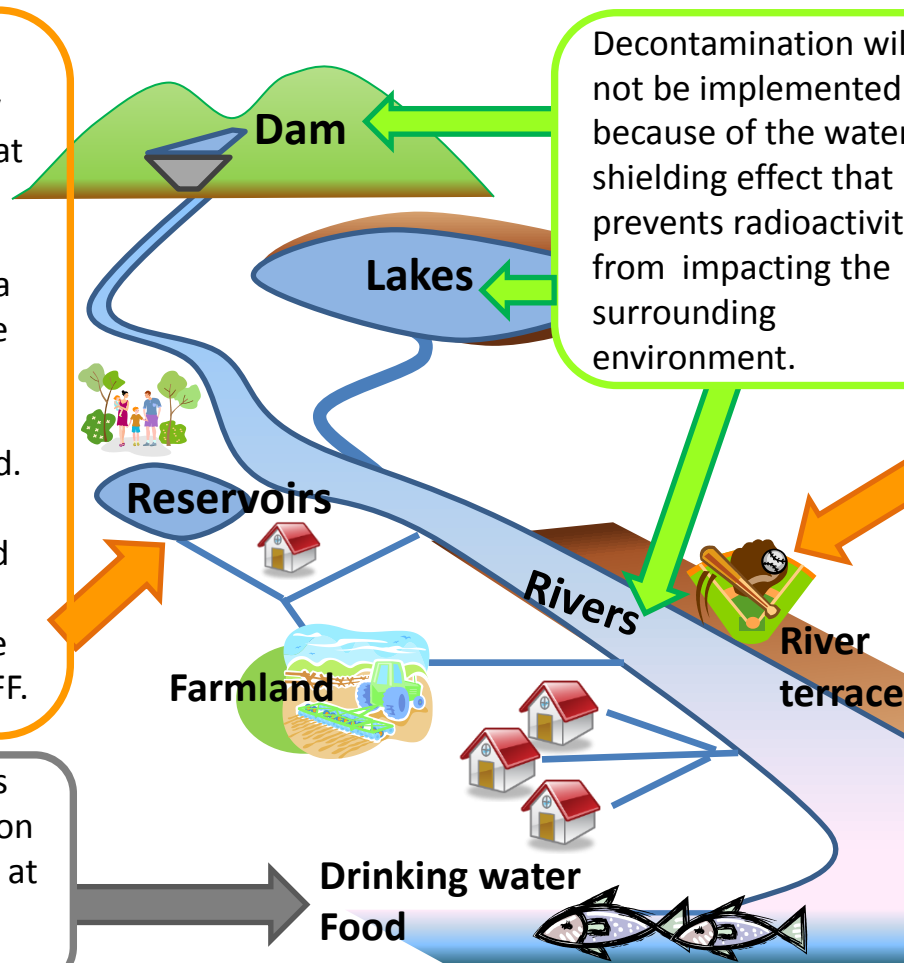
\*Measures for the restart of farming and agricultural reconstruction will be implemented by MAFF.

Continuous measures such as food inspection and water inspection at the water treatment plants will be taken.

Decontamination will not be implemented because of the water-shielding effect that prevents radioactivity from impacting the surrounding environment.

At public facilities such as parks and playgrounds using a part of river beds, where there are many public activities, decontamination will be implemented as a part of the living area as necessary, comparing the air dose rate to that of the surrounding living areas.

**✕Continuous monitoring and research & development from the long term perspective will be conducted to comprehend the environmental behavior of radioactive cesium throughout the entire river basin.**



# Follow-up of Decontamination

Post-decontamination activities are based on local conditions, types of future land use and current air dose rates and include the following:

## ① Confirming retained effects of decontamination / Follow-up decontamination

### 1) Post-decontamination monitoring

Post-decontamination monitoring is implemented for approximately six months to a year after decontamination.

### 2) Follow-up decontamination

If post-decontamination levels do not remain adequately low, an investigation may be conducted and if practicable, follow-up decontamination may take place taking into account rationale and feasibility.

✕ If the overall air dose rate remains at acceptable levels, follow-up decontamination will only take place in specific areas as opposed to whole-area, follow-up decontamination.

## ② Continuous monitoring

Continuous monitoring will be conducted until the decontamination area designation is lifted.

## ③ Service to residents

Radiation monitoring and risk communication will be conducted in hopes to ease anxieties among local residents

- MOE cooperates with relevant ministries and local governments to measure and manage individual doses, provide health consultations, and more.
- MOE utilizes individual doses for consideration of the decision rationale, the scope of follow-up decontamination and service to residents, in view of the implementation of measurement and management of individual doses and the long-term individual additional exposure levels.

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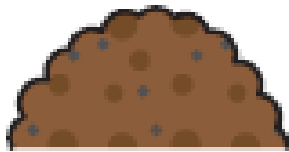
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# What is an Interim Storage Facility (ISF)?

- In Fukushima prefecture, large quantities of contaminated soil and waste have been generated from decontamination activities.
- Currently, it is difficult to clarify methods of final disposal of such soil and waste.
- Until final disposal becomes available, it is necessary to establish an Interim Storage Facility (ISF) in order to safely manage and store soil and waste.

The following materials generated in Fukushima prefecture will be stored in the ISF.

1. Soil and waste (such as fallen leaves and branches) generated from decontamination activities, which have been stored at the Temporary Storage Sites.



\* In principle, combustible materials will be incinerated, and incinerated ash will be stored.

2. Incineration ash with radioactive concentration more than 100,000 Bq/kg.

# Process regarding the Interim Storage Facility

TIME	CONTENTS
Oct. 2011	MOE announced the Basic Principles of the roadmap of the Interim Storage Facility (ISF).
April 2013-	MOE started the field survey including boring survey, obtaining the consent from the local communities..
Dec. 2013	MOE requested that Fukushima prefecture and the 3 towns (Futaba, Okuma and Naraha) accept the establishment of the ISF .
Feb. 2014	The Governor of Fukushima requested the national government to consolidate the ISF in Okuma and Futaba.
May-June, 2014	The Government held <u>explanatory meetings for residents. (16 times in total: 10 times in Fukushima, 6 times outside Fukushima)</u>
Sep. 1, 2014	<u>The Governor of Fukushima accepted the construction of the ISF, and both mayors of Okuma and Futaba agreed that the government would explain to the landowners. At the same time, the Governor asked confirmation of the five conditions of the national government before its acceptance of transportation of soil.</u>
Sep. 2014 -	MOE held <u>explanatory meetings for landowners</u> (12 times in total: 9 times in Fukushima and 3 times outside Fukushima).
Oct. - Nov. 2014	<u>The amendment bill for the Japan Environmental Safety Corporation (JESCO) Law in order to legislate the final disposal of contaminated soil and waste outside Fukushima prefecture was approved by the Cabinet and submitted to the Diet in Oct. The law was enacted in Nov. and put into effect in Dec.</u>
Dec.2014-Jan.2015	<u>Both Okuma and Futaba accepted the construction of the ISF.</u>
Feb. 3, 2015	<u>The construction of stock yards in the ISF started.</u>
Feb. 8, 2015	<u>The Minister of the Environment and the Minister for Reconstruction explained to the Governor of Fukushima the progress related to the five conditions which should be confirmed before the transportation of soil to the ISF.</u>
Feb. 25, 2015	<u>The Governor of Fukushima and both mayors of Okuma and Futaba conveyed the acceptance to the Minister of the Environment and the Minister for Reconstruction.</u>
March, 2015 -	<u>Transportation of soil from temporary storage sites to the stock yards started in Okuma on March 13, in Futaba on March 25, and sequentially in other municipalities.</u>



# Five Conditions for Commencement of Transportation to ISF

## **Fukushima prefecture's offers concerning ISF (Sep. 1, 2014)**

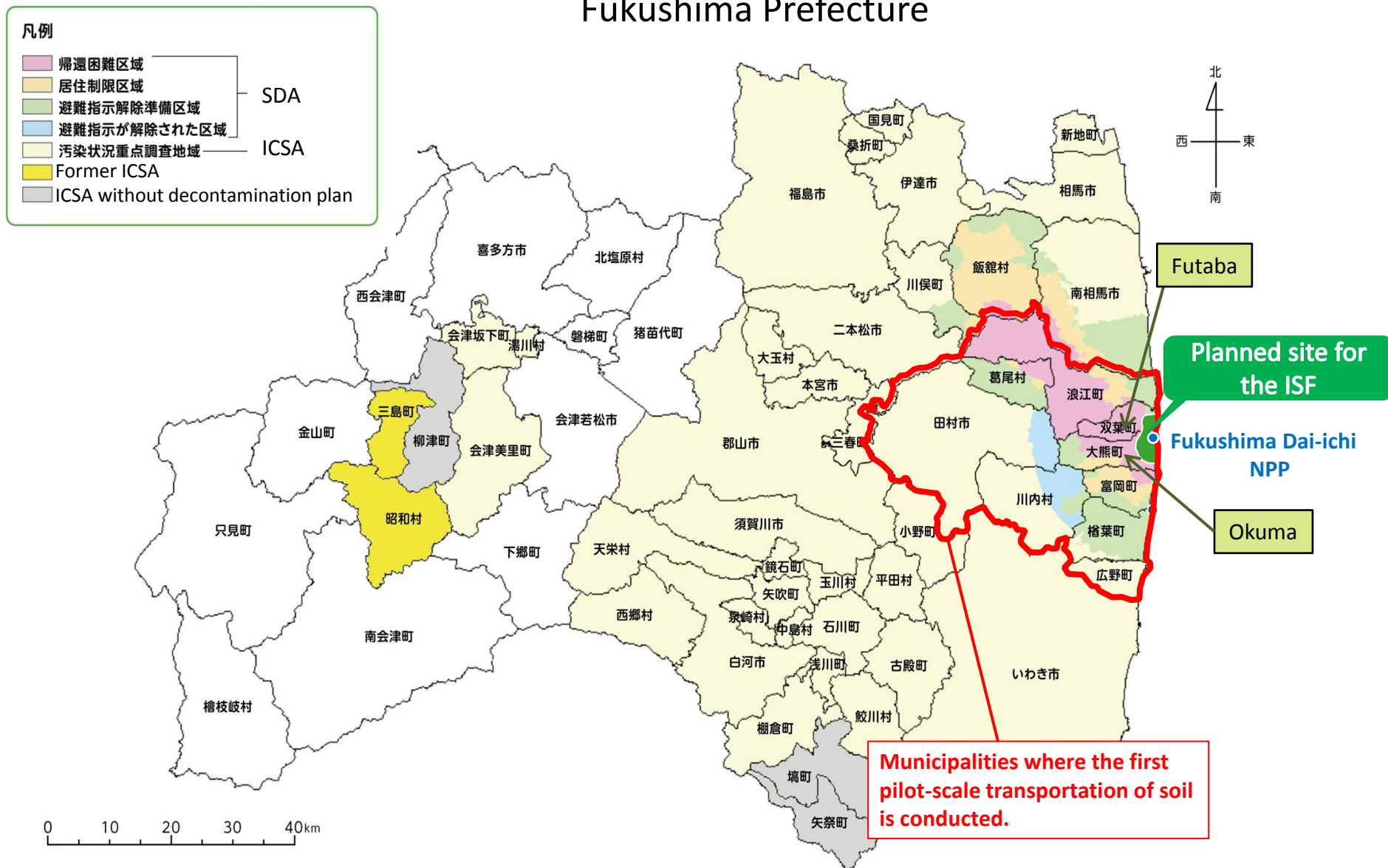
Fukushima prefecture asks the government for understandable and thorough explanations to the landowners. Although Fukushima prefecture has already accepted construction of the ISF, it will not accept transportation of soil to the ISF until the following five conditions are met.

- <1> Enactment of the law for the final disposal outside Fukushima prefecture**
- <2> Preparation of budget for grants concerning the ISF, etc. with high flexibility**
- <3> Clarification of operation & maintenance of transportation routes and roadside measures**
- <4> Safety on the facility and transportation**
- <5> Safety agreement with Fukushima prefecture, Okuma town and Futaba town**



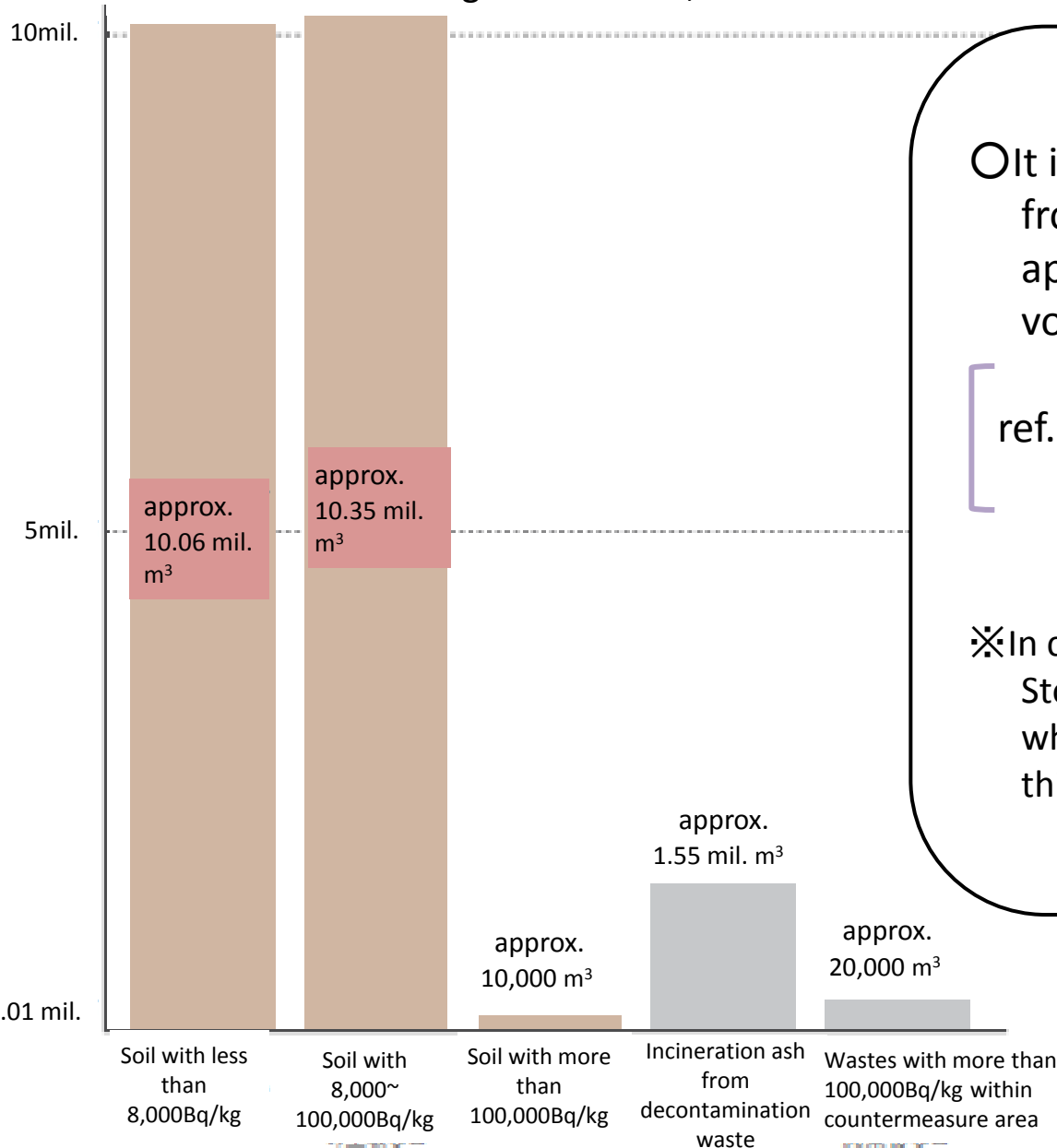
- The Minister of the Environment and the Minister for Reconstruction explained to the Governor of Fukushima the progress on the five conditions (Feb. 8, 2015)**
- The Governor and the mayors of Okuma and Futaba accepted transportation (Feb. 25, 2015)**

# Planned Site for the Interim Storage Facility



# Estimated Volume in the Interim Storage Facility

(m<sup>3</sup>) Estimated volume of generated soil, etc. from decontamination work (in case of 22 million m<sup>3</sup>)



○ It is estimated that generated soil from decontamination will be approx. 16 ~22 mil. m<sup>3</sup> after the volume reduction (incineration)

[ ref. : approximately 13~18 times as much as the volume of Tokyo Dome (1.24 mil. m<sup>3</sup>) ]

✂ In considering the plan for the Interim Storage Facility, storage of products whose volume is difficult to estimate at this moment is taken into account.

# Facilities and Disposal Process at the Interim Storage Facility

The Interim Storage Facility will consist of several facilities with various functions.

## Temporary Storage Sites, etc.

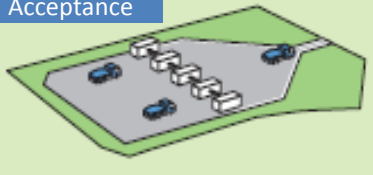


### Acceptance & Separation Facility

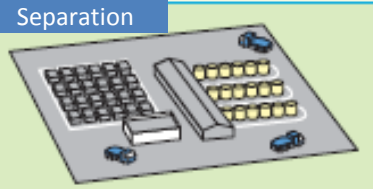
To separate the soil and waste transported by measuring the weight and radiation dose.

Image

#### Acceptance



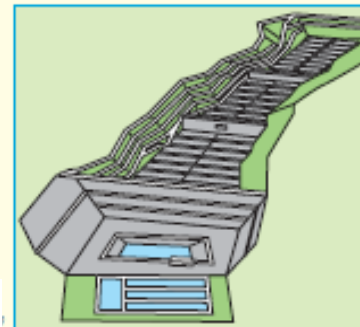
#### Separation



### Soil Storage Facility

To store soils after separation by radioactive cesium concentrations and other features

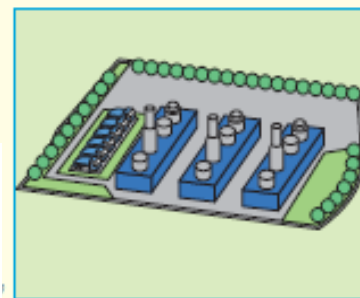
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### Volume Reduction Facility

To reduce the volume of stockpile by incinerating the combustibles (branches and plants, etc.)

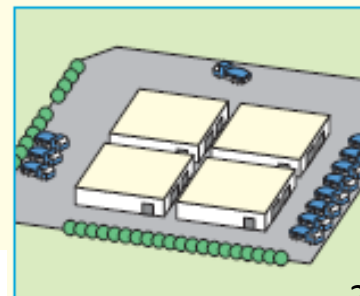
Image



### Waste Storage Facility

To store waste (incineration ash, etc.) measuring more than 100,000 Bq/kg

Image



### Other Facilities

- Screening
- Water treatment
- Stock yard
- Admin. Office
- R&D

# Basic Plan for Transportation of Soil to the ISF

## 1. Basic principles of transportation

- (1) Safe and Secure
- (2) In a short period of time and in smooth manner
- (3) Under the cooperation with the public and relevant organization

## 2. Basic items of transportation

- (1) Object of transportation
- (2) Role-sharing between the national government and municipalities
- (3) Means of transportation etc.
- (4) Current and future situation of road traffic

## 3. Basic policy on transportation

- (1) Implementation of integrated management
- (2) Smooth transportation that contributes to the reconstruction of the whole Fukushima prefecture
- (3) Securement of residents' safety and minimization of environmental impacts
- (4) Positive use of expressway
- (5) Intensive transportation and use of large-sized vehicles
- (6) Taking all measures to prevent accidents and limit possible damage
- (7) Implementation of monitoring and provision of information to the public
- (8) Development of public understanding

## 4. Measures for implementation of transportation

- (1) Development of implementation plan for transportation
- (2) Role-sharing of transportation

- (3) Strengthening of cooperation among relevant organizations
- (4) Conducting of pilot transportation
- (5) Road and traffic measures
- (6) Education and training of drivers and worker etc.



# Transportation to the ISF (Pilot Transportation)

- Pilot transportation is implemented for about a year in order to confirm safe and secure transport towards full-scale transportation of a large quantity of removed soil
- From the start of pilot transportation, MOE conducts management of whole targeted materials, traffic management (transportation vehicles) and monitoring survey to implement safely and steadily
- By pilot transportation, approx. 1,000 m<sup>3</sup> of removed soil will be transported from each relevant municipality, depending on each specific situation

## ◆ Formulation of traffic operation plan

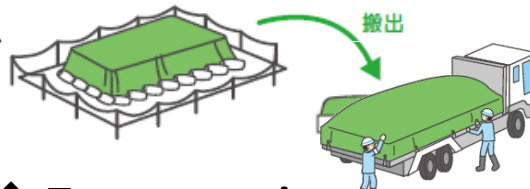
Before implementing transportation, MOE makes sufficient adjustment with the relevant municipalities and provide education and trainings to drivers and so on.

## ◆ Route setting

Transport route is set beforehand, making use of express highways.

## ◆ Loading

Extra care is taken for the surrounding environment by loading and securing the packaging so it does not scatter or leak.



## ◆ Transportation

During the delivery, transport objects and location will be monitored.

## ◆ Response to accidents

A system shall be established in case of an accident, to be thoroughly prepared and for proper response.

## ◆ Monitoring survey

Impacts on the living environment and of radiation doses due to transportation are monitored and will be publicly announced.

⇒ MOE is preparing for full-scale transportation through implementation and review of the pilot transportation

# Pilot Transportation / Storage at Stock Yards

## Pilot Transportation from TSS

	Commencement	Completion
Okuma	March 13	April 7
Futaba	March 25	April 14
Tamura	April 10	May 25
Tomioka	May 26	June 6
Kawauchi	June 8	
Hirono	June 22	
Namie	June 23	
Katsurao	June 26	
Naraha	June 30	

\* As of June 30

## Screening of Trucks

Surface doses of all the trucks from the stock yards have been screened and below the standard (13,000 cpm).

## Storage at Stock Yards

<Volume of storage at stock yards(as of June 30)>

In Okuma: 4,496 m<sup>3</sup>

In Futaba: 1,166 m<sup>3</sup>

\* Calculated on the assumption that the volume of a large bag is one m<sup>3</sup>.

<Air dose rates at the stock yards>

No significant change in dose rates before and after transportation

\* Air dose rates at the stock yards are

In Okuma: about 1 – 9 μSv/h

In Futaba: about 1 – 4 μSv/h



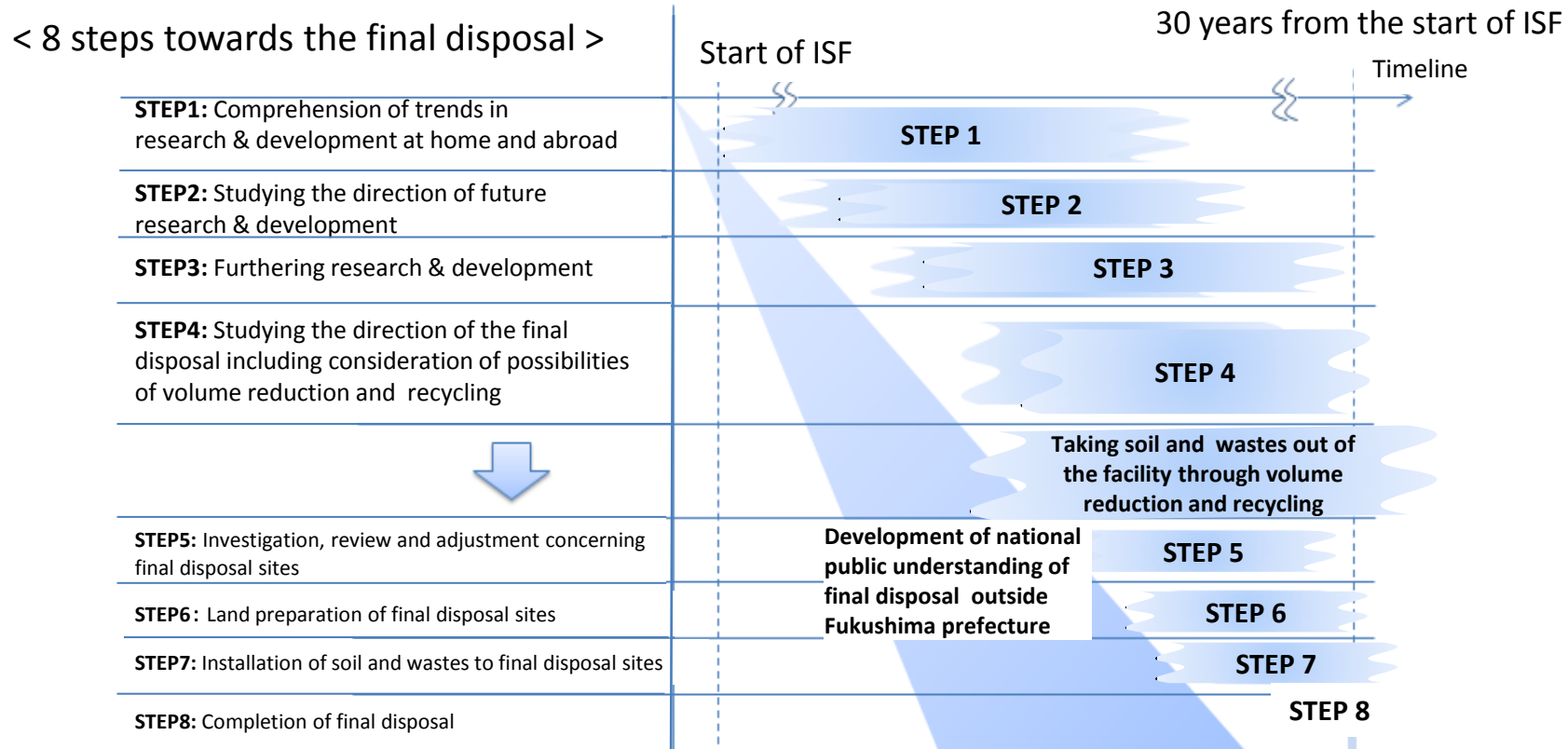
Transportation operations from Minami-Daira TSS in Okuma town



Installation operations to the stock yard in Okuma town

# Steps for Final Disposal outside Fukushima Prefecture within 30 years from the start of the ISF

- Final disposal will be processed outside Fukushima prefecture in accordance with 8 steps
- Collecting information widely and considering physical attenuation of radiation in the process, MOE will undertake:
  - research and develop technology
  - study of a direction of the final disposal taking into account the possibility of volume reduction and recycling
- MOE will develop national public understanding through dissemination of information concerning reuse of low radioactive materials and the final disposal outside Fukushima prefecture



# Technology Development of Volume Reduction and Recycling

The government implements the projects on soil volume reduction and recycling, etc. in order to prepare for final disposal outside of Fukushima Prefecture within 30 years after the start of the ISF.

## Investigation for formulation of technology development strategy

A committee consisted of experts will be established and implements (1) to collect information and verify the latest technologies here and abroad (2) to manage the progress of the projects listed below (3) to formulate a strategy for technology development including targets and scenarios.

## R&D and verification directly-managed by the government

For the early realization of volume reduction and recycling, following projects will be implemented by small scaled classification plants\*: (1) Performance evaluation of plants (2) various tests of soil behavior after treatment and concentrated residual substances (3) demonstration application of soil as cover-soil material and construction material



Plant for  
soil classification

(\*) Classification:  
A technology used to separate small clay from excavated soil by polishing and cleaning based on the cesium properties for adhering to small clay.

## Investigation for promoting of recycling

For exploitation of application of soil with low-level contamination to construction, the following will be studied by MOE in cooperation with research institutions of the relevant ministries and the federation of construction contractors: (1) demand trends for civil engineering materials (2) assessment of required quality and safety for various purposes (3) strategy for promoting recycling of soil



Examples of recycling (left: roadbed material right: core of breakwater)

# Outline

1. Policy Framework
2. Progress in Special Decontamination Area  
(directly conducted by the Government)
3. Progress in Intensive Contamination Survey  
Area (conducted by the municipalities)
4. Decontamination Policies based on Studies  
regarding Radioactive Cesium Behavior
5. Interim Storage Facility
- 6. Cooperation with International Societies**
7. Decontamination Report



# Cooperation with International Societies①

To effectively conduct unprecedented off-site cleanup, MOE has asked and been given advice and evaluation from international and expert points of view. It has also actively shared its experiences with the international community.

## IAEA International Mission

In response to the request made by the Government of Japan, IAEA conducted an International Mission to Japan in Oct. 2011 and Oct. 2013 (as a follow-up mission of 2011) to provide assistance to Japan in assessing the progress made with the remediation, to review remediation strategies, and to share its findings with the international community as lessons learned.

### ● Evaluation and advice from the follow-up mission of 2013

#### 【Evaluation】

- Japan has **achieved good progress** in the remediation activities.
- The team found significant progress in the institutional arrangements, many examples of good practice in stakeholder involvement, a practical option for remediation of forests, development and implementation of TSS, establishment of ISF, and implementation of incineration for volume reduction of contaminated material.

#### 【Advice】

- Japanese institutions are encouraged to increase efforts to communicate that in remediation situations, **any level of individual radiation dose in the range of 1 to 20 mSv per year is acceptable in line with the international standards and with the recommendations from the relevant international organisations, that 1mSv/y is a long-term goal and it cannot be achieved in a short time solely by decontamination work. The appropriate application of the optimisation principle** in a remediation strategy, and its practical implementation, **requires a balance of all factors that influence the situation**, with the aim of obtaining the maximum benefit for the health and safety of the people affected.
- Communicating the entire remediation and reconstruction programmes and how the various components interact (e.g. trade-offs between reducing exposure and increasing waste volumes) could reduce uncertainties and provide greater confidence in the decisions being made.
- There needs to be a continued movement towards **the use of the individual doses**, as measured with personal dosimeters **to support remediation decisions**.
- **Continuing the optimization of the remediation of forest areas by concentrating efforts in areas that bring greatest benefit in reducing doses to the public and avoiding damage to the ecological functioning of the forest is recommended.**
- It is encouraged that the responsible organisation(s) to carry out appropriate demonstrations of **the safety of the facilities and activities for the management of contaminated materials**, in particular for long-term activities, and **to allow for their independent evaluation.**



# Cooperation with International Societies②

Information exchange through bilateral frameworks (U.S., France, UK, etc.) and international organisations (IAEA, OECD/NEA, etc.)

MOE has exchanged information among policy makers and experts, concerning decontamination policy, methods, and research for the environmental behavior of radioactive materials and utilized shared knowledge and information to review and implement its decontamination activities.

## ● Activity cases of the “Working Group on Decommissioning and Environmental Management” under the “US-Japan Bilateral Committee on Civil Nuclear Cooperation”

### (1) Experts from DOE and EPA of U.S. (February-March, 2013)

MOE hosted three U.S. experts and shared information on decontamination policies. It utilized their advice on radiation protection, decontamination methods, waste & soil management based on their experience and professional knowledge

### (2) U.S. – Japan workshop (July 2013)

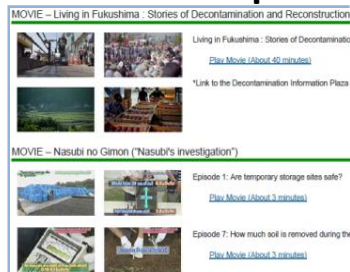
Government officials and researchers from Japan and abroad shared information about research on cesium behavior and stakeholder communication. MOE reported at the Environmental Remediation Study Meeting and utilized shared information to improve its decontamination policies.

## Dissemination of information abroad

### ■ Dissemination of information using the decontamination information web-site and the Decontamination Information Plaza

Provision of accurate information to embassies and foreign media

### ■ Development of the Decontamination Report



# Outline

1. Policy Framework
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- 7. Decontamination Report**

# Decontamination Report

MOE developed the Decontamination Report, a comprehensive report regarding the basic policies and framework of decontamination, contractors' experience on project management, applicable conditions and effects of actual decontamination technologies, in March 2014. MOE aims to convey the experience of decontamination and lessons learned both domestically and internationally and to contribute to improvement of decontamination through compiling the information.

## Table of contents

1. The basic features of off-site decontamination in Japan
2. Overview of decontamination procedures
3. Management and treatment of decontamination soil and waste
4. Management of decontamination project
5. Effects of decontamination
6. Overview, usage and applicable conditions, and verification of effects of decontamination technologies

- The report is available on the MOE decontamination web-site (in Japanese):  
[http://josen.env.go.jp/material/pdf/report\\_on\\_decontamination\\_h26.pdf](http://josen.env.go.jp/material/pdf/report_on_decontamination_h26.pdf)
- English version will be coming soon and be provided for policy makers and experts in the world, in cooperation with IAEA.

# Thank you for your kind attention

<http://josen.env.go.jp/en/>  
<http://josen-plaza.env.go.jp/>



環 境 省

Ministry of the Environment,  
Government of Japan