



Progress on Off-site Cleanup Efforts in Japan

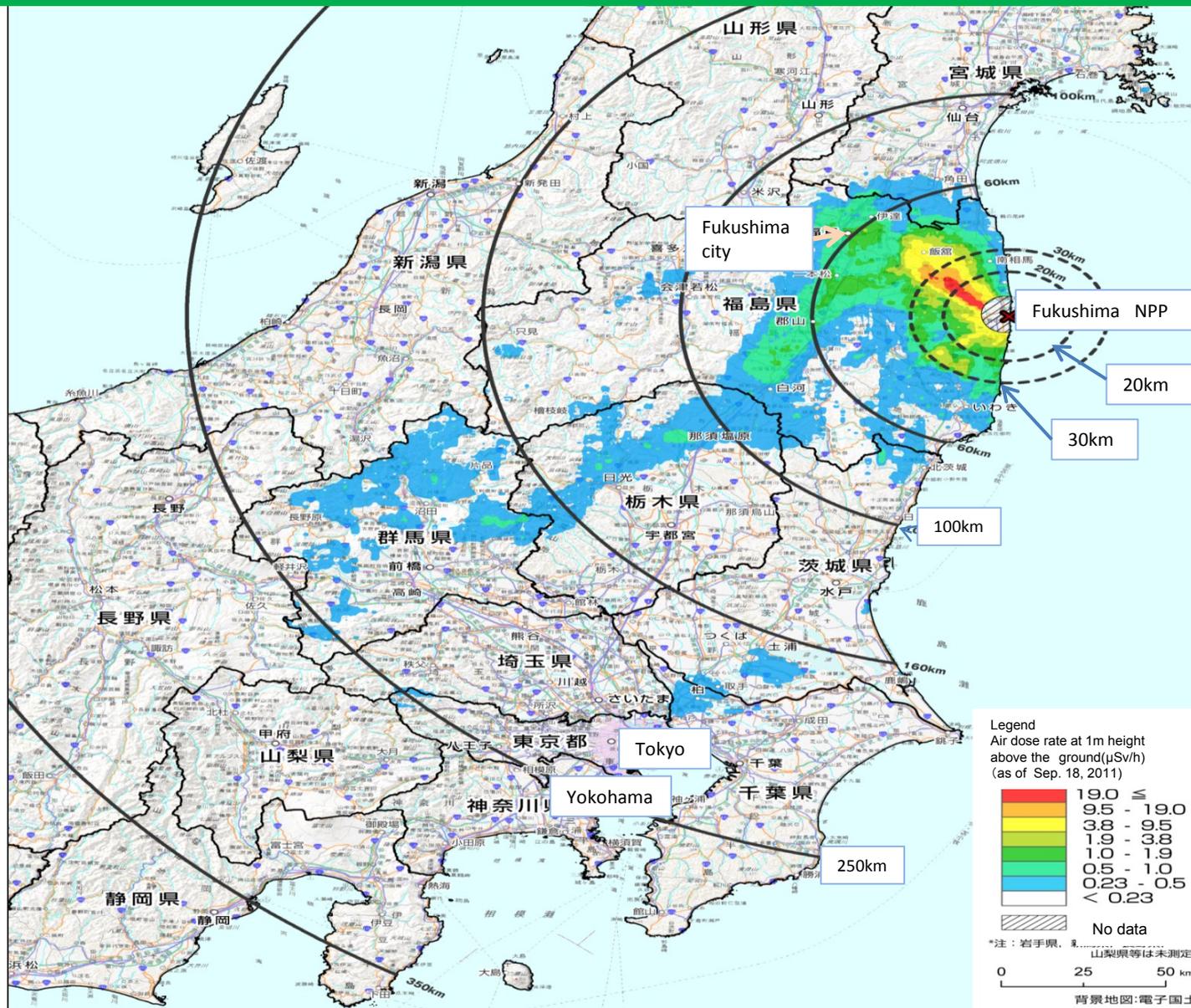
April , 2015

Ministry of the Environment, Japan

Outline

- **Policy Framework**
- Progress in Special Decontamination Area
- Progress in Intensive Contamination Survey Area
- Effect of Decontamination Work
- Efforts to secure Interim Storage Facility
- Public Communication

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



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

Decontamination is one of the measures for radiation protection* to remove radioactive materials from living environment in order to promptly decrease impacts on human health and living environment.

*The national government aims at a long-term goal to reduce additional annual dose to 1 mSv or less by comprehensive measures for radiation risk management including not only decontamination but also monitoring survey, food safety administration, and health exams .

Aircraft monitoring survey by MEXT/Japan and DOE/US (as of Apr. 29, 2011)

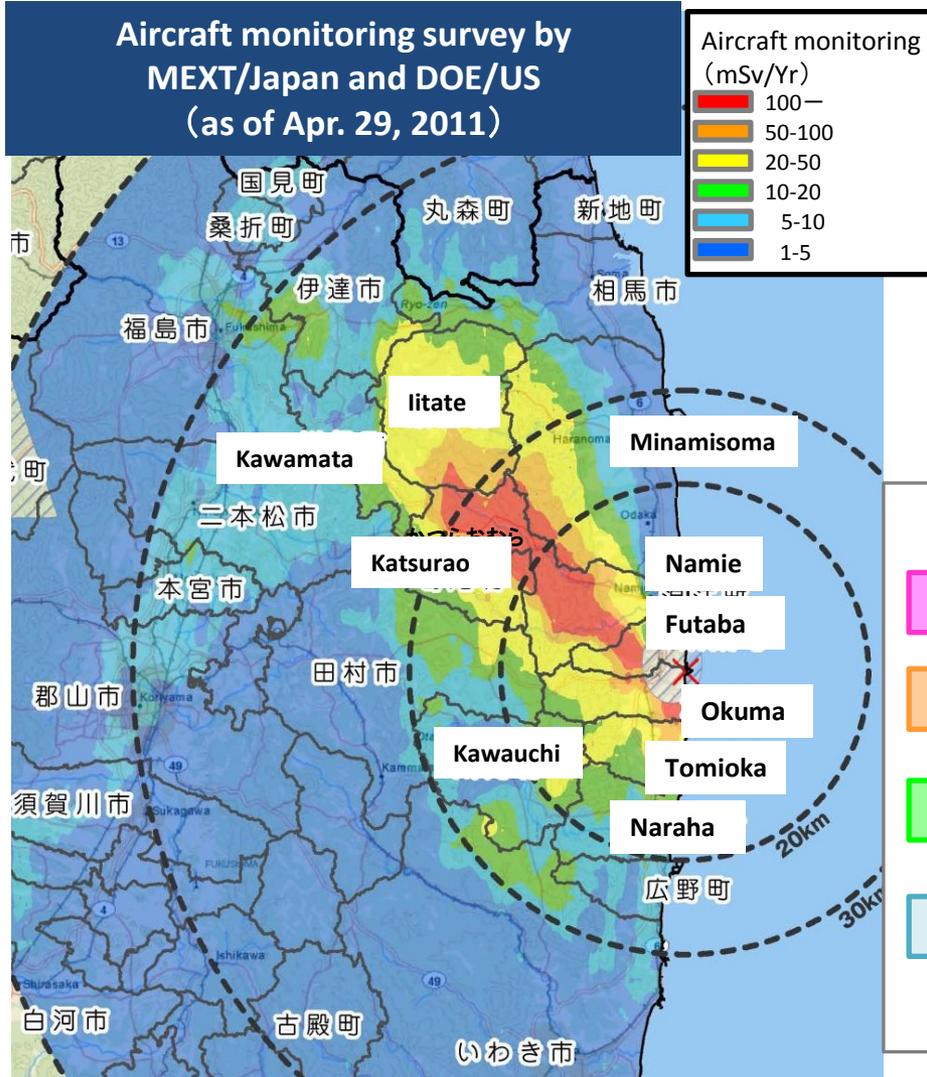
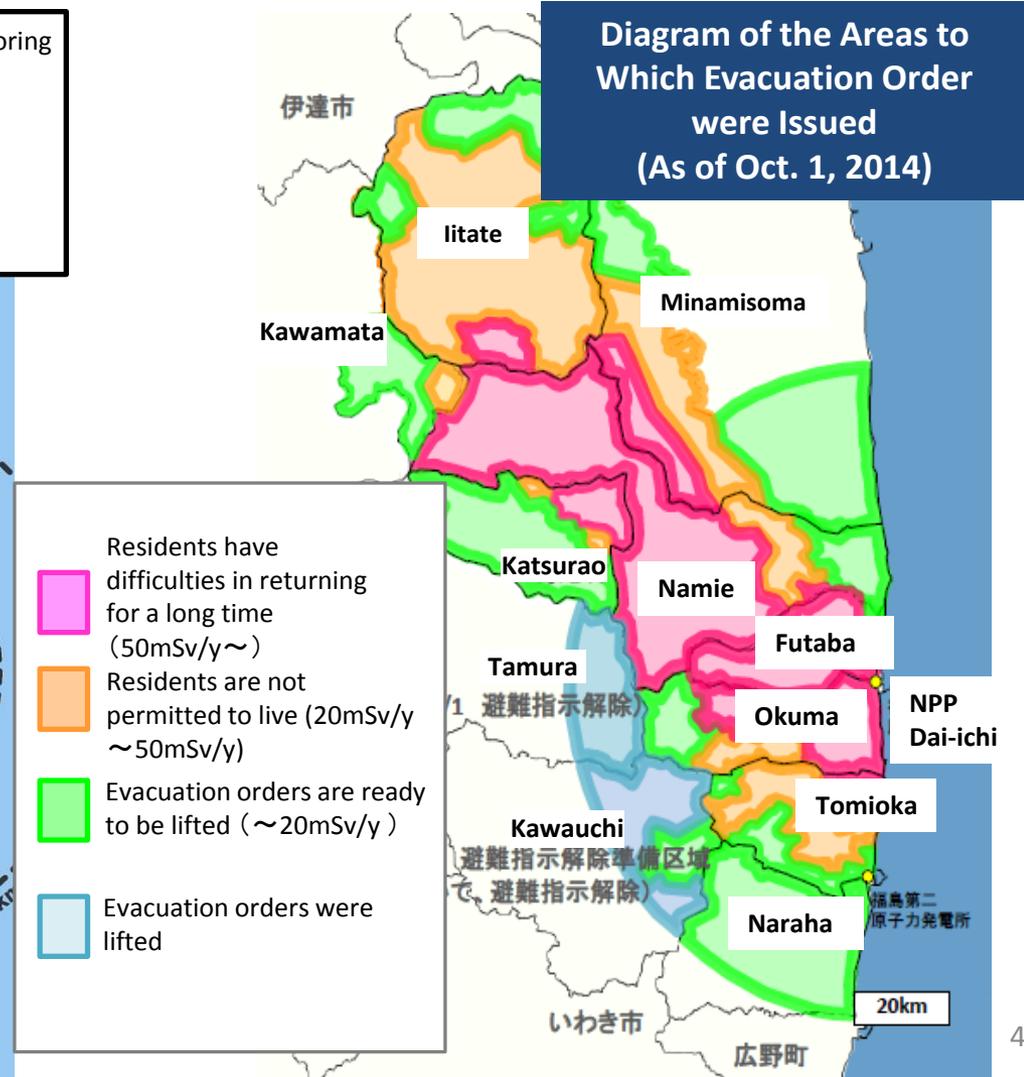


Diagram of the Areas to Which Evacuation Order were Issued (As of Oct. 1, 2014)



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 followings are carried out:
 - Planning and implementation of decontamination work
 - Collection, transfer, temporary storage, and final disposal

Special Decontamination Area

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

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

Intensive Contamination Survey Area

- ◆ 104 municipalities in 8 prefectures (*), in which over 0.23 μ Sv/hour of air dose rate (estimated from the long-term target of annual additional exposure dose, 1 mSv/year, under a certain condition) is observed, were designated.
- ◆ **Decontamination is implemented by each municipality.** The national government will take financial and technical measures.

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

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Status of the Areas to Which Evacuation Order were Issued (as of Oct, 2014)

Rearrangement of the (former) Restricted Area and the (former) Deliberate Evacuation Area was completed on Aug. 7, 2013. The areas were rearranged into three areas, Area1, 2 and 3, as below.

Area 1: < 20mSv/yr

Evacuation orders are ready to be lifted: 

Area 2: 20 – 50 mSv/yr

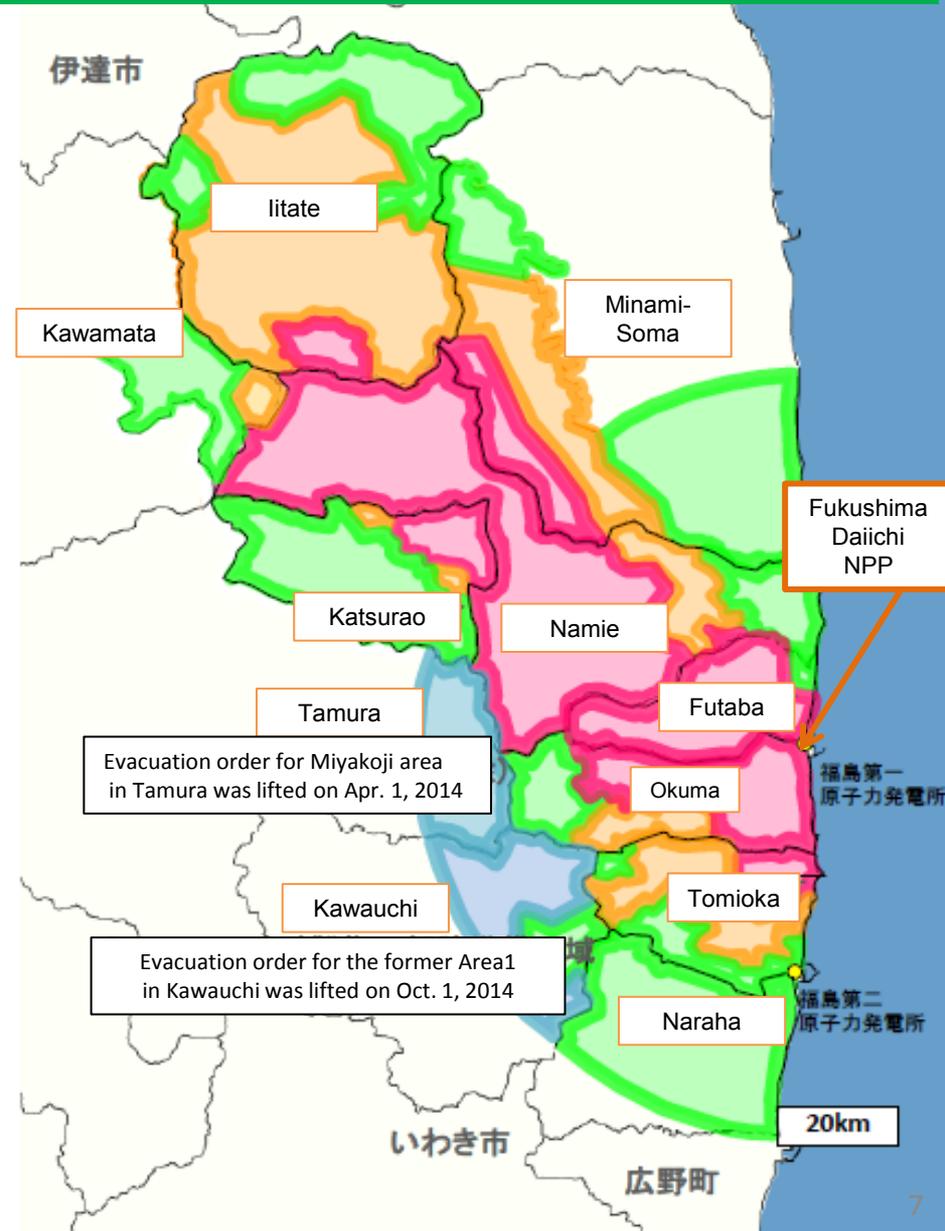
Residents are not permitted to live: 

Area3: > 50 mSv/yr

Residents will have difficulties in returning for a long time: 

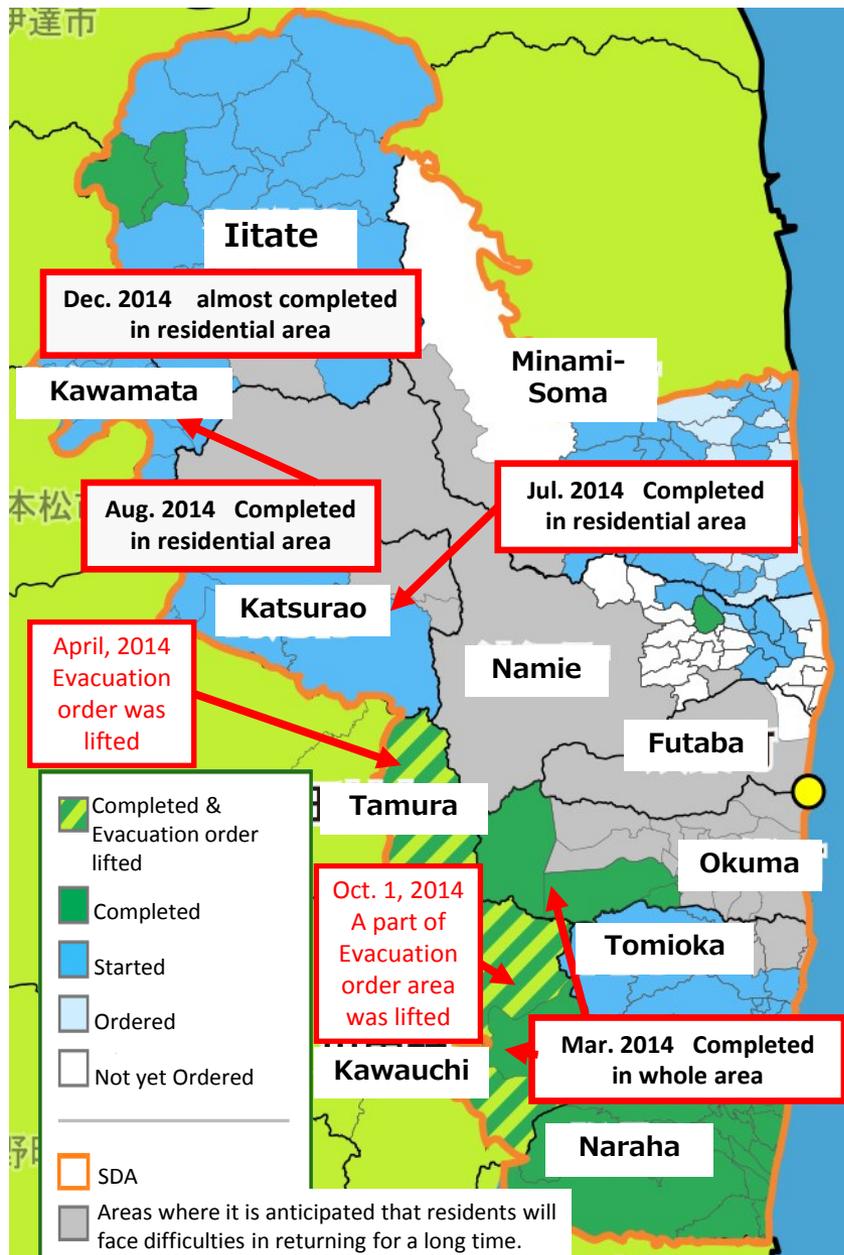
The areas evacuation orders were lifted: 

- Miyakoji Area in Tamura City (Apr. 2014)
- A Part of Kawauchi Village (Oct. 2014)



Progress in the Special Decontamination Area ①

(as of Mar., 2015)



< Completed decontamination >

Tamura	Whole area decontamination was completed in June, 2013. Evacuation order was lifted on April 1, 2014
Kawauchi Naraha Okuma	Whole area decontamination was completed in March, 2014 ※ As for Kawauchi, a part of the evacuation order was lifted on October 1, 2014
Katsurao	Decontamination of residential area was completed in July, 2014
Kawamata	Decontamination of residential area was completed in August, 2014
Joban Expressway	Decontamination was completed ※ 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 Mar. 1, 2015

< Schedules of decontamination ahead >

Kawamata Katsurao	Aiming at the completion of decontamination of remaining areas within 2015
Iitate	Decontamination of residential area was almost completed at the end of Dec., 2014 aiming at the completion of decontamination of remaining area within 2016
Minami-soma Namie Tomioka	Aiming at the completion of decontamination of residential area within FY 2015 and the completion of decontamination of remaining area within FY 2016
Futaba	Aiming at the completion of decontamination within FY 2015

Progress in the Special Decontamination Area ②

Decontamination Plan has been established in all the 11 municipalities, and the progress has been made.
Decontamination has been completed in Tamura in June, 2013, and in Naraha / Kawauchi / Okuma in March, 2014.

		Population in Decontamination Target Area(person) (approx. Figure)	Decontamination Target Area (ha) (approx. figure)	Rearrangement of the Restricted areas, etc.	Progress of the Decontamination Work < as of Feb. 20, 2015 >				Schedule	
					Decontamination Plan	Temporary Storage Site	Consent of landowners, etc.	Decontamination activities	Residential Areas completed	The rest of other areas completed
Whole area decontamination was completed	Tamura	400	500	Apr. 2012	Apr. 2012	Secured	Completed	Completed in June. 2013	FY2013	
	Kawauchi	400	500	Apr. 2012	Apr. 2012	Secured	Completed	Completed in March, 2014	FY2013	
	Naraha	7,700	2,100	Aug. 2012	Apr. 2012	Secured	completed	Completed in March, 2014	FY2013	
	Okuma	400	400	Dec. 2012	Dec. 2012	Secured	Completed	Completed in March, 2014	FY2013	
Decontamination of residential area was completed	Katsurao	1,400	1,700	Mar. 2013	Sep. 2012	Secured	Almost completed	In progress	Summer, 2014 (completed)	Within 2015
	Kawamata	1,200	1,600	Aug. 2012	Aug. 2013	approx. 90% Secured	Almost completed	In progress	Summer, 2014 (completed)	Within 2015
	Iitate	6,000	5,600	Jul. 2012	May 2012	secured	approx. 90%	In progress	Almost completed	Within 2016
Decontamination is under operation & in preparation	Minami-Soma	13,300	6,100	Apr. 2012	Apr. 2012	approx. 80% secured	approx. 70%	In progress	FY2015	FY2016
	Namie	18,800	3,300	Apr. 2013	Nov. 2012	approx. 40% Secured	approx. 70%	In progress	FY2015	FY2016
	Tomioka	11,300	2,800	Mar. 2013	Jun. 2013	secured	approx. 90%	In progress	FY2015	FY2016
	Futaba	300	200	May, 2013	Jul. 2014	Under coordination	Under preparation	Under preparation	FY 2015	

Note 1: Necessary areas for securing Temporary Storage Sites might be reviewed in future survey

Note 2: In the municipalities where decontamination was completed, such as Tamura, Kawauchi, Naraha, and Okuma, remaining decontamination shall be implemented for the residents who did not yet consent but newly request decontamination.

Progress in the Special Decontamination Area ③

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

As of Feb. 20, 2015 < Unit: % >	Tamura		Naraha		Kawauchi		Iitate		Kawamata	
	Executing ratio	Ordering ratio								
Residential area	100	100	100	100	100	100	96	100	100	100
Farmland	100	100	100	100	100	100	25	100	18	100
Forest	100	100	100	100	100	100	38	100	56 (54)	100
Road	100	100	100	100	100	100	24	100	4	100

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

Note 2: Ordering ratio is calculated as follows: ③Areas already contracted for decontamination / ②Target 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 skipped

Progress in the Special Decontamination Area ④

As of Feb. 20, 2015	Katsurao		Okuma		Minami-Soma		Tomioka		Namie	
	Executing ratio	Ordering ratio								
Residential area	100	100	100	100	7	99.9	17 (14)	100	11	48
Farmland	68 (62)	100	100	100	8 (6)	65	5	100	13	35
Forest	99.9 (99)	100	100	100	34 (31)	79	28 (22)	100	14 (13)	43
Road	32 (23)	100	100	100	2 (1)	65	61 (60)	100	20 (19)	46

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

Note 2: Ordering ratio is calculated as follows: ③Areas already contracted for decontamination / ②Target areas to be decontaminated

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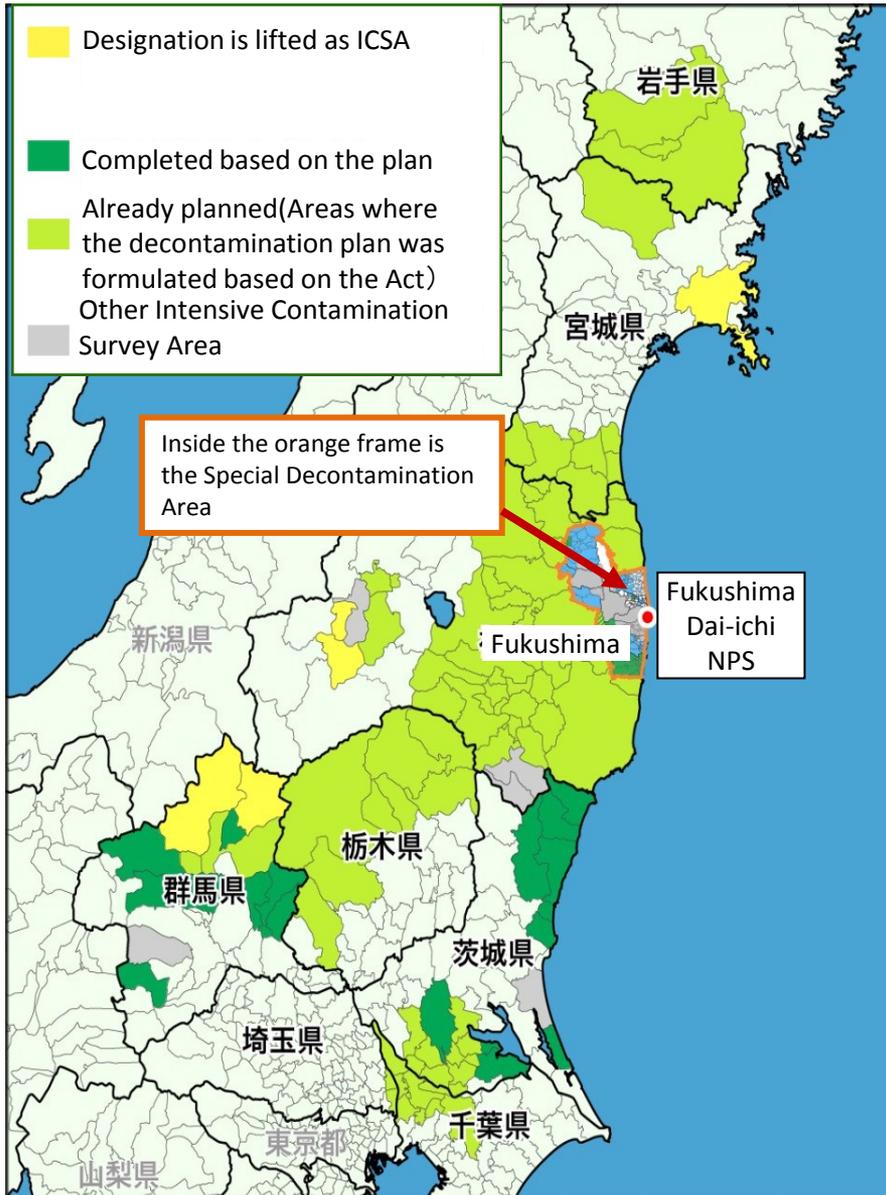
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Progress in Intensive Contamination Survey Area ①

As of the end of January, 2015

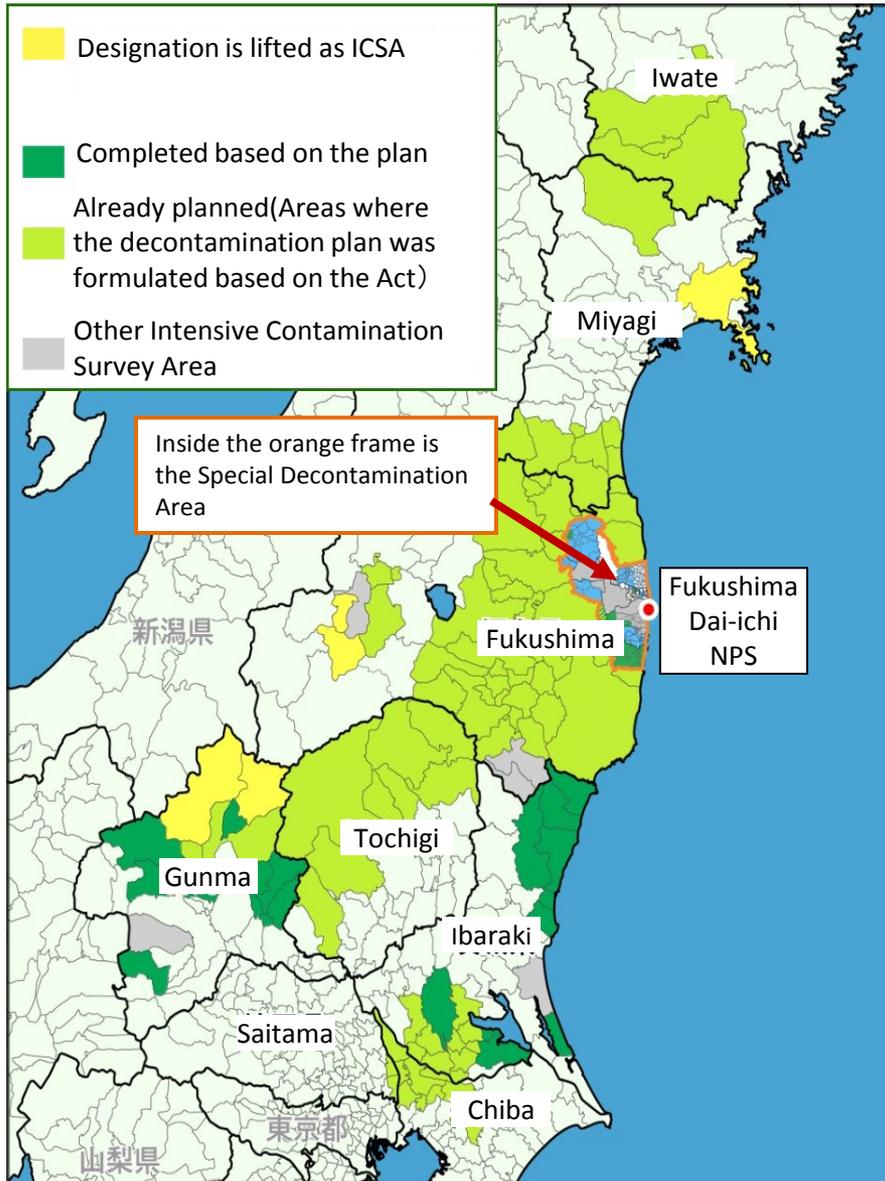


< In Fukushima prefecture >

- ◇ Number of municipalities designated as the Intensive Contamination Survey Area:
41 (at the start) → 39 (at present)
When the situation becomes different from the required condition of designation, the designation can be lifted. The designation was lifted in two municipalities up to now because of the radiation dose decrease, etc.
- ◇ Municipalities that formulated decontamination implementation plans (all municipalities that had intended to do):
36 municipalities
- ◇ Municipalities in process of implementing decontamination based on the plans:
36 municipalities
- ◇ The progress of decontamination (as of the end of February 2015)
Public facilities: approx. 80%
Residential houses: approx. 70%
Roads: approx. 40%
- ◇ The end of most of the decontamination plans are set between FY2015- FY2016.

Progress in Intensive Contamination Survey Area ②

As of the end of December, 2014



< Outside Fukushima prefecture >

- ◇ Number of municipalities designated as the Intensive Contamination Survey Area: 63 (at the start) → 60 (at present)
When the situation becomes different from the required condition of designation, the designation can be lifted. The designation was lifted in two municipalities up to now because of the radiation dose decrease, etc.
- ◇ Municipalities that formulated decontamination implementation plans (all municipalities that had intended to do): 58 municipalities
- ◇ 18 out of 58 municipalities have completed their plans (and continued monitoring of air dose rates).
- ◇ 27 out of 58 municipalities have almost completed.
- ◇ The progress of decontamination (as of the end of December 2014)
Schools & nurseries: almost completed
Residential houses: approx. 90%
Roads: approx. 90%

Progress in Intensive Contamination Survey Area ④

Within Fukushima prefecture (As of the end of Feb., 2015)	Ordering Ratio (Number of ordering/Number of planning)	Executing Ratio (Number of actual achievement/Number of planning)
Public facilities, etc.	mostly ordered	approx. 80%
Residential houses	mostly ordered	approx. 70%
Roads	approx. 70%	approx. 40%
Farmlands & meadows	mostly ordered	approx. 80%
Forests(in living areas)	approx. 80%	approx. 50%

Note: The table is based on the investigation result conducted by Fukushima prefecture.

The number of planning is the total number until the end of FY2013, which might be increased in future depending on each municipality's status.

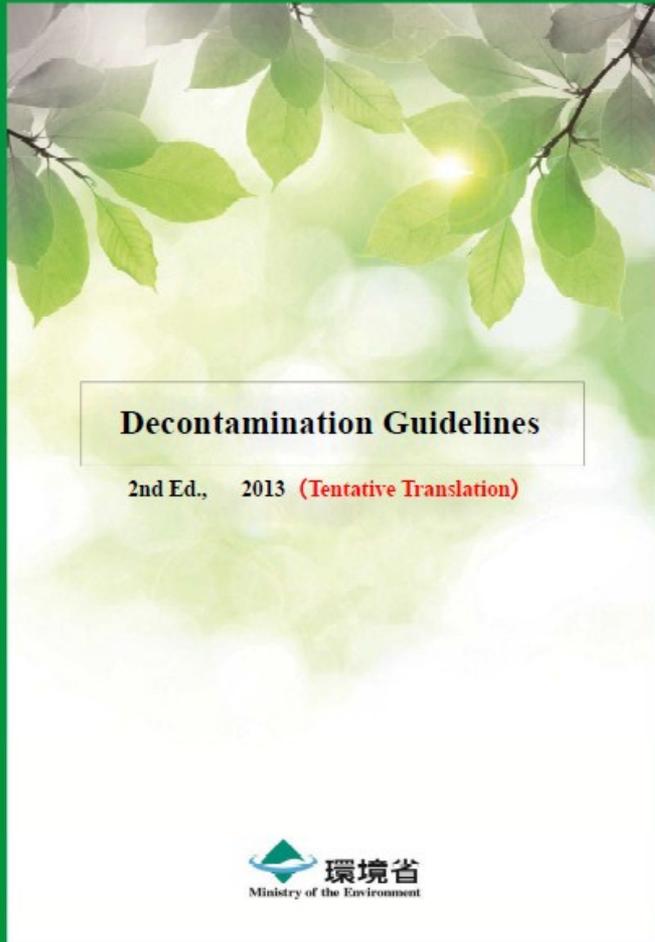
Outside Fukushima pref. (As of the end of Dec., 2014)	Ordering Ratio (Number of Ordering/number of planning)	Executing Ratio (Number of actual achievement/number of planning)
Schools and nurseries	ordered	almost completed
Park, Sports facilities	mostly ordered	approx. 90%
Residential houses	mostly ordered	approx. 90%
Other facilities	approx. 90%	approx. 90%
Roads	approx. 90%	approx. 90%
Farmlands & meadows	ordered	almost completed
Forests(in living areas)	mostly ordered	approx.70%

Note: The number of planning is the total number including future plan as of the end of 2014, and might be increased aftertime

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Decontamination Guidelines



- Technical guidelines for carrying out decontamination
- Developed to complement the Ordinance of the Ministry of the Environment
- Used as reference when ordering decontamination projects and the like

Contents

1. Guidelines on the methods of investigating and measuring the status of environmental pollution in intensive survey areas
2. Guidelines pertaining to measures on decontamination and the like
3. Guidelines pertaining to the collection and transportation of the removed soil
4. Guidelines pertaining to the storage of the removed soil

URL:

http://josen.env.go.jp/en/framework/pdf/decontamination_guidelines_2nd.pdf

Techniques Used for Decontamination ①

- Houses, buildings
 - Removal of deposits from the roof, deck , and gutters
 - Wiping off the roofs and walls, high-pressure washing etc.
- Gardens and standing trees
 - Mowing, removal of fallen leaves, topsoil stripping etc.
- Roads
 - Removal of deposits in the ditch, high-pressure washing etc.

Decontaminating paved surfaces
(by a collective type high-pressure water cleaner)



Decontaminating roofing tiles (by wiping-off)



Decontaminating gardens (by removing soils etc.)



Techniques Used for Decontamination ②

- **Schoolyards, gardens and parks**
Stripping of soils and topsoil etc.
- **Farmlands**
Reversal tillage, stripping of topsoil etc.
- **Forests and woods**
Removal of fallen leaves and lower twigs, pruning etc.

Decontaminating a schoolyard



Photo provided by: JAEA

Decontaminating a grass plot



Photo provided by: Japanese Society of Turf grass Science

Decontaminating a forest (by removing fallen leaves)



Photo provided by: JAEA

Summary on Decontamination Effect

Effect of decontamination works by national and local governments (Major results)

Air dose rate^{*1,2} (Measured at 1m height)	Before decontamination: 0.36-0.93 μSv/h  After decontamination: 0.25-0.57 μSv/h		
Reduction rate (average) of air dose rate^{*2,3}	<1μSv/h before decontamination	1-3.8μSv/h before decontamination	> 3.8μSv/h before decontamination
	32%	43%	51%
Example of reduction rate of surface concentration of contamination^{*4}	Asphalt-paved roads: 50-70% by washing, 30-70% by high-pressure washing Playground(Soil): 80-90% by stripping off surface-dirt		

*1: Range from 25 to 75 percentile values of the air dose rate.

*2: Data measured at 50cm height in children's living environment are not included.

*3: Average reduction rate of the air dose rate for different dose levels before decontamination.

(Reduction rate (%))= (1-air dose rate after decontamination / air dose rate before decontamination) x100.)

*4: Already in press release of "Announcement on 'Effectiveness of decontamination work which is implemented by the national government and relevant municipalities in decontamination project' (Jan. 18, 2013)"

<Original Data>

○Projects: Mostly, decontamination projects after FY2012

(Projects by national government: 10 municipalities;
Projects by municipalities: 90 municipalities in 8 prefectures)

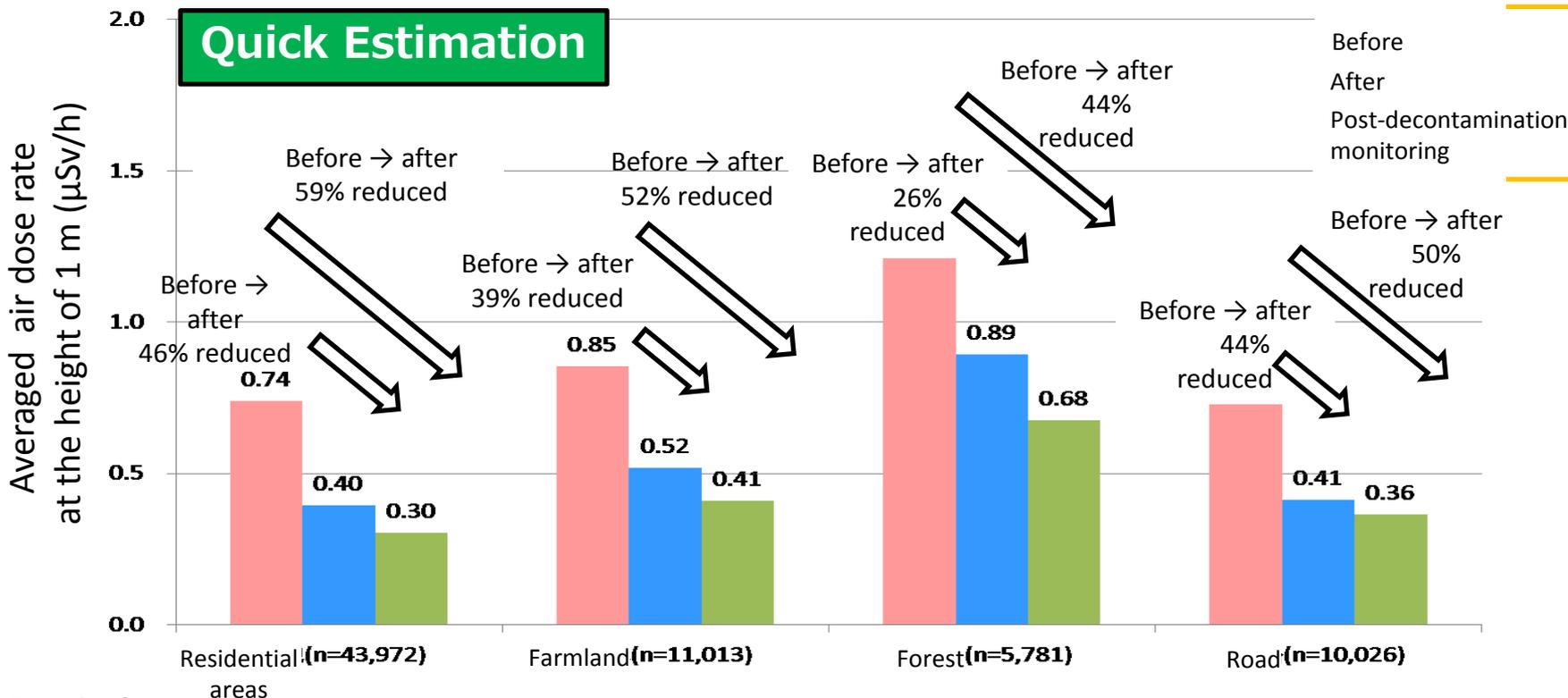
○Data measurement term : Roughly from Mar. 2012 to Oct. 2013

○Measured item: Air dose rate (measured at 1m and 50cm heights; Unit: μSv/h)

○Number of data: About 250,000 (A pair of data collected before and after decontamination is counted as one item of data)

Effects of Decontamination Work in Naraha

- ◆ Decontamination work decreased radiation dose: e.g. approx. 46% in residential area
- ◆ Post-decontamination monitoring confirmed that effects of the whole area decontamination have been maintained and that radiation dose has been continuously decreasing



- ◆ It is the policy that the whole area decontamination is not to be conducted in principle. However, if post-decontamination monitoring finds hot spots where decontamination effects are not maintained and whose high radiation affects air dose rates of surrounding environment, follow-up decontamination is to be conducted on each situation, taking into account rationality and feasibility.

Outline

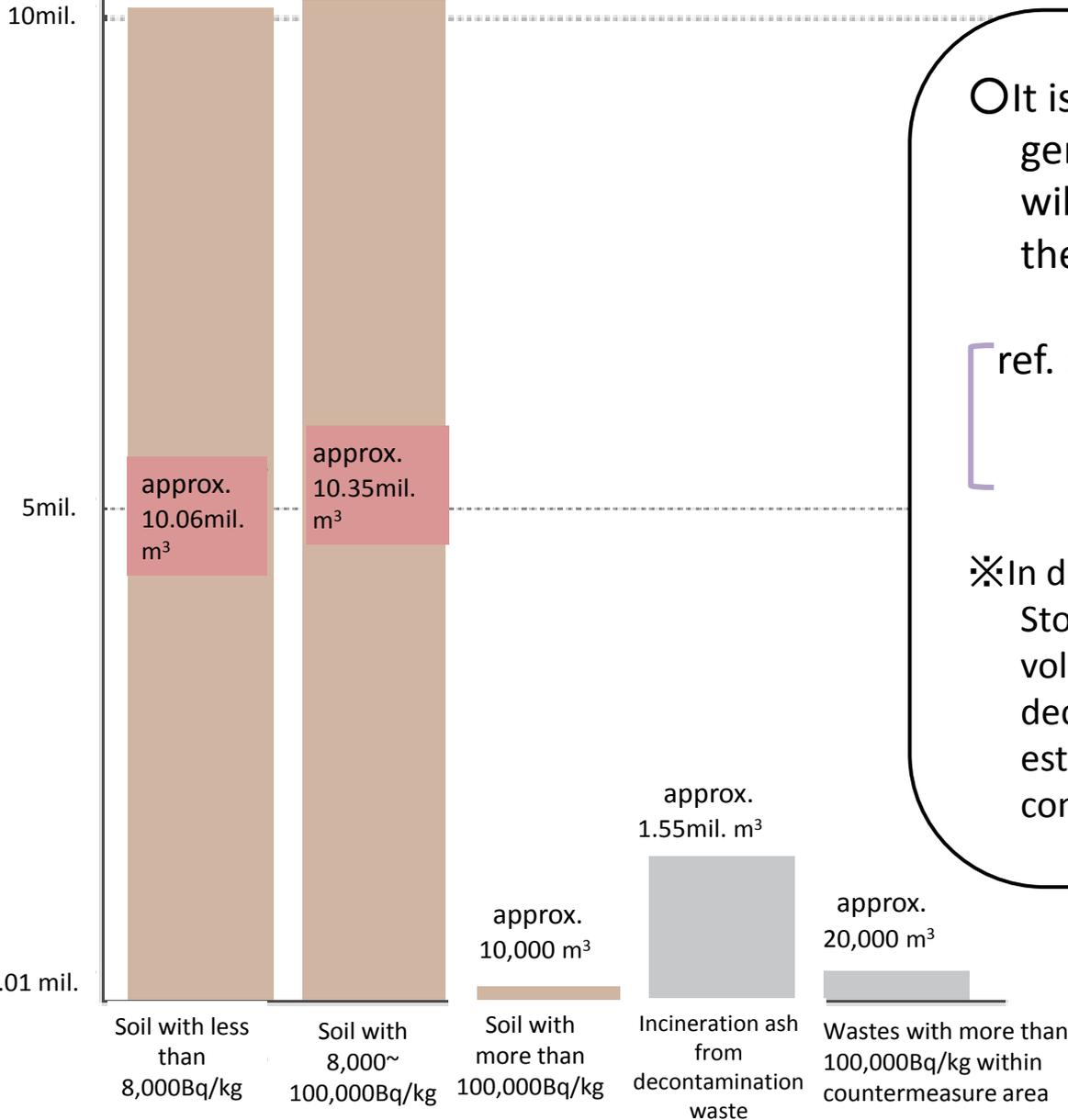
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Process regarding the Interim Storage Facility

Time	Contents
<u>Oct. 2011</u>	<u>MOE announced the Basic Principles of the roadmap of the Interim Storage Facility (ISF).</u>
Apr., 2013-	MOE started the field survey including boring survey, obtaining the consent from the local communities.
Feb.-Mar., 2014	The Governor of Fukushima requested MOE to consolidate the ISF in Okuma and Futaba. MOE accepted the request in March.
May.-Jun., 2014	The Government held the explanatory meetings for residents. (16 times in total: 10 times in Fukushima, 6 times outside Fukushima)
<u>Sep. 1, 2014</u>	<u>The Governor accepted the construction of the ISF</u> , and both mayors of Okuma and Futaba agreed that the government would explain to the landowners
Oct. — Nov. 2014	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.
<u>Dec.-Jan., 2015</u>	<u>Both Okuma and Futaba accepted the construction of the ISF.</u>
<u>Feb. 3, 2015</u>	<u>The construction of stock yards in the ISF started.</u>
<u>Feb. 25 & 27, 2015</u>	<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> and requested the delivery to be started after Mar. 12.
<u>Mar. 13 & 25</u>	<u>MOE started the delivery from temporary storage sites in Okuma and Futaba, respectively.</u>

Possible Stockpile in the Interim Storage Facility

(m³) Estimated volume of generated soil, etc. from decontamination work (in case of 22 million m³)



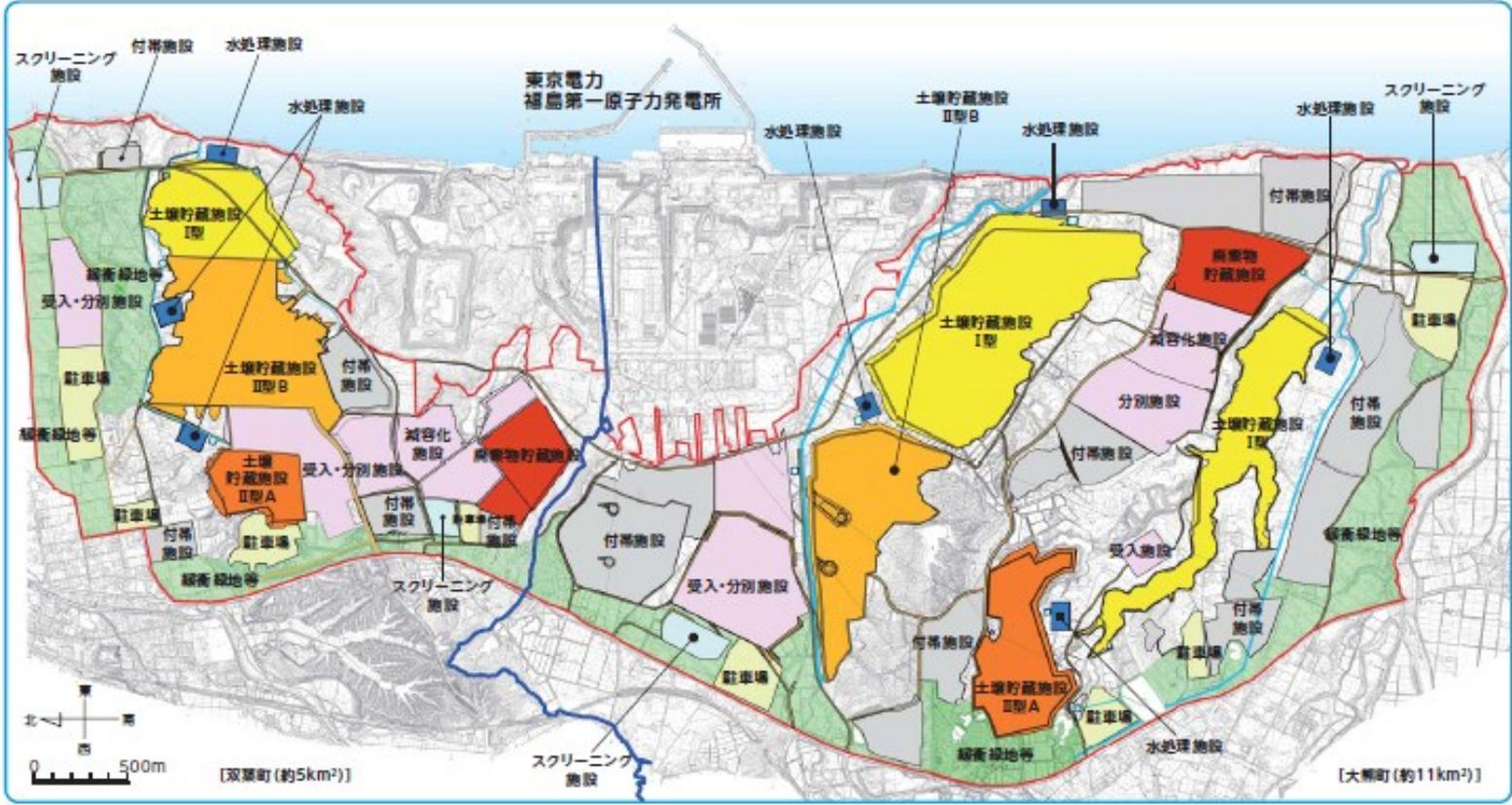
○ It is estimated that stockpile of soil generated from decontamination will be approx. **16 ~ 22 mil. m³** after the volume reduction (incineration)

ref. : approximately 13~18 times as much as the volume of Tokyo Dome (1.24 mil. m³)

※ In discussing the plan for the Interim Storage Facility, possible increase in volume of soil due to additional decontamination that is difficult to estimate for now will be also considered.

Layout Drawing of Interim Storage Facilities (draft)

- Interim Storage Facility will be consisted of facilities with various functions.
- Those facilities will be developed in accordance with the consent of landowners and the generation of removed contaminated soil, etc.



- Type - I Soil Storage Facility
- Type - II - A Soil Storage Facility
- Type - II - B Soil Storage Facility
- Waste Storage Facility
- Acceptance & Separation Facility/Volume Reduction Facility
- Attached facilities: Admin Office/R&D Facility/Public Information Center etc.
- Screening Facility
- Parking Lot
- Water Treatment Facility
- Buffer Green Zone
- Boundary of lot
- Boundary of administration

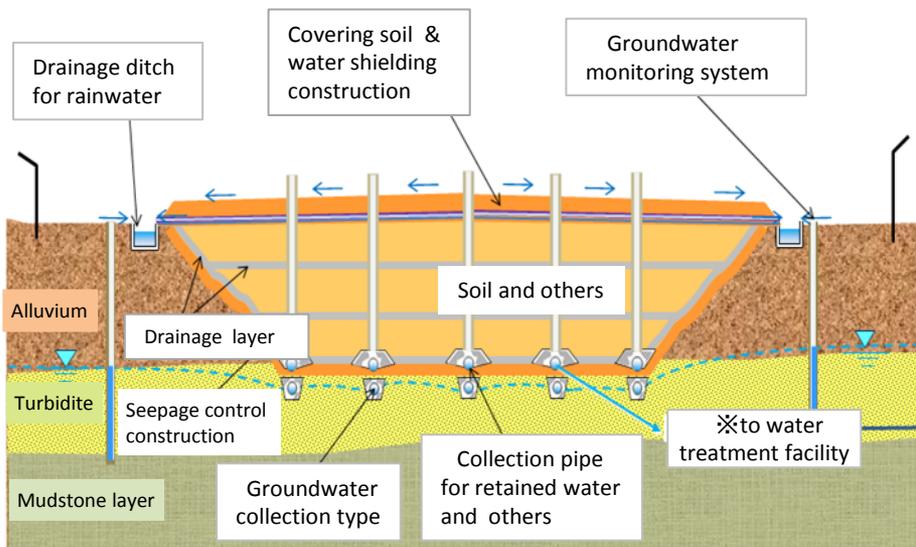
本図面に示す各施設の配置は、ボーリング調査等の結果に基づき、現段階での案として示したものであり、今後変更の可能性があります。

Structure Concept on Interim Storage Facility

< Schematic view of Soil Storage Facility >

Applicable geography and geology:
tableland, etc.

Radioactive cesium concentration:
more than 8,000Bq/kg

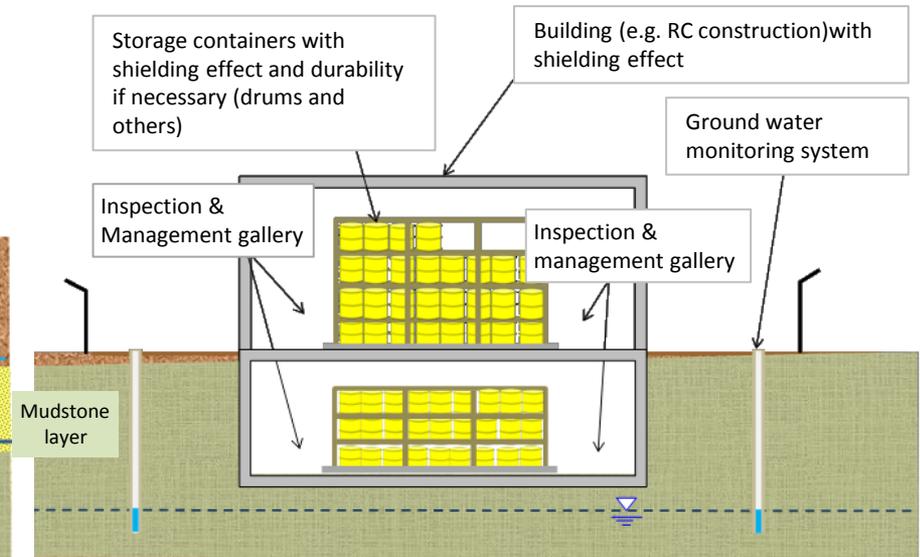


Soil storage facility
<Type II B>

< Schematic view of waste storage Facility >

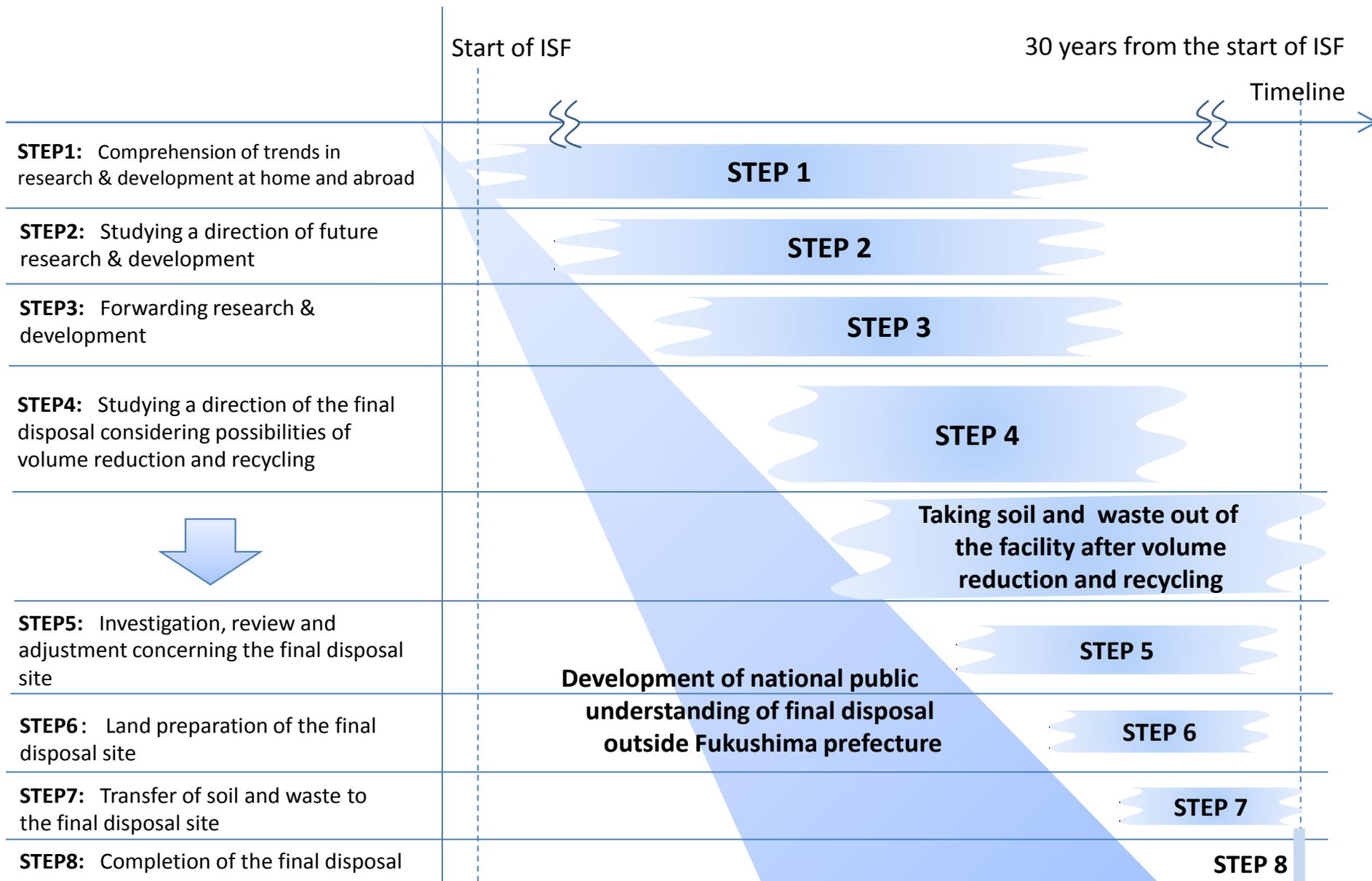
Applicable geography and geology:
Hill, tableland

Radioactive cesium concentration
more than 100,000Bq/kg



※Above pictures are schematic and details may be reviewed in future, considering geography and geology

Road Map for Final Disposal outside Fukushima Prefecture



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Public Communication

WEB

- Comprehensive and instantaneous information



Pamphlets and other materials

- Easy-to-understand and detailed information
- Distributed at meetings, workshops, city offices, banks, convenience stores, etc.
- Available on the Web



Newspaper ads and TV programs

- Media is the largest information source for people in FP



Decontamination Information Plaza

- Information hub of decontamination run by MOE and FP (located near the Fukushima Station)
- Providing people inside and outside of FP and municipalities with comprehensive and latest information of decontamination and radiation



Interactive exhibition, demonstration, and workshops



Dispatch of experts to municipalities, communities, schools, etc.



Thank you very much

Decontamination information web site;
<http://josen.env.go.jp/en/>