



Off-site Environmental Remediation in Affected Areas in Japan

March, 2020



Ministry of the Environment, Japan



< Topic of the Month >

Minister Visited Iitate Village on February 9

Minister Koizumi (in the middle) visited Nagadoro in Iitate Village to inspect the contaminated soil recycling demonstration project site on February 9. He met Mr. Kanno, Village Mayor (on the left) and Mr. Shigihara, Borough Head (on the right).



Result and Effect of the Whole Area Decontamination

Interim Storage Facility

Disposal of the Specified Waste

Communication to the Public and
International Societies

Decontamination and Waste Treatment based on the “Act on Special Measures”

Measures on decontamination of soil contaminated by radioactive materials

① Special Decontamination Areas (SDA)

Designation of SDA by the Minister of the Environment

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

Decontamination implementation by the National Government



② Intensive Contamination Survey Areas (ICSA)

Designation of the ICSA by the Minister of the Environment
(The areas with more than 0.23μSv/h)

※0.23μSv/h is not the decontamination target, but designation criteria for the ICSA
If the area is more than 0.23.μSv/h, after the monitoring survey by municipality mayors

Development of Decontamination Implementation Plan by the municipality mayors

Implementation of decontamination by municipality mayors based on the plan (the national government allocates the budget)

※Removed soil generated by decontamination work inside NPS, is implemented by the relevant nuclear producer, TEPCO

Management of waste contaminated by radioactive materials

Specified waste

① Waste within the countermeasure area

Designation of contaminated waste management area※ by the Minister of the Environment
※Designated areas which meet requirements to be contaminated by radioactive materials at certain level necessary to manage waste under special management

A management plan for waste within the countermeasure area is formulated by the Minister of the Environment

Implemented by the national government pursuant to the treatment plan for waste

Prohibition on unauthorized actions (ex. unauthorized dumping)

Specified domestic waste and specified industrial waste

➤ It is stipulated by MOE’s ordinance that the waste applied for waste treatment law, but might be contaminated by radioactive materials diffused from the NPS accident. It is managed based on treatment criteria of the waste treatment law and special treatment criteria on the Act on Special Measures

Survey on sewerage sludge, incinerated ash, etc. (obligatory)

Report to the Minister of the Environment

Survey on waste other than that specified in the left box (voluntary basis)

Application

② Designated waste

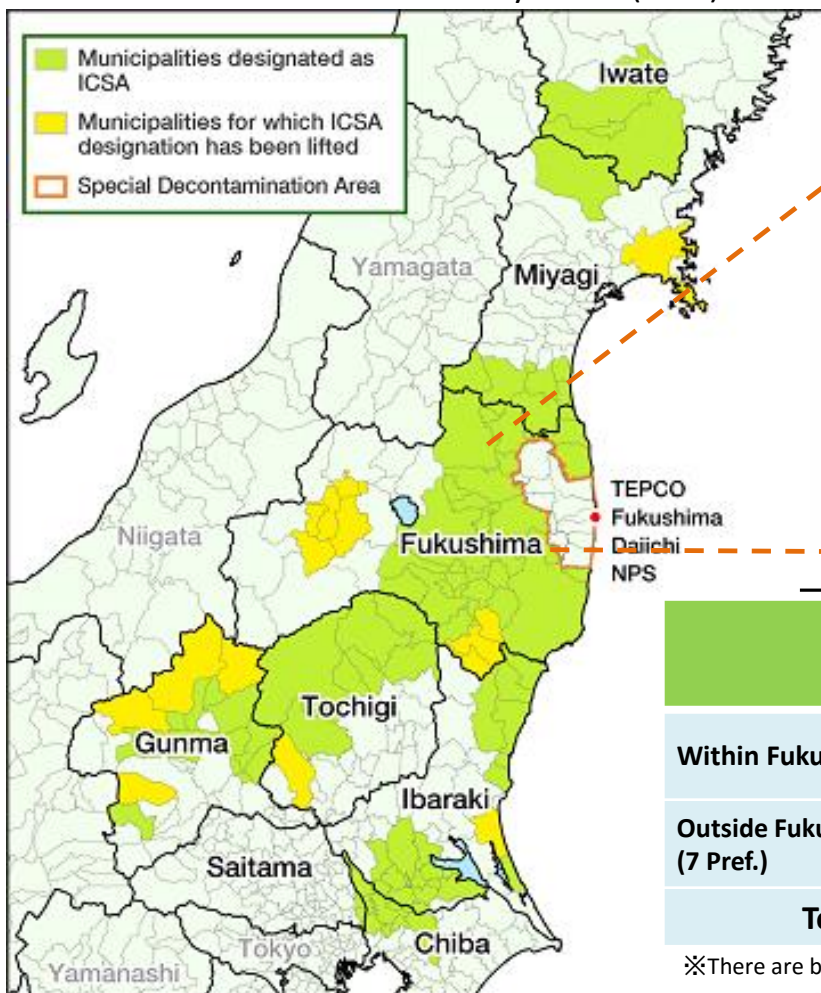
Designated as “designated waste” by the Minister of the Environment
※ Contaminated waste above certain level (8,000Bq/kg)

Implemented by the national government

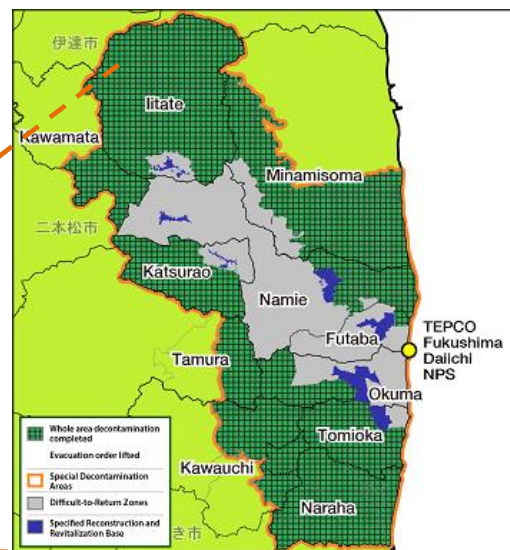
Result of Whole Area Decontamination

Whole area decontamination based on the Act on Special Measures was completed on March 19, 2018, excluding the Difficult-to-Return Zones (DRZ)

<Intensive Contamination Survey Areas (ICSA)>



<Special Decontamination Areas (SDA)>



→ Whole area decontamination in the SDA was completed at the end of March 2017

	Municipalities where whole area decontamination was completed		
		SDA (11)	ICSA (93)
Within Fukushima Pref.	43※	11	36
Outside Fukushima Pref. (7 Pref.)	57	—	57
Total	100	Completed in March 2017	Completed in March 2018

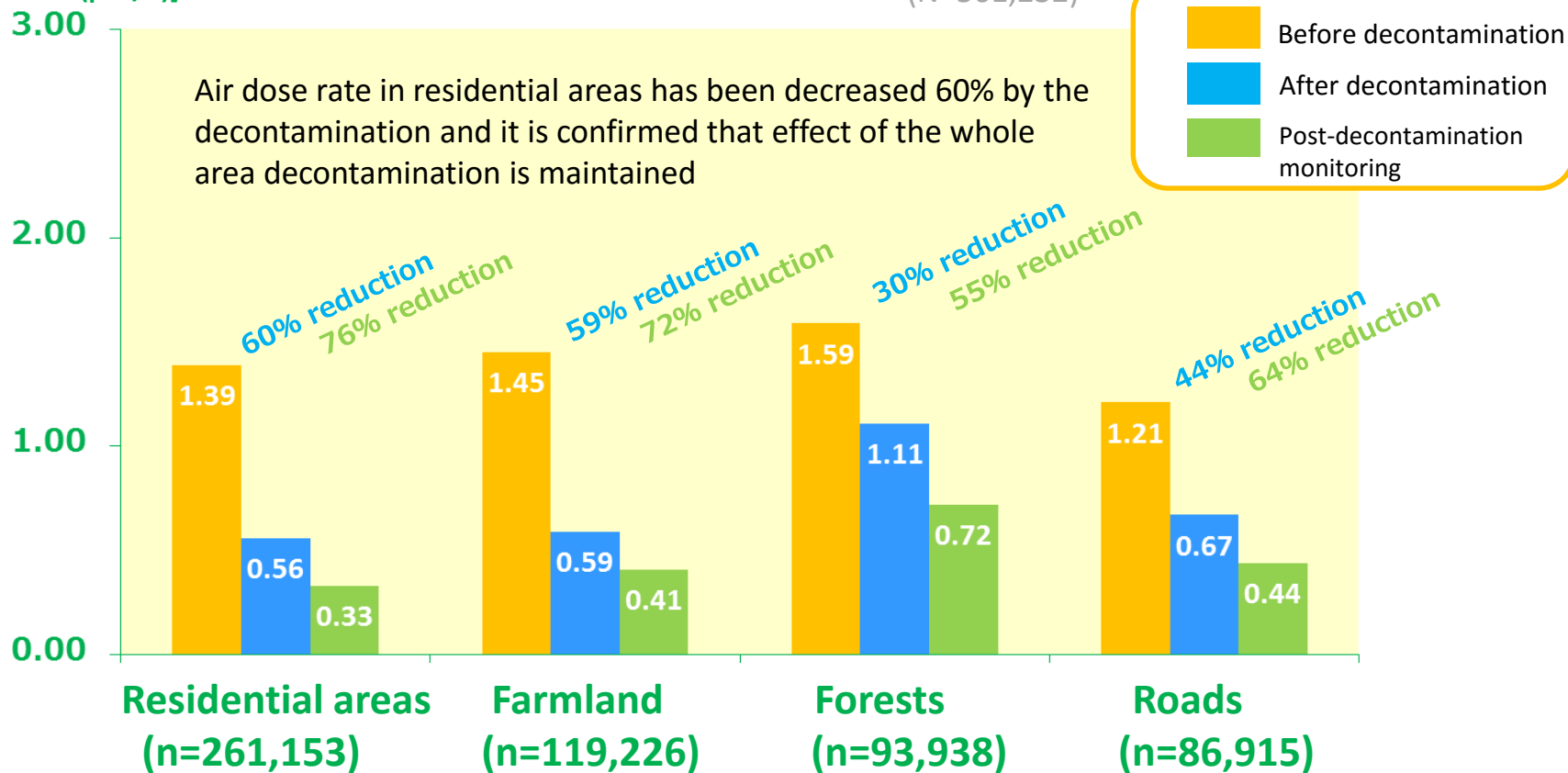
※There are both SDA and ICSA in Minamisoma, Tamura, Kawamata, and Kawauchi

Effects of Decontamination in SDA

<Air dose rate measured at the height of 1m from the ground / Transition according to land category>

[Air dose rate (μSv/h)]

(N=561,232)



NOTE: The chart shows the air dose rate average in each category (aggregated data of measuring points).

Residential areas include schools, parks, cemeteries, and large-sized facilities, farmland includes orchard, and forests include slopes, grassland and lawn.

Post-decontamination monitoring was implemented after 6 months to a year after the decontamination work. The latest result of post decontamination monitoring in municipalities were summarized

[Implementation period] • Monitoring before decontamination

Nov.2011 - Nov. 2016

• Monitoring after decontamination

Dec. 2011 - Dec. 2017

• Post decontamination monitoring

Oct. 2014 - Aug. 2018

Scale of Whole Area Decontamination Project

- ◆ The MOE has budgeted approx. JPY 2.9 trillion (= USD 27 billion) for decontamination until FY2018.
- ◆ 17mil. m³ (among which approx. 16.5mil. m³ were from Fukushima Prefecture) of contaminated soil and wastes were removed until the end of FY2017.
- ◆ MOE published "Decontamination Project Report" to leave a record behind of the experiences, knowledge and lessons learned through decontamination works.

Decontamination in SDA

- Total number of labor:
approx. 13,700,000 workers
※as of the end of March 2018
- Budget: approx. JPY 1.5 trillion
※ MOE's budget until FY2018
- Volume of the generated soil:
approx. 9,100,000 m³
※Estimation as of the end of March 2018
- Transported volume of soil from TSS*:
approx. 1,900,000 m³
(ISF: approx. 280,000 m³, Volume Reduction Facility: approx. 1,620,000 m³) ※Estimation as of the end of 2018

※Considered 1US\$ =JPY107

Decontamination in ICSA

- Total number of labor:
approx. over 18,400,000 workers
※ estimated from interviews with relevant municipalities as of the end of March 2018
- Budget: approx. JPY 1.4 trillion
(within Fukushima Pref. : approx. JPY 1.4 trillion, outside Fukushima Pref. : approx. JPY 40 billion
※MOE's budget until FY2018)
- Volume of the generated soil:
approx. 7,900,000 m³ (estimation)
(within Fukushima Pref.: approx. 7,400,000m³, outside Fukushima Pref.: approx. 500,000m³, both are estimation as of March 2018)
- Transported volume of soil from TSS:
approx. 1,700,000 m³
(ISF: approx.500,000 m³, Volume Reduction Facility: approx. 1,200,000 m³) ※Estimation as of the end of March 2018

Progress of Land Restoration in Temporary Storage Sites (TSS)

- ◆ Currently, the volume of removed soil stored in Fukushima Prefecture has decreased to approx. 7.9 mil. m³.
※ It is the volume as of the end of January 2020 in SDA and as of the end of December 2019, calculating a bag as 1 m³.
- ◆ 222 TSS are planned to complete land restoration by the end of March 2020 and in FY2020 MOE will aim to restore land in about 280 TSS

<Image of transportation and land restoration>

Transportation to the ISF and restoration in TSS

Storage situation

After land restoration

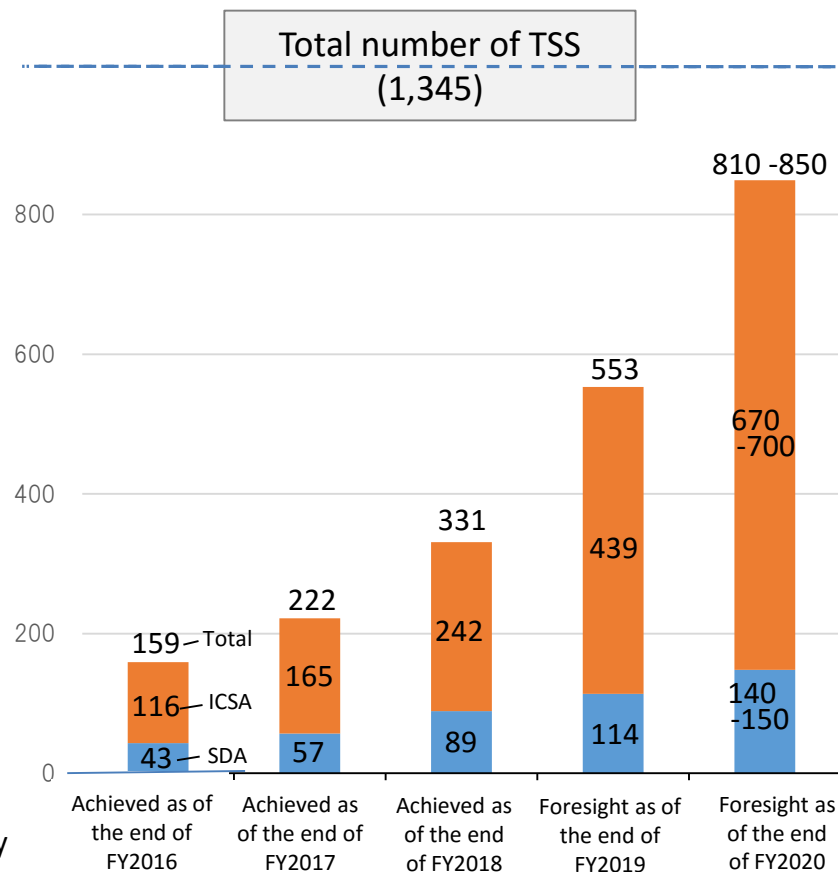


Restart of farming by the landowner



Photos: provided by Nihonmatsu City

<Number of TSS which will be restored (Estimation)>



Progress in Specified Reconstruction and Revitalization Base (SRRB)

- ◆ In all 6 municipalities (Futaba, Okuma, Namie, Tomioka, Iitate and Katsurao), demolition of houses and decontamination work have started. Especially, in public facilities such as station square, nurseries, and gymnasium, demolition and decontamination work were completed.
- ◆ Towards the goal of lifting evacuation order at entire SRRB in Spring of 2022-2023, MOE is conducting demolition and decontamination cooperating with relevant ministries

Examples

Before decontamination

Decontamination work

After decontamination

Tsushima Elementary School (Namie)



Farmland (Tomioka)



Before dismantling

Dismantling work

After dismantling

Community Center in Iitate



Result and Effect of the Whole Area
Decontamination

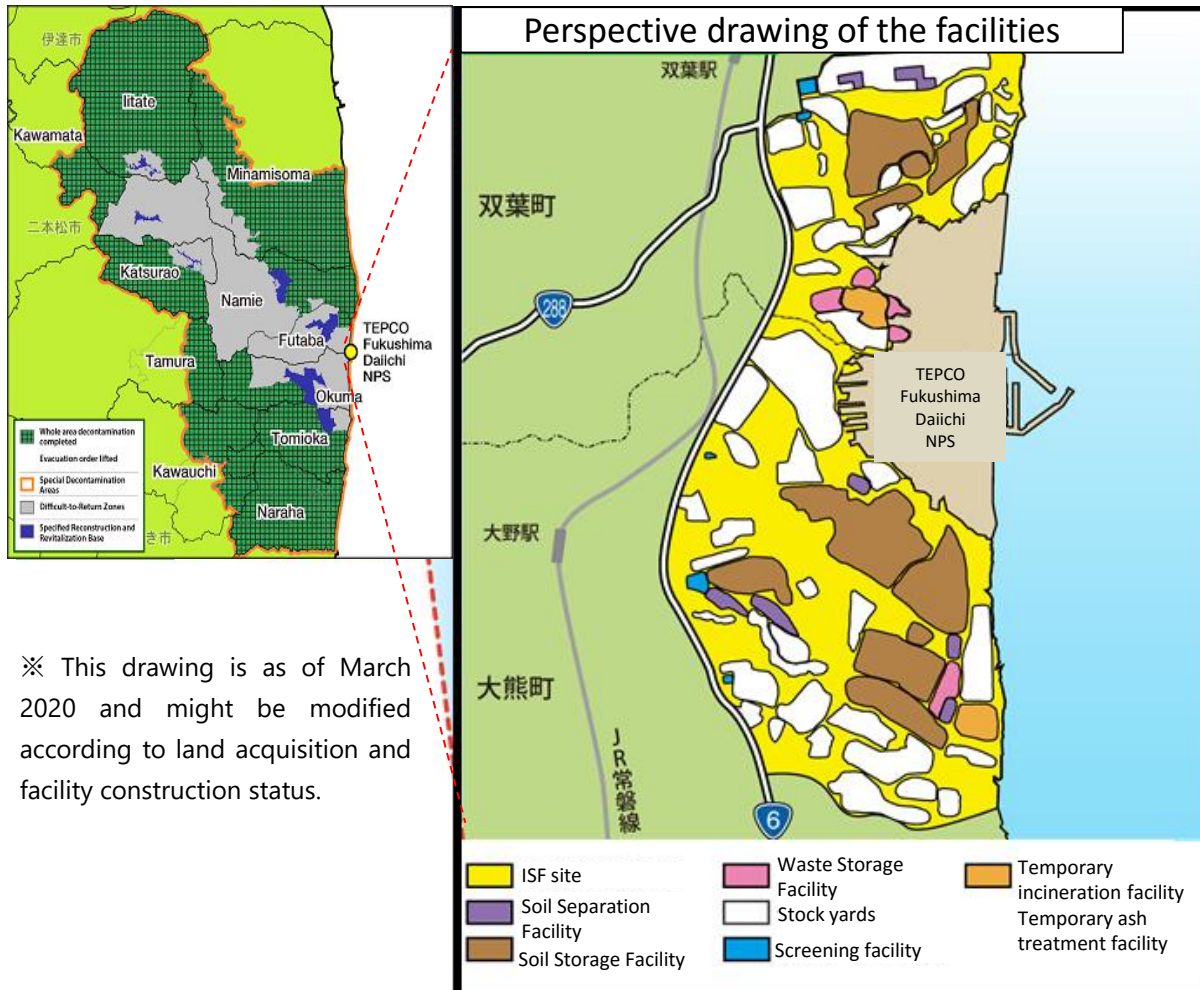
Interim Storage Facility

Disposal of the Specified Waste

Communication to the Public and
International Societies

Interim Storage Facility (ISF)

- In Fukushima Prefecture, large quantities of removed soil and waste have been generated from decontamination works.
- The Interim Storage Facility is necessary to manage and store the soil and waste intensively and safely until the final disposal.
- Removed soil and waste derived from decontamination works, and specified wastes (> 100,000 Bq/kg) are stored.
- The total volume is currently estimated at around 14 mil. m³, with the further review reflecting the actual circumstances.



【Process of the ISF Project】

Land acquisition

Construction of facilities

For soil separation and soil storage facility

Transportation of soil and waste from TSS to ISF

Processing and storage of soil and waste

※ This drawing is as of March 2020 and might be modified according to land acquisition and facility construction status.

Current Status of Interim Storage Facility

Photo of the ISF taken by drone



Source : http://www.jesconet.co.jp/interim_infocenter/index.html

Progress of Land Acquisition of the ISF

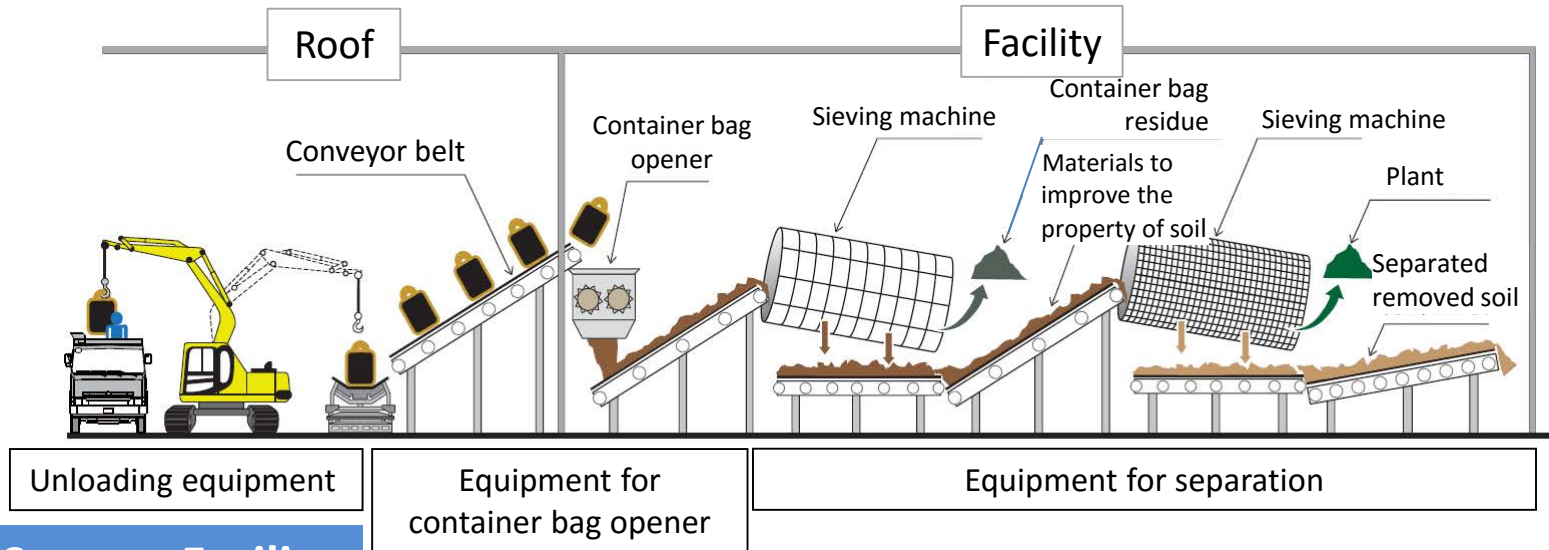
As of the end of
February 2020

Whole Area Ca. 1,600ha	Item	Ratio to the whole area	Ratio and the number of people registered to whole registration record (2,360 pers.※1)	
	Landowners with contact information	Ca. 1,560ha ※1 97.5%	Ca. 1,960 pers. ※1 83.1%	
Private land Ca. 1,270ha (Ca. 79%)	<u>Contracted</u>	<u>Private land out of contracted land</u> Ca. 1,117ha	<u>Ca. 1,157ha</u> (72.3%)	<u>1,752 pers. ※2</u> 74.2% (The ratio to 1,960 pers. landowners with contact information: 89.4%)
<u>National/ Municipality land</u> Ca. 330ha (Ca. 21%)		<u>Public land out of contracted land</u> Ca. 40ha	Ca. 290ha (18.1%)	<Reference> Ca. 1,447ha (90.4%)
	Other public land		※1 Including National / Local government ※2 Private landowner: 1,750 pers. Public land: 2pers.	

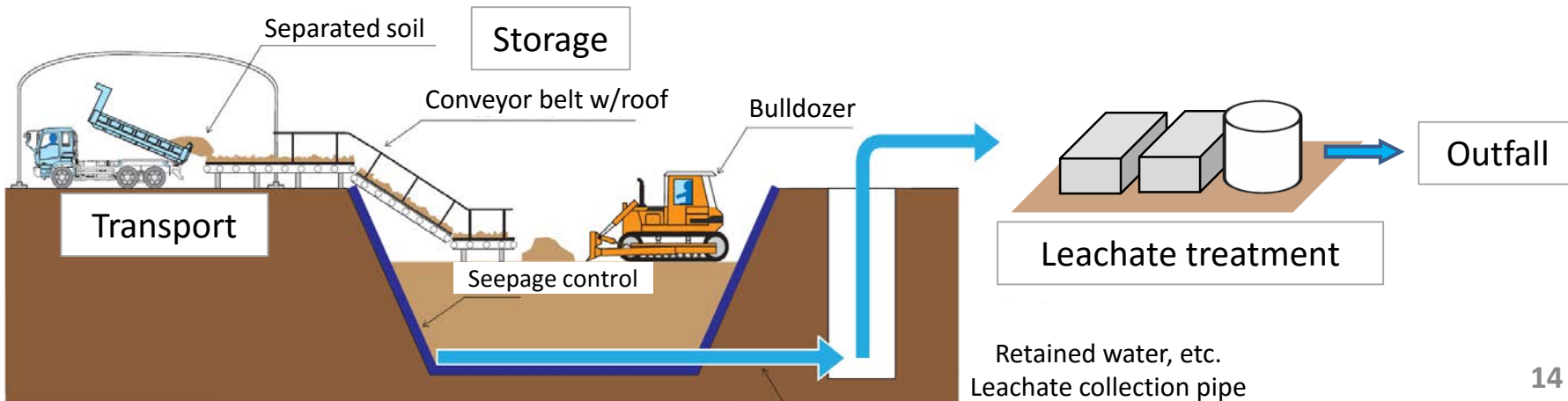
Soil Separation / Storage Facility

- ◆ Soil Storage Facility started the operation in October 2017 in Okuma and in December 2017 in Futaba

Soil Separation Facility



Soil Storage Facility

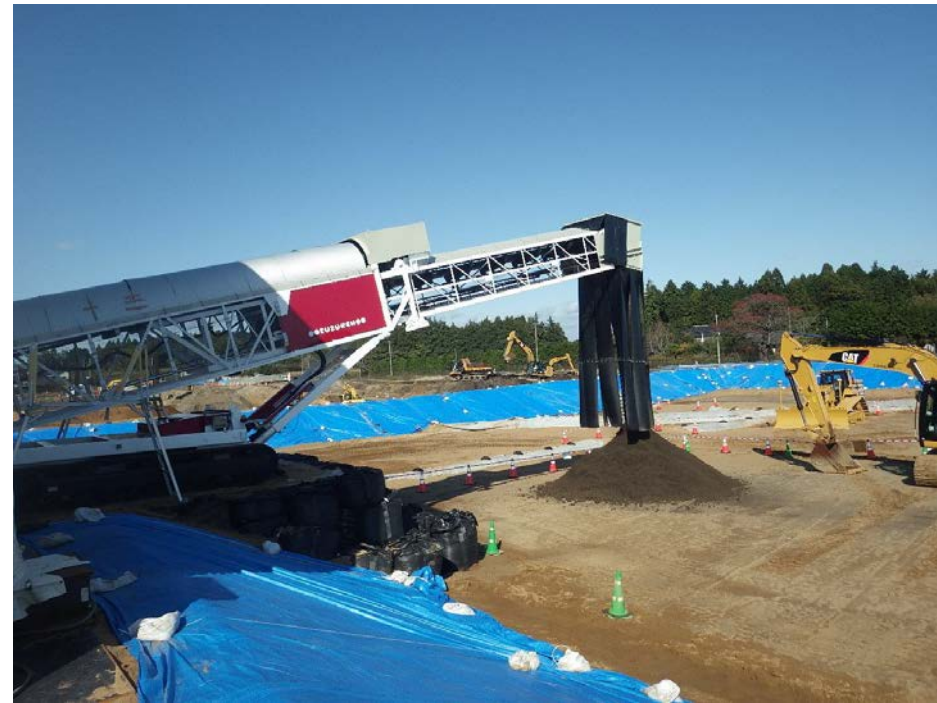


Operational Status of the ISF

- ◆ Construction of the facility started in November 2016
- ◆ The operation of Soil Separation Facilities started in June 2017 in Futaba, and in August 2017 in Okuma
- ◆ The storage of the removed soil started in October 2017 in Okuma and in December 2017 in Futaba after the completion of the Soil Storage Facilities



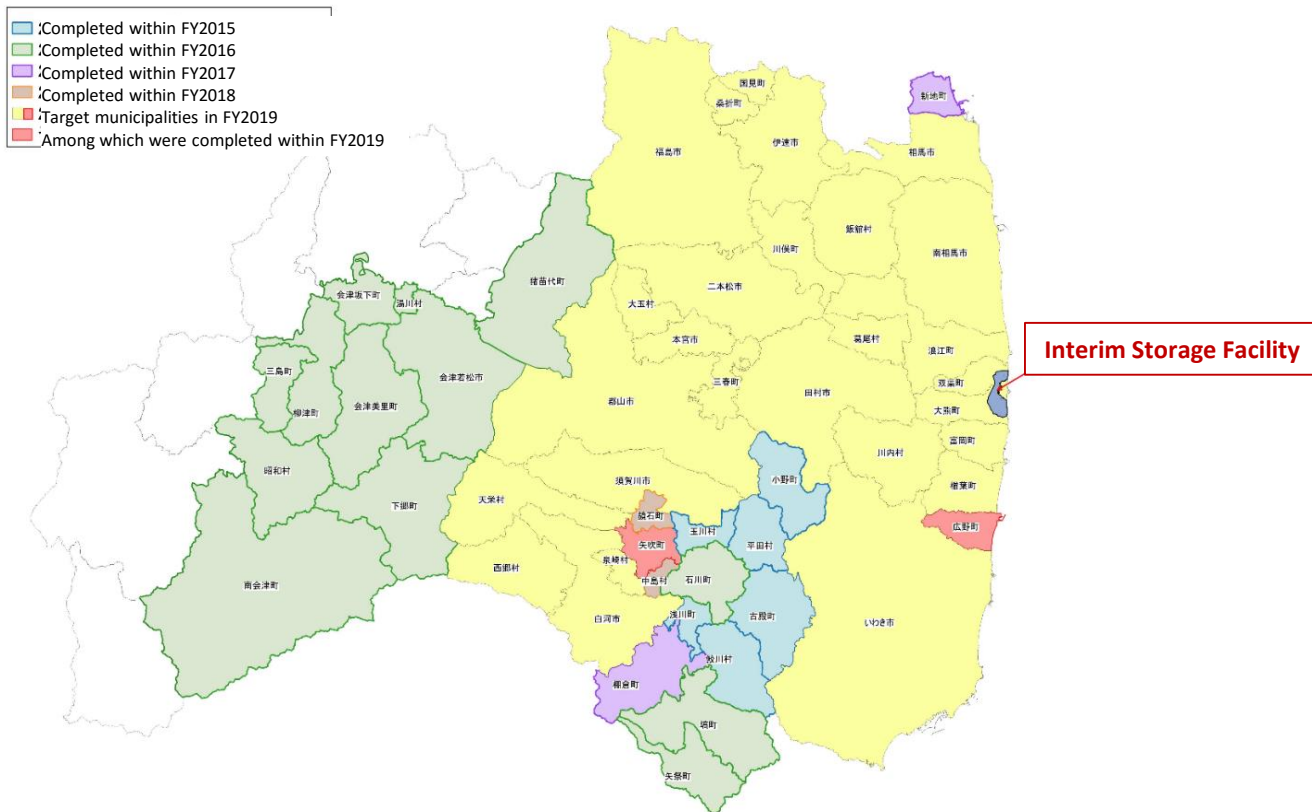
Soil Separation Facility (in Futaba)



Soil Storage Facility (in Okuma)

Transportation to the ISF

- ◆ Transportation of the removed soil from TSS to the ISF has been implemented mostly using 10-ton dump trucks.
- ◆ Cumulative total of approx. 6.15mil. m^3 has been transported so far, which makes approx. 44% of the whole transport target object (14mil. m^3 as of the end of October 2019), was delivered to the ISF (as of February 12, 2020) .
- ◆ Safe and secure transportation has been sequentially conducted.



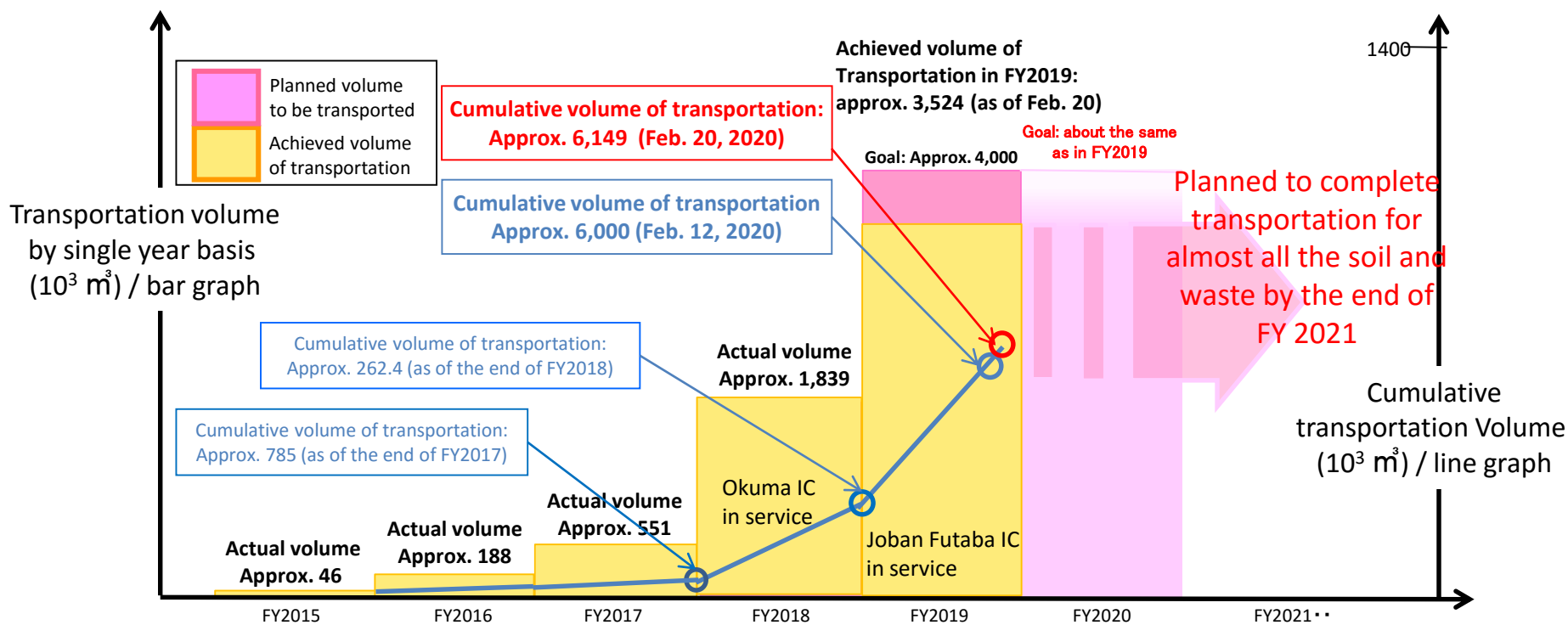
A truck transporting removed soil



A truck leaving from the ISF gate

Ad-hoc Policy on Transportation to the Interim Storage Facility

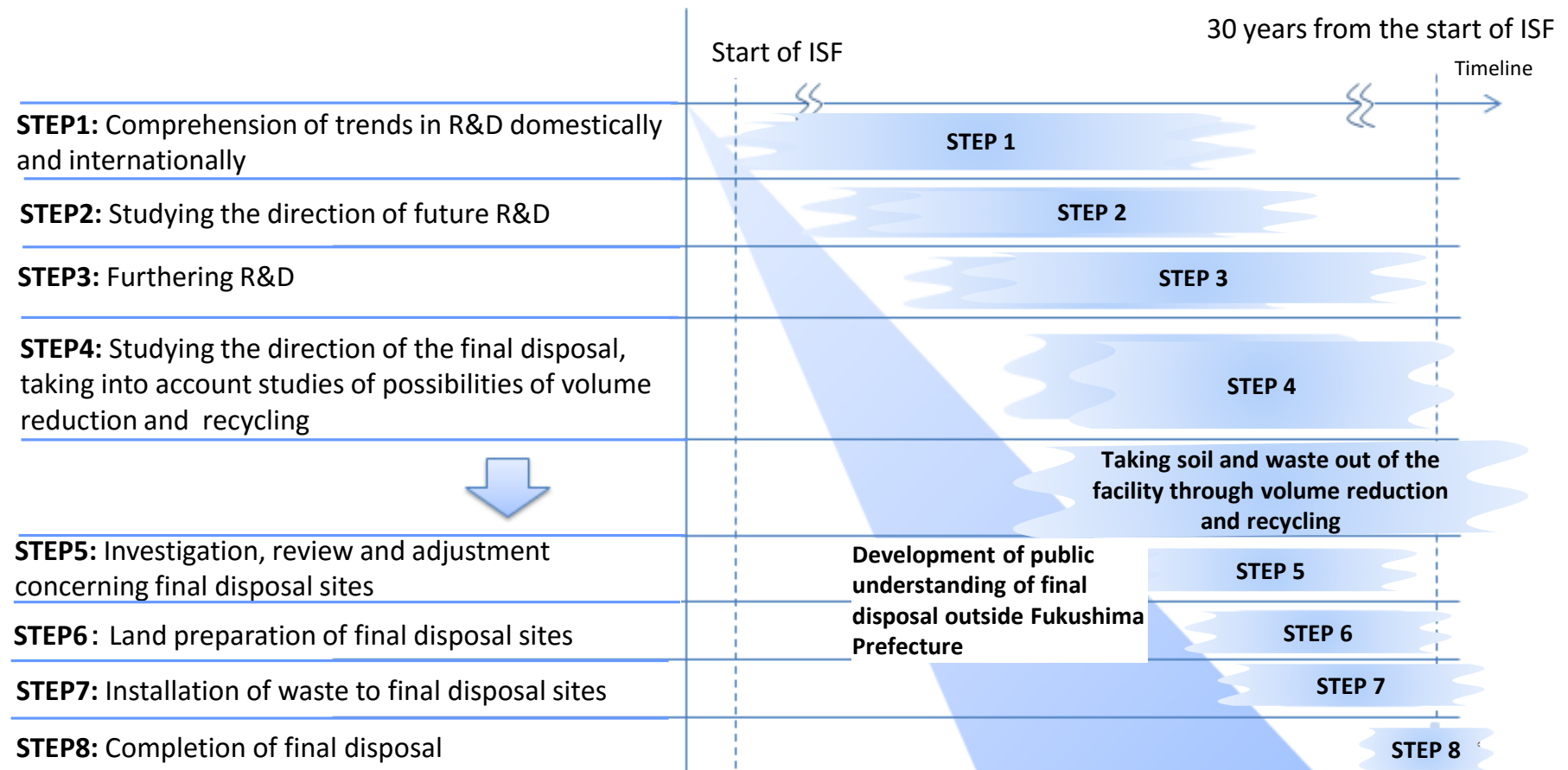
- ◆ In order to transport targeted object of 14 mil. m^3 to ISF, MOE is conducting transportation with “Safety first” and with locals understanding. ※As of October 2019
- ◆ By the end of FY2021, MOE aims to complete the transportation of the removed soil and waste (except in DRZ) which are temporarily stored in Fukushima Prefecture.
- ◆ In FY2019, approx. 4 mil. m^3 of removed soil will be transported. MOE plans to transport the same amount of removed soil to ISF in FY2020.



Source: Added the estimated volume of transportation in FY2020 based on achieved volume of transportation between FY2015-2019 and policy of Interim Storage Facility project in FY2020

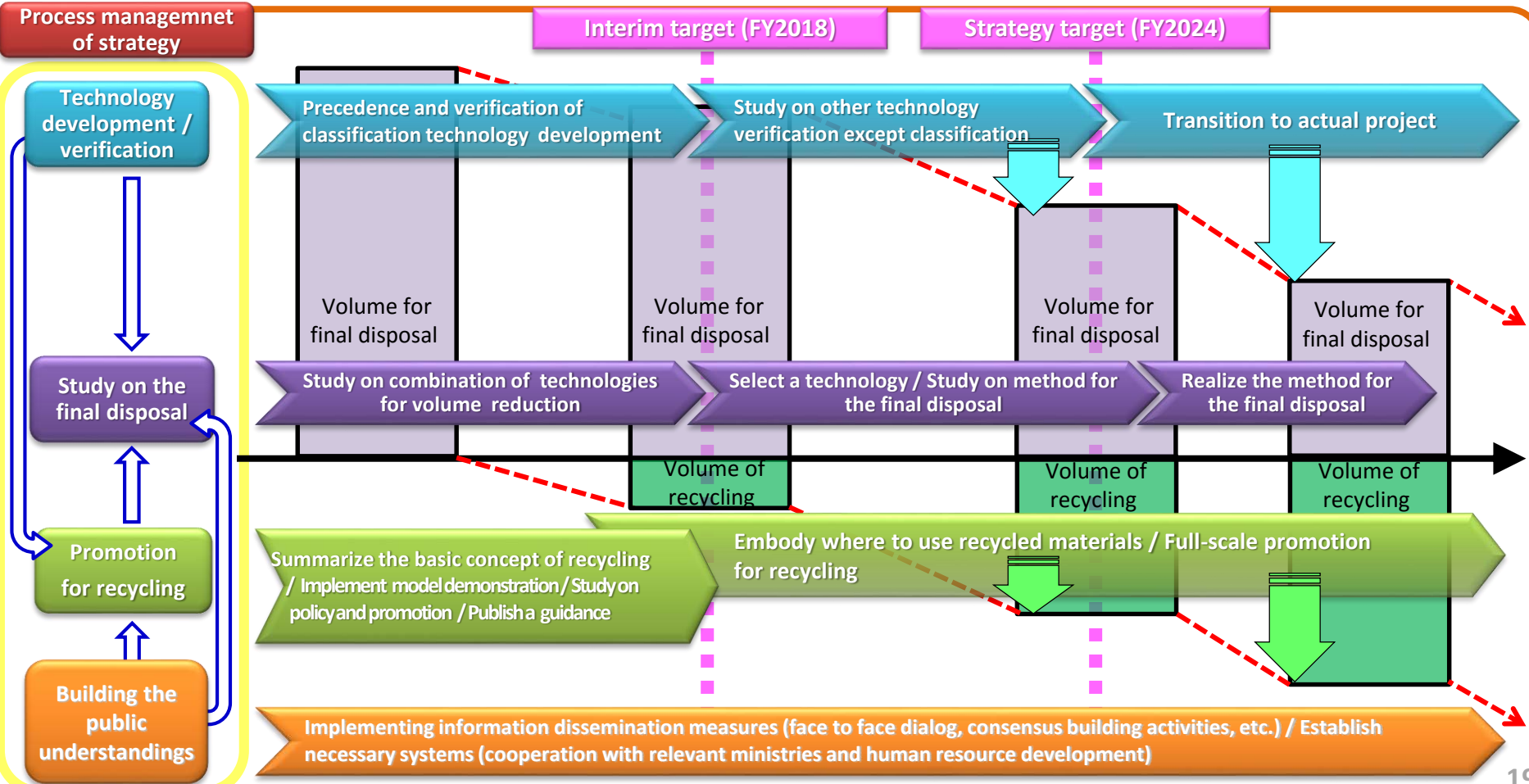
8 Steps towards the Final Disposal outside Fukushima Prefecture within 30 years from the Start of the ISF

- MOE conducts R&D to examine how the final disposal to be implemented taking into account the effect of radioactive decay and the potential of volume reduction and recycling
- MOE shares the information with the public to build the consensus for recycling of lower contaminated soil and the final disposal outside Fukushima Prefecture



Technology Development Strategy for Volume Reduction & Recycling of the Removed Soil

- Towards the final disposal of the removed soil outside Fukushima Pref., MOE will promote recycling of the soil after volume reduction technology as much as possible, which consequently would lead to reduce the volume of soil for the final disposal
- After clarifying the objectives and priority of technology development and volume reduction & recycling, basic technology development is planned to be completed within 10 years, then move onto a phase of treatment
- On the premise of securing safety, MOE will try to realize the recycling in the possible field, building public understandings for the safety
- Based on technology development and prospect of recycling in the future, MOE would propose some options for structure and necessary dimension of the final disposal



Concepts on Safe Use of the Removed Soil after Recycling

- ◆ MOE announced “Basic concept” in June 2016 to realize the use of the removed soil under proper management after volume reduction and recycling materialization as basic premise of radiation safety.
- ◆ According to a policy of this Basic Concept, MOE implements model demonstration project, confirms radiation safety, studies specific management system, as well as to foster understandings of public all over Japan, and proceed with full-scale recycling towards environmental improvement.

Limited Use

- ✓ The use of contaminated soil will be limited to public project whose management entity and responsible system are clear such as basic structure of banking, which assumed not to change shape artificially for a long time.

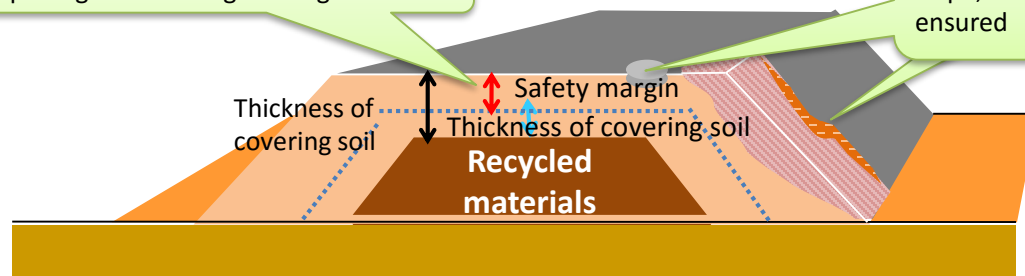
E.g. coastal levee, seaside protection forest, embankment materials for roads, cover soil for waste disposal site, landfill materials and filler for land development, and farmland for flowers and energy crops

Proper Management

- ✓ The additional exposure dose should be restricted below 1mSv/y during the construction and below 0.01mSv/y in use
- ✓ Radioactivity concentration level possible for recycling of the removed soil is below 8,000Bq/kg as a principle and set in accordance to the use.
- ✓ Shielding is installed to cover soil and prevent the leakage and scattering. The data is also recorded .

Thickness allowable enough to conduct repairing as a civil engineering structure

Even if there is any cave-in or collapse of slope, the thickness of cover soil is ensured



Covering soil should be designed to ensure the necessary thickness to confine the additional exposure dose, even under general repairing of a civil engineering structure

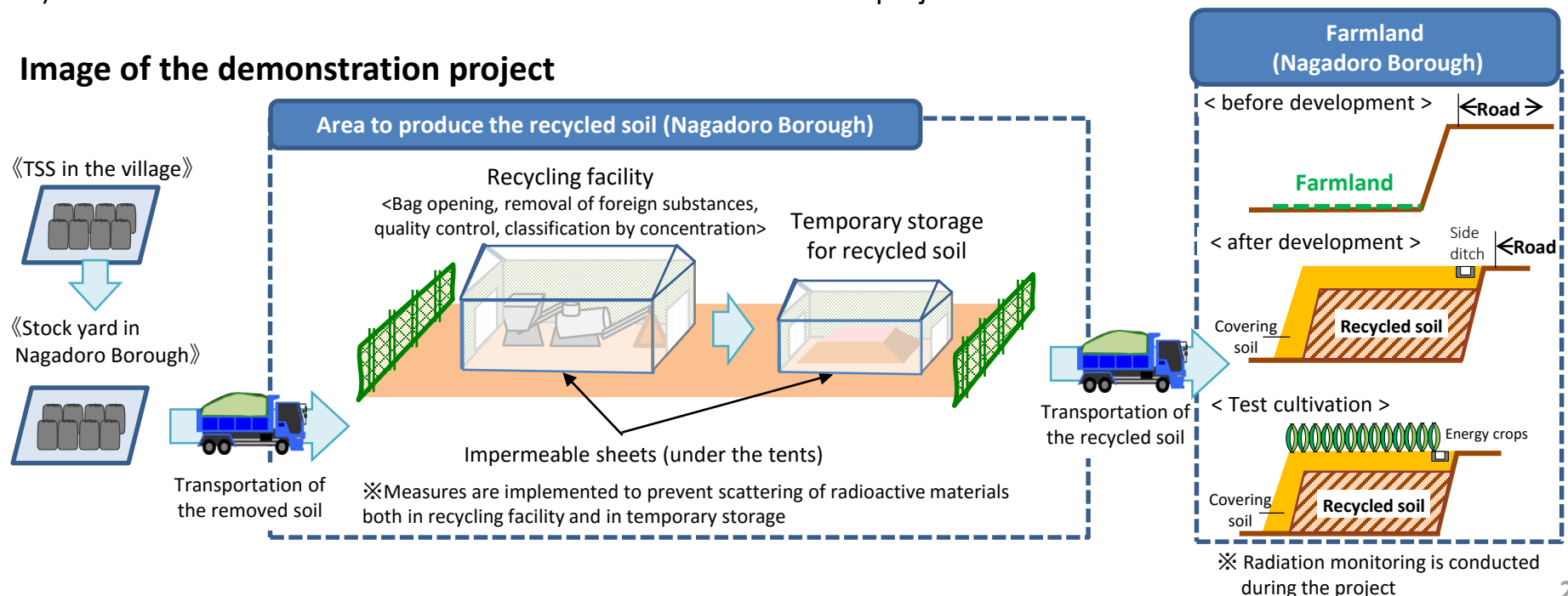
Demonstration Project for Recycling in Iitate Village

A demonstration project in Iitate Village is as follows; In response to the request from Iitate Village, the removed soil stored at TSS will be recycled, and experimented in cultivation of flowers and energy crops in Nagadoro Borough.

Contents of the demonstration project

- 1) Transport the removed soil from TSS in Iitate Village to the stock yard in Nagadoro Borough
- 2) Produce the recycled soil by separating foreign materials from the removed soil, classifying upon the radioactive concentration, and controlling the quality after construction of the recycling facility
- 3) At the demonstration project site, develop the basement of the farmland with the recycled soil covering the surface with uncontaminated soil
- 4) Conduct test cultivation at the farmland in the demonstration project site

Image of the demonstration project



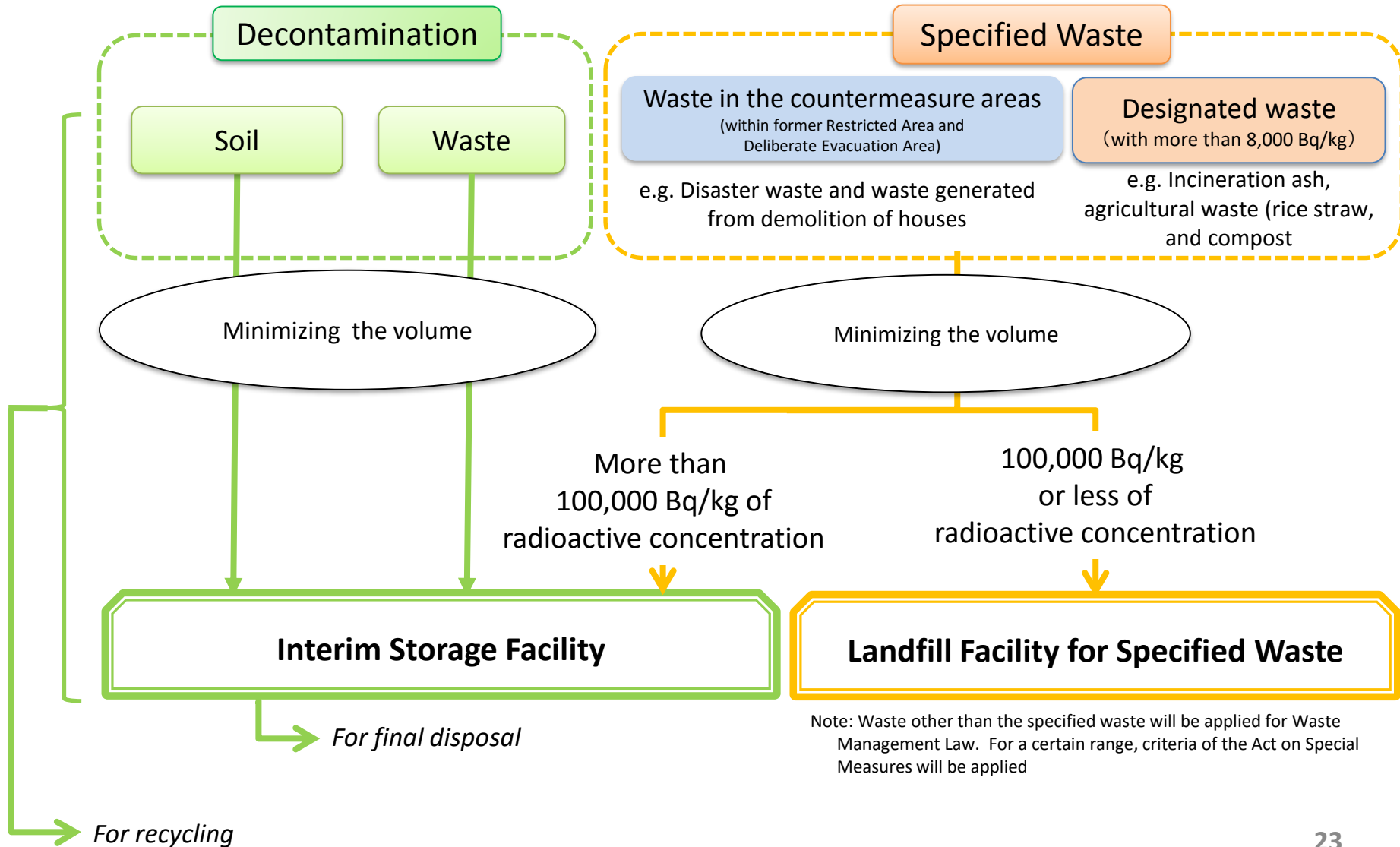
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Flowchart of the Specified Waste and Removed Soil Treatment Generated within Fukushima Prefecture



Progress on Waste Disposal in the Countermeasure Areas (Fukushima Prefecture)

◆ Approx. 2.51 mil. tons of disaster waste have completed the transportation to the TSS

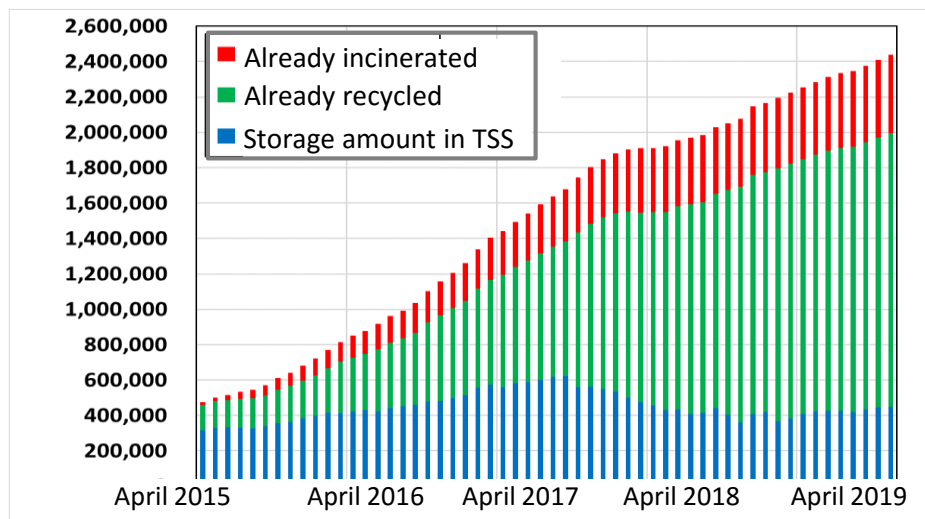
*As of the end of December 2019

450,000 tons of them were incinerated, while 1.57mil. tons of them were recycled.

MOE has already landfilled 100,000 tons of the disaster wastes.

◆ The transported disaster waste has been recycling as large as possible.

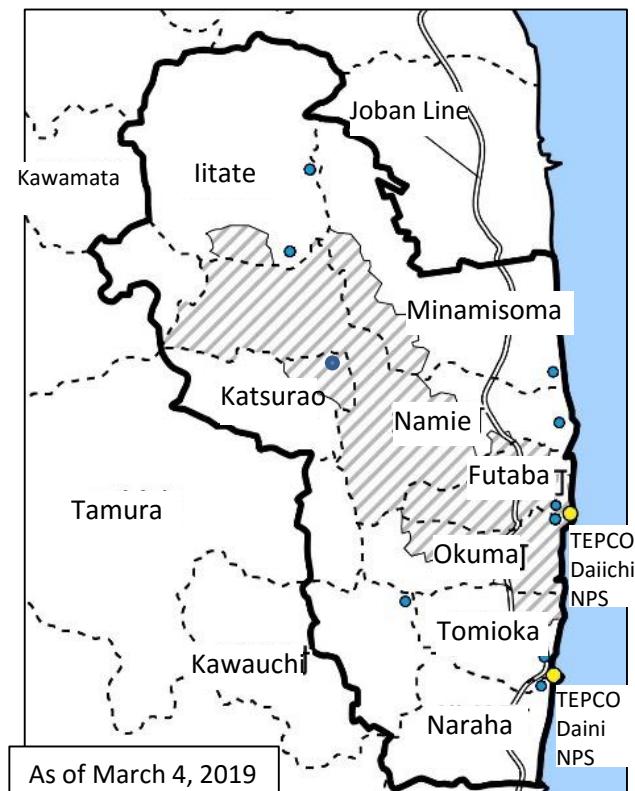
Amount of the disaster waste already transported to the TSS (t)



Dismantling of a damaged house



Temporary incineration facility at Okuma



As of March 4, 2019

- Countermeasure area
- ▨ Difficult-to-Return Zones
- TIF (incl. facilities under construction and dismantlement)

Implementation Situation of Waste Disposal across Municipalities

- To promote waste disposal across municipalities: city/town/village hosting Temporary Incineration Facilities accept waste from other cities.

Date City (130t/day) <Completed>

- Waste generated by decontamination from Date area (Date City, Kunimi Town, Kori Town, Kawamata Town)

Nihonmatsu City (120t/day)

- Agricultural waste, waste generated by decontamination from Adachi area (Nihonmatsu City, Motomiya City, Otama Village)

Katsurao Village (200t/day)

- Waste generated by decontamination, disaster waste in the village
- From Tamura City, Miharu Town, Kawauchi Village

Tamura City, Kawauchi Village (60t/day)

- Agricultural waste from 24 municipalities in Aizu-Kennan, such as Kenchu, Kennan, Iwaki, Kawauchi Village

Tomioka Town (Final disposal)

- Household waste from 8 towns and villages in Futaba County
- Waste within Countermeasure Areas,
- Designated waste within the Prefecture

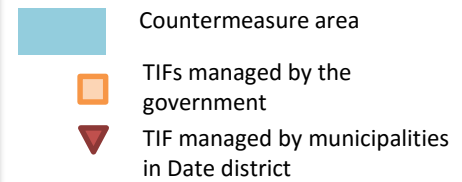
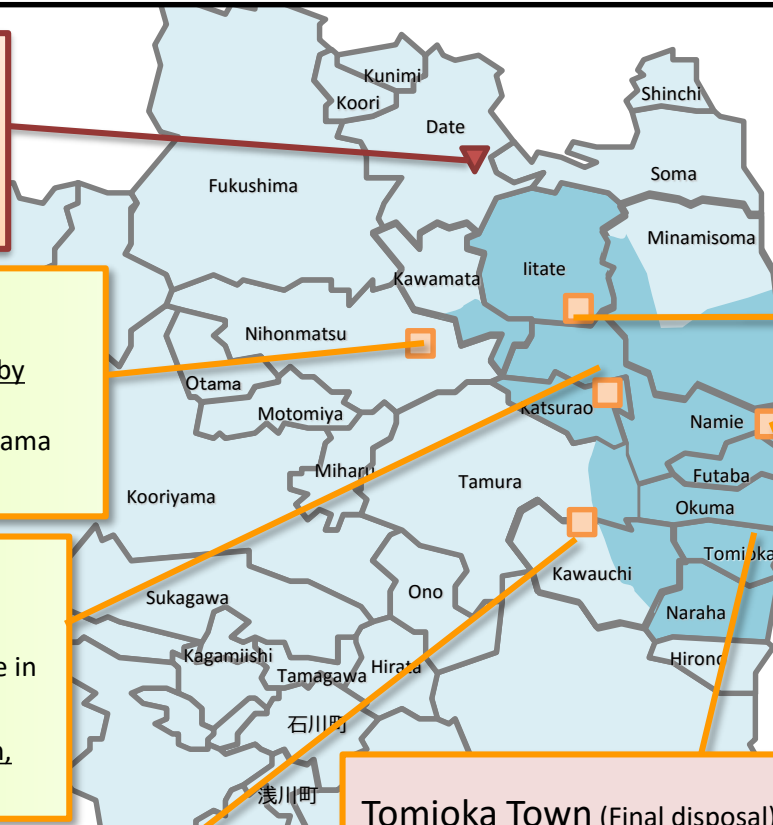
Iitate Village (240t/day)

<Completed>

- Waste generated by decontamination, disaster waste in the Village
- Sewage sludge, agricultural waste from outside the village (Fukushima City, Date City, Kunimi Town, Kawamata Town, Minamisoma City)

Namie Town (300t/day)

- Waste generated by decontamination, disaster waste in the Town
- Waste generated by decontamination, disaster waste in Tomioka Town
- Disaster waste from Futaba Town
- Buried livestock in Futaba Town, boars caught in the DRZ (July 2019-)



Disposal Project utilizing Existing Controlled Landfill Site

- ◆ As for Landfill disposal project for specified waste, the transportation to the site started on Nov. 17, 2017
- ◆ 109,790 container bags of waste mostly from Tomioka and Naraha Towns were transported (as of the end of Jan. 2020)
- ◆ Monitoring survey result before and after transportation shows no significant increase of air dose rate

※Specified waste: Waste within Countermeasure areas or designated waste

Outline of the facility

- ◆ To use existing controlled landfill site (formerly Fukushima Eco Tech Clean Center)
- ◆ To locate it in Tomioka (access from Naraha)
- ◆ The facility has been nationalized after local coordination
- ◆ Positioning as the final disposal site

Landfill object/Transport period

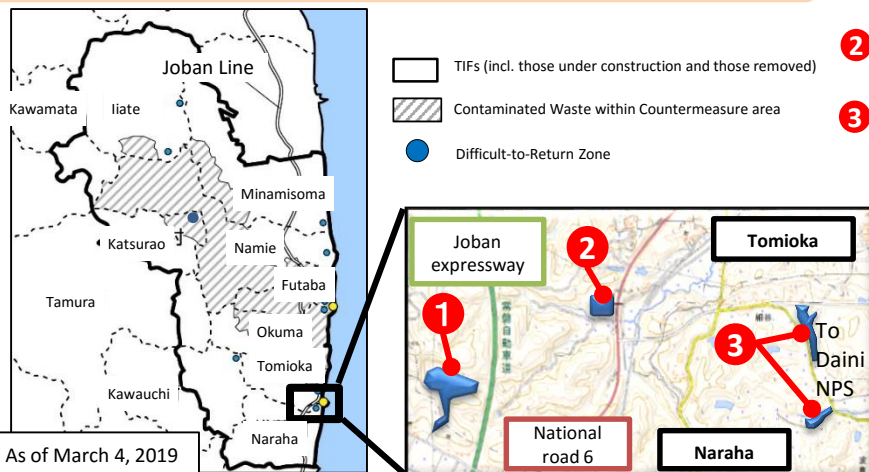
- ◆ Waste within the countermeasure areas (with radioactivity concentration of 100,000Bq/kg or less): 6years
- ◆ Designated waste within Fukushima Pref. (100,000Bq/kg or less) : 6years
- ◆ General waste in 8municipalities in Futaba County: 10years
- ◆ Waste with more than 100,000Bq/kg will be transported to the ISF

Outline of the history

- ◆ 14.12.2013 The government requested Fukushima Pref, Tomioka and Naraha Towns to accept the project
- ◆ 04.12.2015 Fukushima Pref., Tomioka and Naraha conveyed the message to accept the project
- ◆ 18.04.2016 Nationalized the controlled landfill site
- ◆ 27.06.2016 Fukushima Pref. and both Towns signed the safety agreement
- ◆ 13.11.2017 The government announced Fukushima Pref. and both Towns to start the transportation
- ◆ 17.11.2017 Started transportation
- ◆ 24.08.2018 Established Reprun Fukushima, the information center of the specified waste
- ◆ 20.03.2019 Solidification treatment facility for the specified waste has started operation

Related facilities

- 1 Landfill facility for specified waste
- 2 Specified waste information facility, Reprun
- 3 Solidification treatment facility for specified waste



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**Communication to the Public and
International Societies**

Information Sharing with International Communities

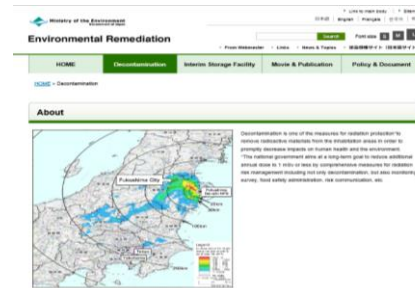
MOE has been making efforts to share correct information with international communities to eliminate misconception towards Fukushima Prefecture.

English booklet



A comic style booklet, “Nasubi no Gimon”, was released in August 2017, explaining radiation measures for food, etc.

MOE English web-site

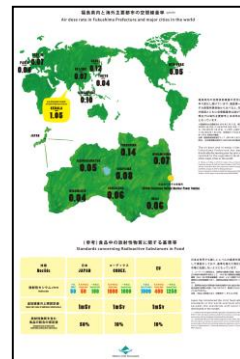
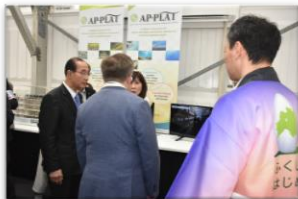


MOE renewed the web-site, adding more updated information.

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

Recent Activities on international matters

- MOE set a display booth in G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable Growth in 2019, introducing environmental remediation project in Fukushima and explained the current status to leaders and high-level government officials of the world.



- International Atomic Energy Agency (IAEA) and MOE held “IAEA-MOE Experts Meetings” on environmental remediation four times between 2016 and 2017, now working on a summary of these meetings.

