

Recycling and Reusing of Removed Soil, “contaminated soil”, from Decontamination Works

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Ryukoku University / Citizens' Commission on Nuclear Energy

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原発ゼロ 社会への道

——市民がつくる脱原子力政策大綱



原子力市民委員会
www.ccnejapan.com

Citizen

Commissi

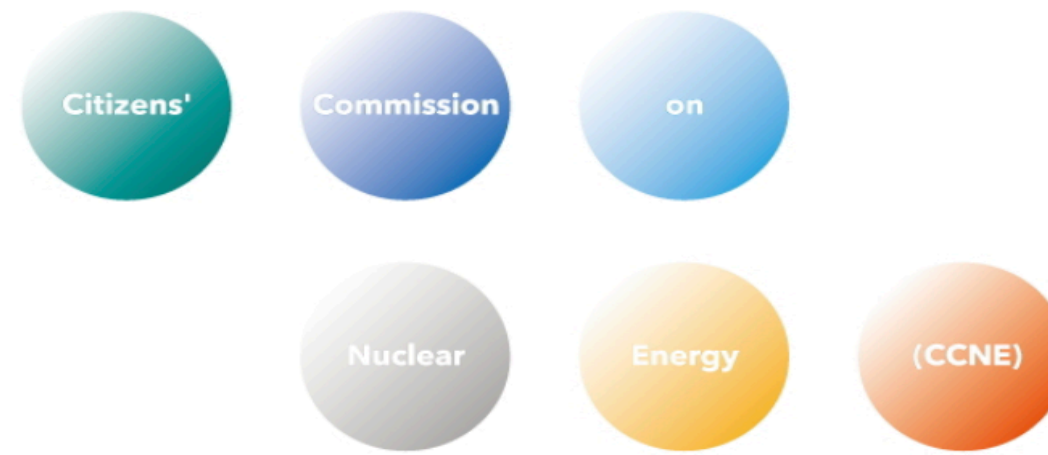
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原発ゼロ社会 への道 2017

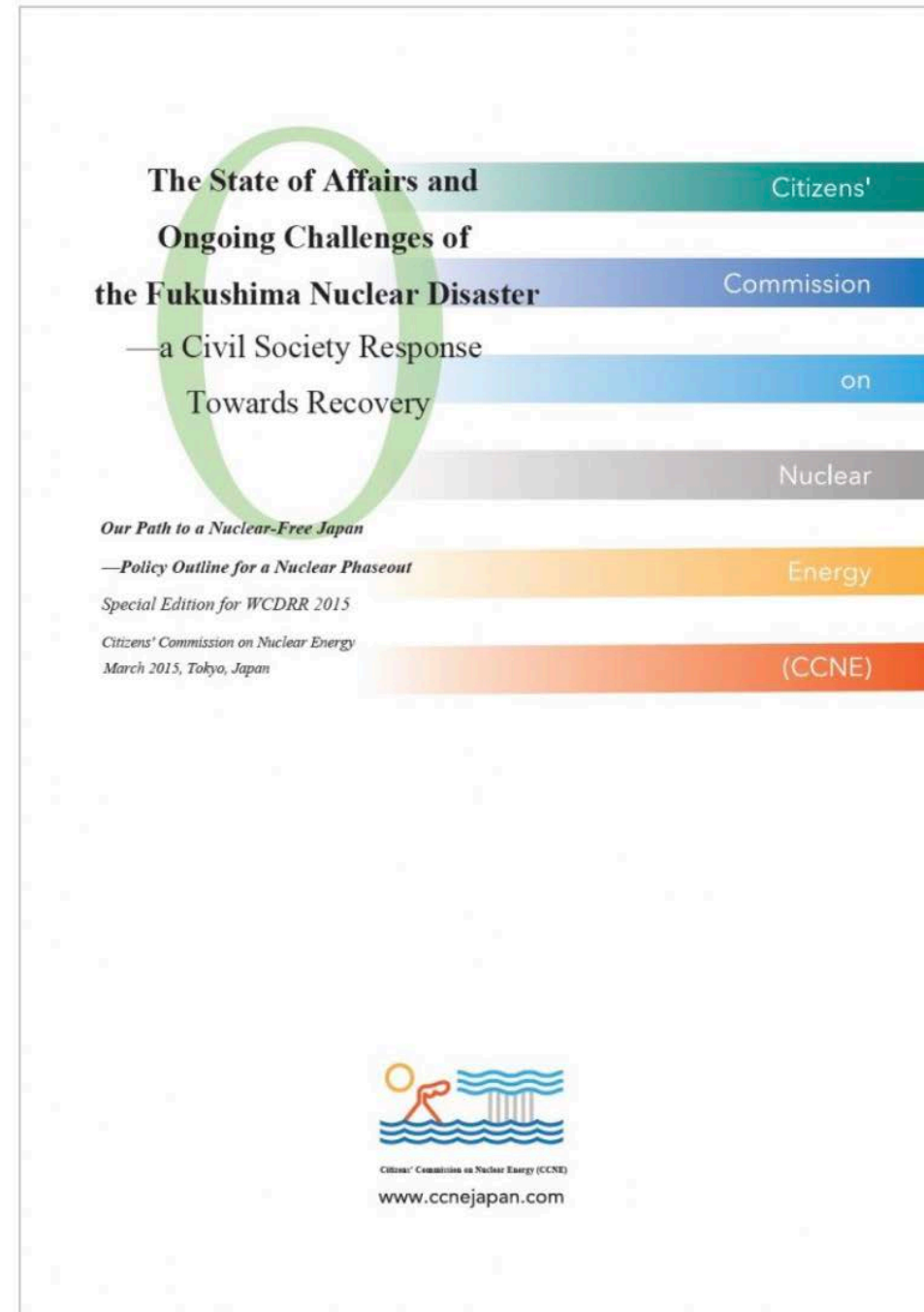
——脱原子力政策の実現のために



原子力市民委員会
www.ccnejapan.com

About Citizens' Nuclear Commission

Our Path to a Nuclear-Free Japan: *Policy Outline for a Nuclear Phaseout*



Established in 2012

Members

- Engineers
 - Metal Engineers
 - Nuclear Engineers
 - Plant Engineers
 - Medical Doctors,
 - Lawyers
 - Economists
 - Sociologists
 - NGO activists
 - Local citizens
- etc.

Proposals, Research Reports, Special Report and Statements have been published.

Contents

- Fukushima daiichi Nuclear Disaster and Radioactive Contamination
- Decontamination Policy by the National Government
 - Decontamination Area
 - Why “removed soil” is to be recycled?
- Problems of Removed Soil from Decontamination Works
 - Reusing of “recycled materials”
 - Double Standard
 - Reusing/Recycling before Interim Storage
 - Inside/Outside Fukushima
 - Decision Making Process / Democracy

Nuclear Wastes in Japan

1. From Operation of nuclear facilities (mainly nuclear power plants and a reprocessing plant)

- Low level nuclear wastes
- Spent fuel
- Wastes from decommissioning
- Wastes from reprocessing

2. From Fukushima disaster

- Inside NPP
Debris, spent fuels, rubbles, secondary wastes from contaminated water treatment
- Outside NPP
Wastes and soil from decontamination works
Contaminated wastes

Many words which are used concerning soil from decontamination works in Japan

News / Report by media / Citizens

- Contaminated Soil 汚染土
- Decontamination soil 除染土
- Decontamination waste 除染廃棄物

= = =

Policy level

- Specified waste 特定廃棄物
- Designated waste 指定廃棄物
- Removed soil 除去土壌
- recycled soil 再生土壌
- recycled materials 再生資材

There is no single word for radioactive waste/soil/materials by Fukushima Disaster.

Why “removed soil” is to be reused? Points to understand “removed soil” from decontamination works

- Soil and wastes are different under the waste management policy in Japan.
- Under the waste management policy
 - Soil is not waste.
 - ✂ the law on contamination of soil exists. But, it does not cover radioactive contamination.
 - Soil is useful resource. Therefore soil should be reused/recycled after “treatment”.
- Soil from decontamination work is not “radioactive waste” but “removed soil (=resource)”, which contains radioactive materials. Basically, soil can/should be reused after treatment under the Act on Special Measures regarding Fukushima. Therefore “removed soil” from decontamination work is to be reused/recycled after treatment. After the treatment, “removed soil” becomes “recycled materials (or recycled soil)” to be used.
- More complicatedly, soil and waste are treated differently between “inside Fukushima prefecture” and “outside Fukushima prefecture”

Radioactive Pollution caused by Fukushima Daiichi Nuclear Disaster

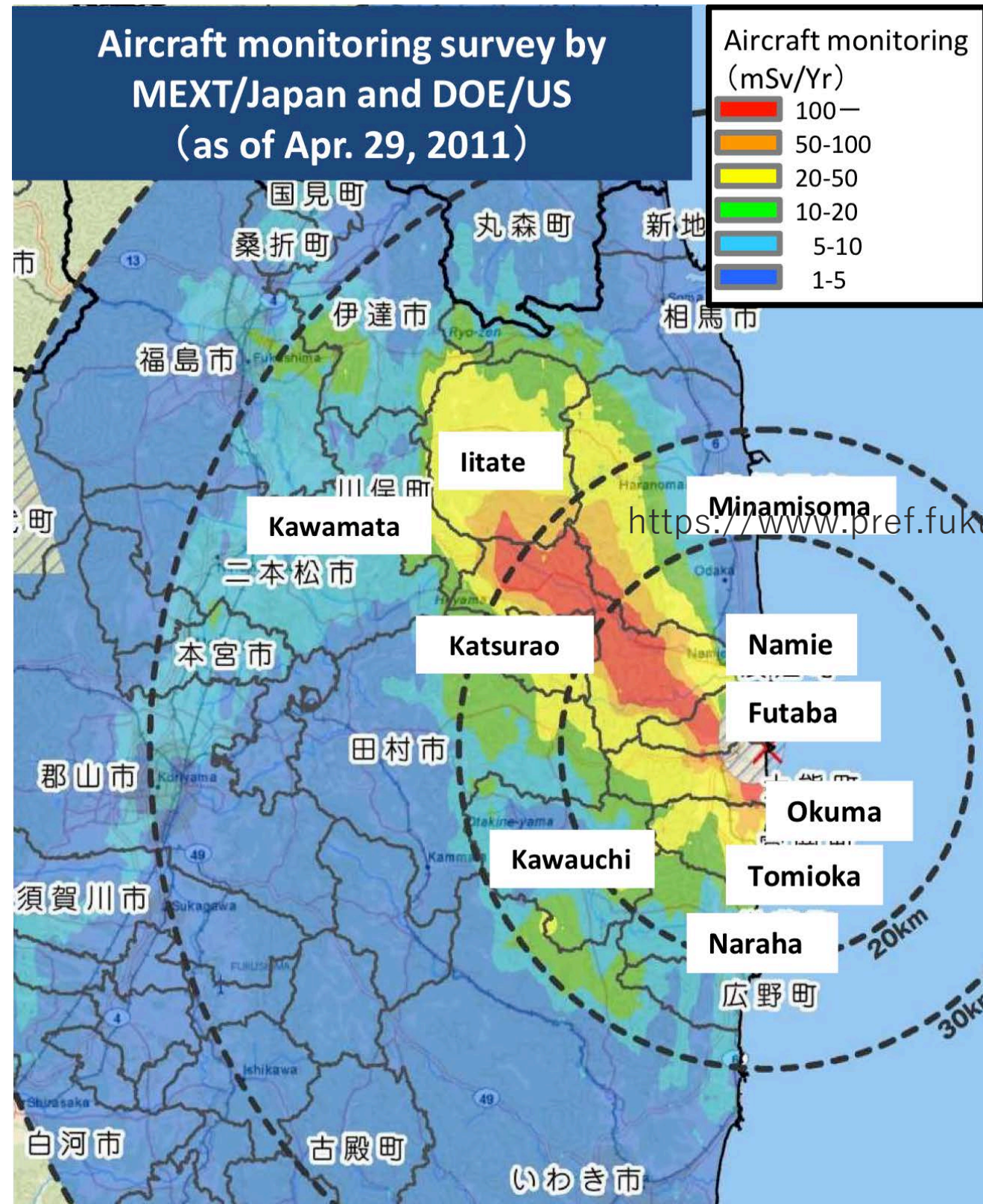
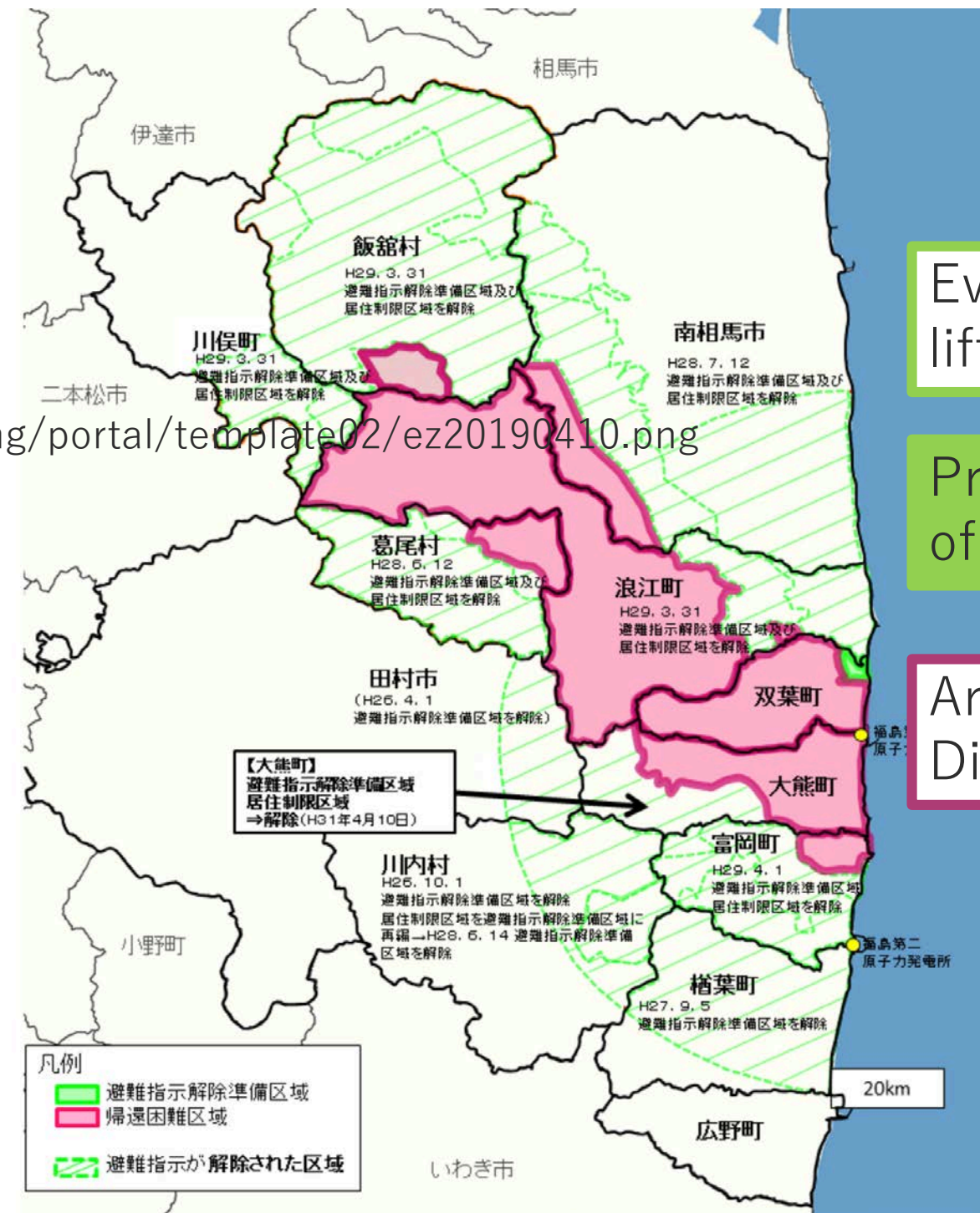


Diagram of the areas to which evacuation order were issued (As of April 1, 2019)



Evacuation orders were lifted

Preparation Area for Lift of Evacuation Order

Areas where Returning is Difficult (50mSv/y~)

http://josen.env.go.jp/en/pdf/progressseet_progress_on_cleanup_efforts.pdf

<https://www.pref.fukushima.lg.jp/img/portal/template02/ez20190410.png>

Evacuation Area (Areas where Returning is Difficult) in Fukushima (as of October 2019)

- Iitate Village (part)
 - Nagadoro borough
- Futaba Town
- Okuma Town
- Namie Town
- Katsurao Village (part)
- Tomioka Town (part)

Decontamination of soil contaminated by radioactive materials

1. Inside 1F (Fukushima daiichi NPP)

- Decommissioning and Decontamination works are implemented by TEPCO.

2. Outside 1F (Fukushima daiichi NPP)

- Decontamination works were implemented by the National Government (MOE) and local municipalities. (area decontamination was completed)

I. Special Decontamination Area (SDA)

- 1) Designation of SDA by Ministry of the Environment (MOE)
- 2) Decontamination work by the National Government (MOE)

II. Intensive Contamination Survey Area (ICSA)

- 1) Designation of ICSA by MOE
 - * more than $0.23 \mu\text{Sv/h}$ (nearly 1mSv/y)
- 2) Decontamination work by municipalities



Decommissioning Work is going on inside Fukushima NPP

(December 4, 12017)

Contaminated Water Tanks



(December 4, 2017)



Reactor No.1 from high ground. $140 \mu\text{Sv/h}$
(December 4, 2017)

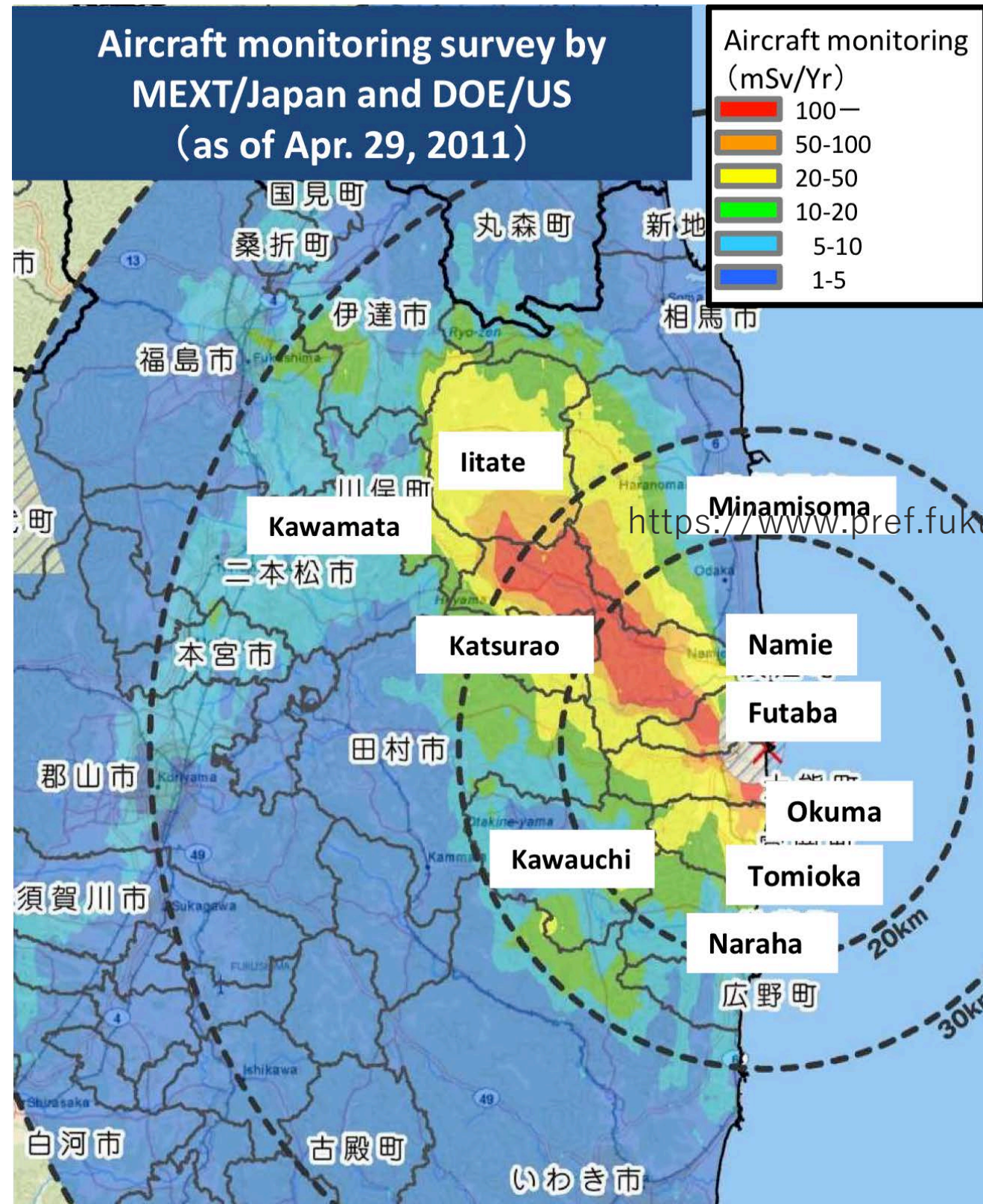


Reactor No.2 and 3 from high ground. $140 \mu\text{Sv/h}$
(December 4, 2017)



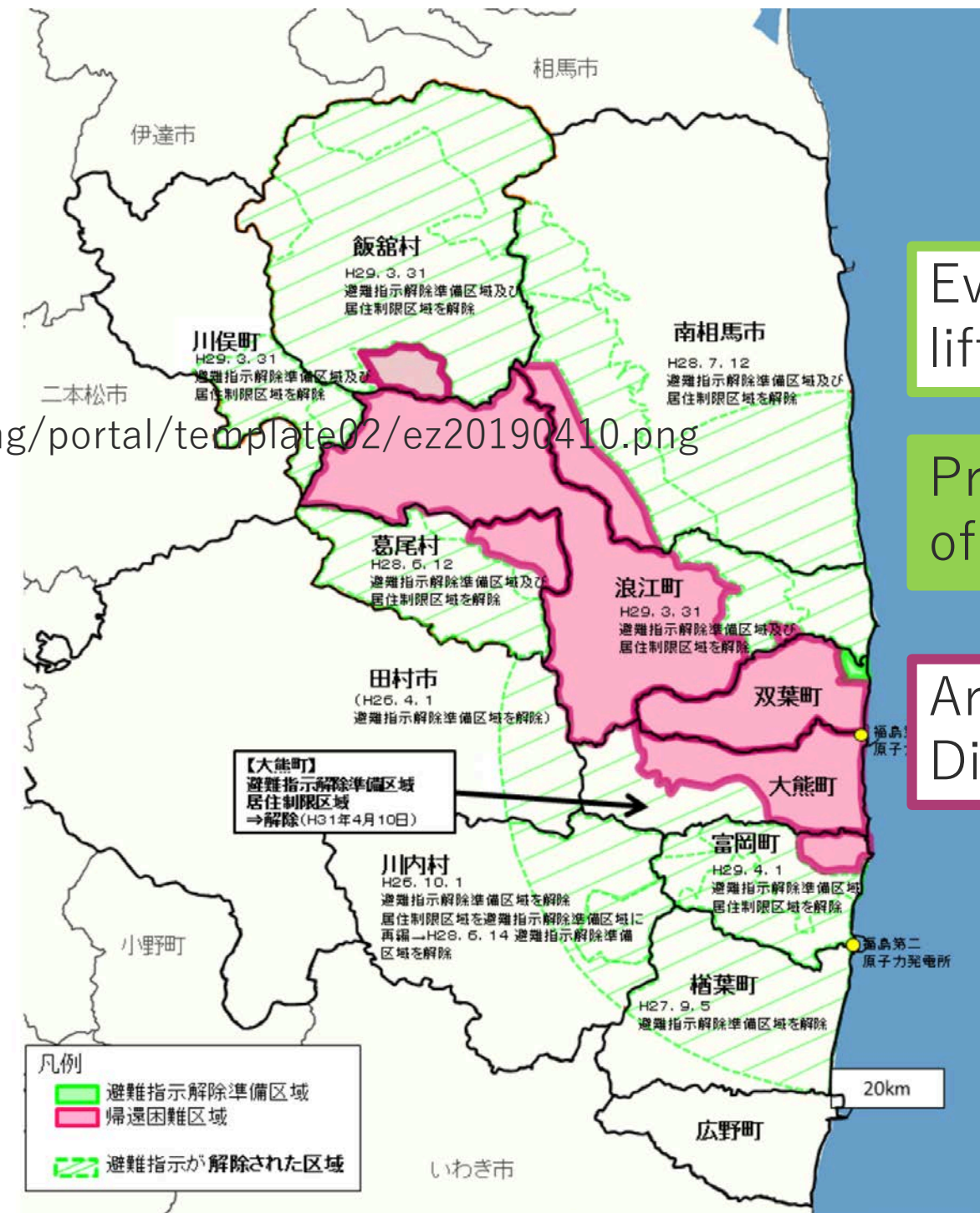
Side of Reactor No.3.
Rubbles remains as it
was. $220 \mu\text{Sv/h}$ in a
bus.
(December 4, 2017)

Radioactive Pollution caused by Fukushima Daiichi Nuclear Disaster



http://josen.env.go.jp/en/pdf/progressseet_progress_on_cleanup_efforts.pdf

Diagram of the areas to which evacuation order were issued (As of April 1, 2019)



<https://www.pref.fukushima.lg.jp/img/portal/template02/ez20190410.png>

Decontamination has been implemented mainly in residential area.

Completion of the Decontamination in SDA (as of the end of March 2017)

Municipality	Residential area	Farmland	Forest	Road	Evacuation order was lifted on
	Number of implemented houses	Implemented area ha	Implemented area ha	Implemented area ha	
Minami soma	4,500	1,700ha	1,300ha	270ha	July 12, 2016
Namie	5,600	1,400ha	390ha	210ha	March 31, 2017
Tomioka	6,000	750ha	510ha	170ha	April 1, 2017
Iitate	2,000	2,100ha	1,500ha	330ha	March 31, 2017
Futaba	97	100ha	6.2ha	8.4ha	-
Kawamata	360	600ha	510ha	71ha	March 31, 2017
Katsurao	460	570ha	660ha	95ha	June 12, 2016
Okuma	180	170ha	160ha	31ha	-
Kawauchi	160	130ha	200ha	38ha	Former Preparation Areas for lift of Evacuation Order : October 1, 2014 Former Habitation Restricted Areas: June 14, 2016
Naraha	2,600	830ha	470ha	170ha	September 5, 2015
Tamura	140	140ha	190ha	29ha	April 1, 2014
Total Number	22,000	8,500ha	5,800ha	1,400ha	

- "Forest" means that is close to residential area
- MOE will continue decontamination if we get new consents from the residents

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

Decontamination works in Farmland

- Farmland:
 - deep tillage (plowing soil as deep as 30cm) or inversion tillage (replacing topsoil with subsoil)

Stripping of topsoil (Topsoil removal)

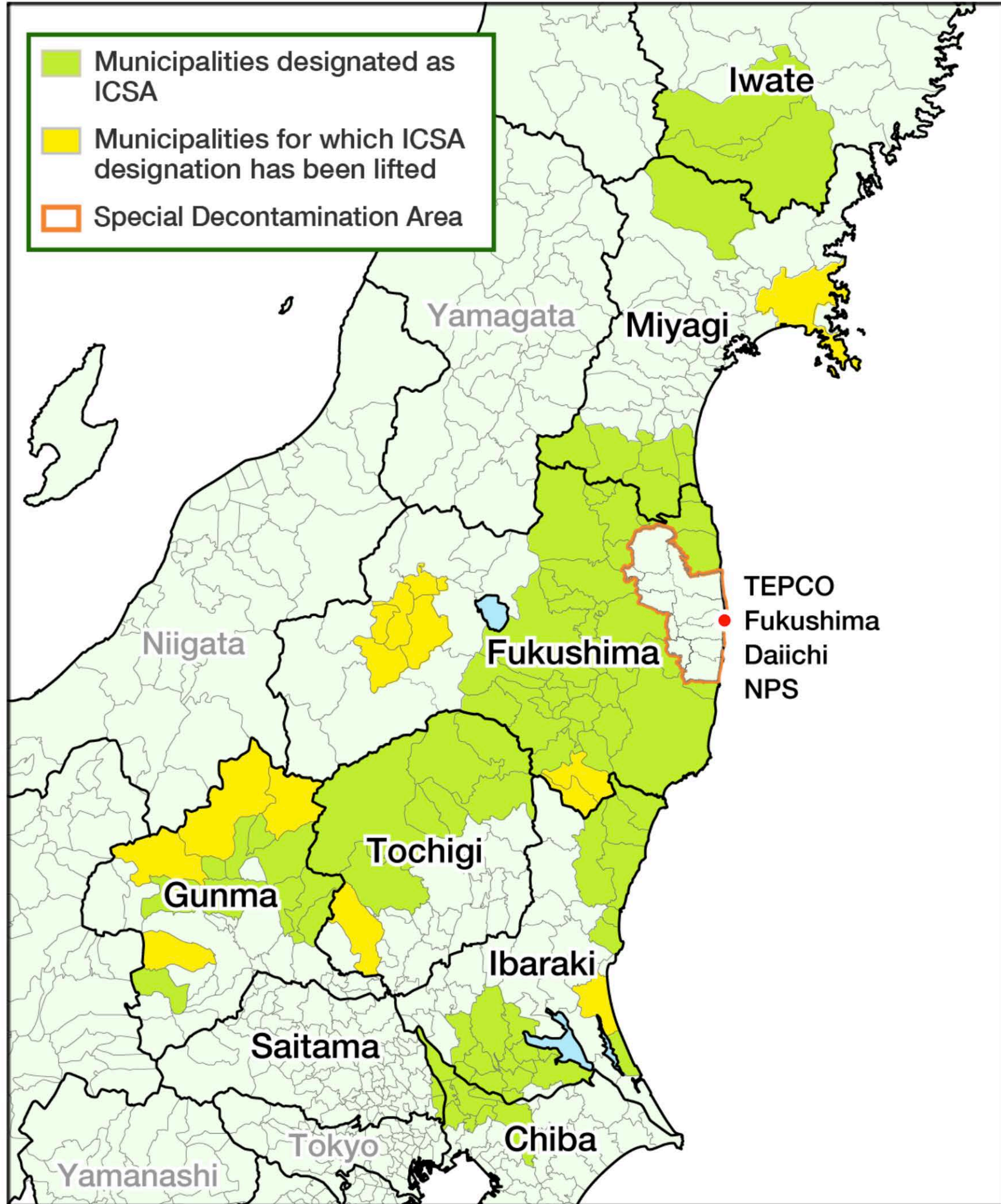
Scrape away the topsoil to remove radioactive materials which remain in shallow depth



Inversion tillage

Replace topsoil with subsoil, thereby reducing radioactivity concentrations in the soil layer where plants take root





- Whole **area decontamination works on the Act on Special Measures** was completed on March 19, 2018 except for Areas where Returning is Difficult.
- In Fukushima prefecture
 - Completed all categories
 - ⊗ Residential houses / Public facilities / Roads / Farmland & meadows / Forest in living areas
- Outside Fukushima prefecture
 - Completed all categories
- Completion of decontamination on the Act does not mean that radioactive materials are completely removed from farmland, meadows and forest. Radioactive materials still exist there.
- Huge amount of wastes and soil was generated from decontamination works.

Disposal Plan of Waste and Soil by the National Government

1. Decontamination Works inside Fukushima.

Implemented by the National Government (MOE) → soil and wastes

2. Interim Storage Facility (for at most 30 years)

Transportation of soil and wastes

Processing and Storage of soil and wastes

3. Final Storage Facility outside Fukushima

- Within 30 years, the National Government will transport soil and waste from the Interim Storage Facility to the Final Storage Facility outside Fukushima prefecture.
- Stipulated in JESCO (Japan Environmental Storage and Safety Corporation) Law.
- Based on the agreement between the National and Fukushima Prefecture Government in October 2011.
- As of October 2019, there is no possible place for the Final Storage Facility outside Fukushima.

* Waste and Soil outside Fukushima are disposed differently.

Major problems concerning waste and soil from decontamination works outside Fukushima NPP

1. Complicated System

- ① Inside/Outside Fukushima prefecture
- ② Categories of wastes and soil

2. Double Standard

Nuclear Regulation Law vs the Act on Special Measures

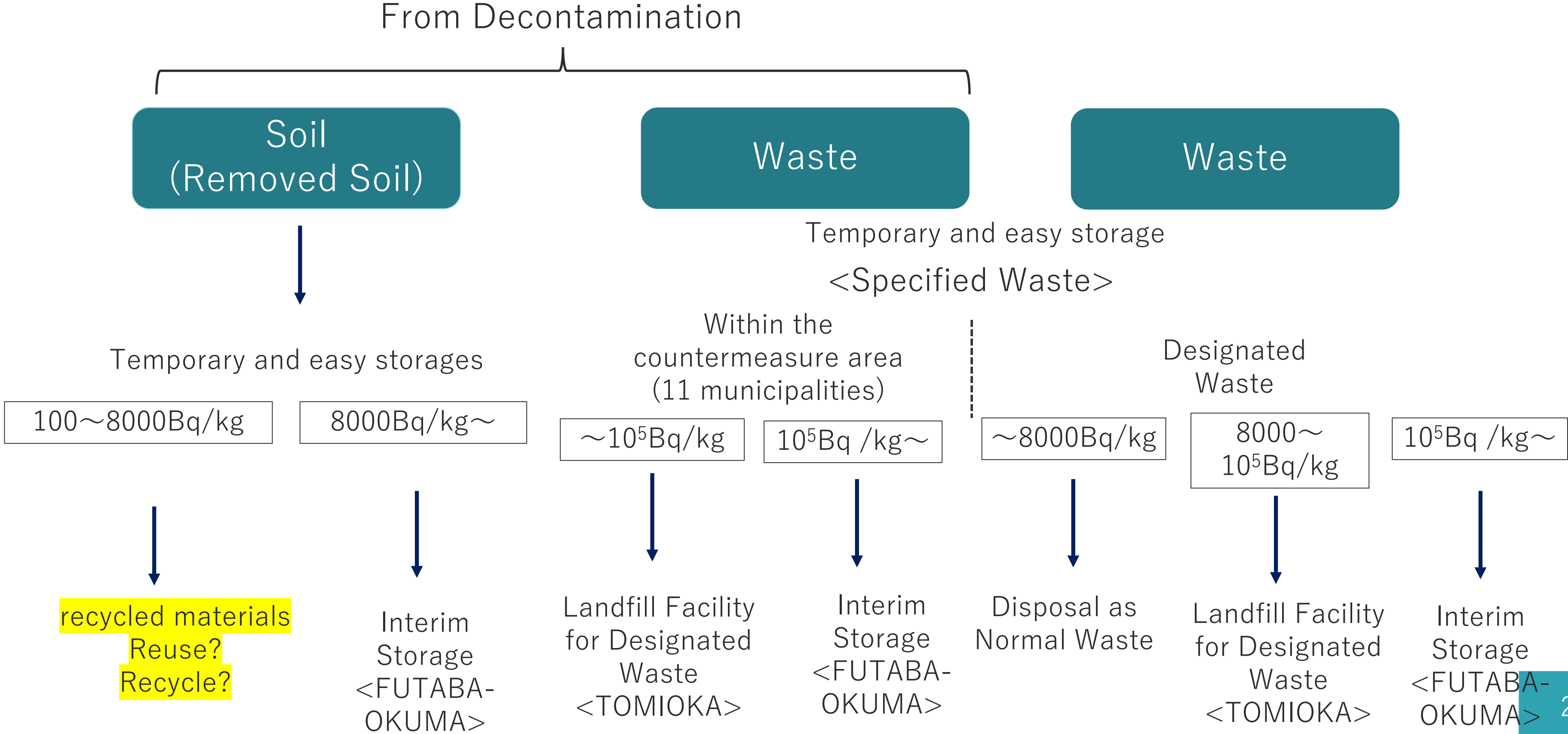
3. Reduction of the volume of “removed soil” means the increase of the volume of reused/recycled “removed soil” under farmlands, roads and embankments in Fukushima or throughout Japan.

4. Decision Making Process/Democracy

The use of “recycled materials”

- Embankment of roads and railways covered with earth, sand or asphalt
- Embankment of breakwaters covered with concrete
- Embankment of windbreaks covered with earth and plants
- Covering soil for waste disposal facilities
- Earthen dams
- Etc.
- Other uses are considered for being suitable.

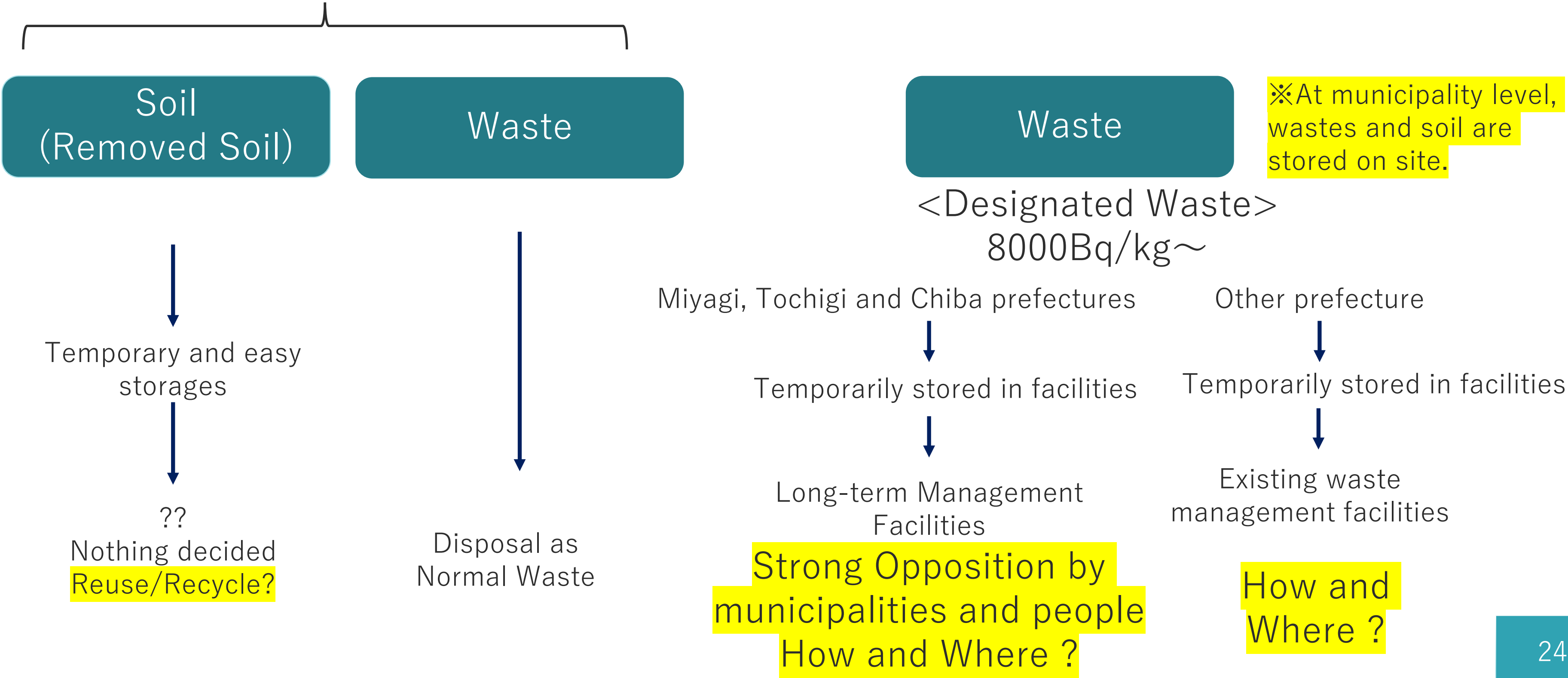
Problem 1(1): Complicated System
 “Removed soil” and “Specified Waste” inside Fukushima prefecture (Not inside NPP)



Problem 1(2): Complicated System

“Removed soil” and “Specified Waste” **outside** Fukushima prefecture

Decontamination



Problem 2 : Double Standard / Double administration

1. Standards of waste and soil contaminated with radioactive wastes (Fukushima originated waste and soil) is looser than existing standards of radioactive wastes.
 - Under the existing Nuclear Regulation Law, radioactive materials above 100Bq/kg should be managed and disposed as radioactive wastes.
 - But, Fukushima originated waste and soil below 8000Bq/kg is not treated as radioactive wastes. There is a gap between 100 and 8000 Bq/kg.
2. Under the “the Act on Special Measures”, “removed soil” below 8000Bq/kg is treated as resource. Reusing/recycling of “removed soil” is promoted by the National Government (MOE).
3. Long-term risk management perspective is lacking.
 - According to MOE, “recycled materials” will be under “management”. But the management is different from conventional “management” of radioactivity or radioactive materials according to the Radiation Council.
 - MOE uses a word “management” ambiguously. → What is “management”?
 - MOE put responsibilities on recycling material business operators. → What is “responsibilities”?
 - How long and how removed soil will be managed is completely unclear.

Two Laws / Two bodies on radioactive materials

- Radioactive materials from nuclear facilities including power plants, laboratories, hospitals etc. including Fukushima Daiichi NPP
 - the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (Reactor Regulation Law)
 - ※ Controlled by Nuclear Regulation Committee
- Radioactive materials in the environment released by the Fukushima Accident (outside NPP)
 - Act on Special Measures against Radioactive Substance Contamination
 - ※ This law is applicable only to Fukushima Disaster
 - ※ In case of emergency, **existing laws are not applicable**, an "act on special measures" is made in Japan. ? ?
 - ※ Controlled by the Ministry of Environment

Double Standard

Reactor Regulation Law		Act on Special Measures (inside Fukushima prefecture)		
100~ 10 ⁵ Bq/kg	Trench Disposal	~8000Bq/kg	Soil and Wastes from Decontamination Works	Treatment→ Recycled materials →Reusing
		8000~10 ⁵ Bq/kg	Designated Wastes Specified Wastes from the countermeasure area	Landfill Facility for Designated Waste
			Soil and Wastes from Decontamination Works	Interim Storage Facility
10万Bq/kg~	Pit Disposal	10 ⁵ Bq/kg~	Designated Wastes Specified Wastes from the countermeasure area Soil and Wastes from Decontamination Works	

- Trench Disposal

- 400m × 400m × 15m depth × 10 facilities
- 1300m × 1300m × 15m depth × 1 facility (坂井・仲田・天澤, 2018)
- NRC Regulation “Regulation on Location, Structure and Facility of the Second Class Wastes”

No clear definition of “Management” of recycled materials

- recycling/reusing of removed soil is to be implemented without defining “management”,
 - Who manage?/Who is responsible?/How long?
Traceability / Record keeping / information disclosure etc.
 - “in order to implement management of removed soil, with sharing roles among MOE and responsible parties on construction and management of recycling, MOE will consider to make a system of the management based on the Act of Special Measures.” (Basic Concept, p.8)
- The radioactive level of “removed soil” is equal to the low level of radioactive wastes which should be shallow-ground trench disposed.
 - Management under roads and embankments is not suitable to low-level radioactive wastes.
 - “Removed soil” and ”recycled materials” should be controlled as low level radioactive wastes under the existing Nuclear Regulation Law.

Problem 3 : Reduction of the volume of soil for the final disposal outside Fukushima? → Increase the volume of reusing/recycling of soil

- Final disposal outside Fukushima prefecture
 - In the JESCO (Japan Environmental Storage and Safety Corporation) Law, “the national government is responsible to take necessary measures to complete final disposal of wastes and soil outside Fukushima prefecture within 30 years after starting the operation of the Interim Storage Facilities.”
- But, the volume of soil for the final disposal outside Fukushima is too much.
 - “The total volume of removed soil and etc. is estimated to 22 million m³. It is not feasible to dispose them in the total volume in the Final Disposal Facilities because preparation of necessary land is difficult. “ (R&D strategy, p.3)
- Therefore the volume of reused/recycled soil should be increased.
 - “The volume of soil for the final disposal should be reduced by increasing the volume of soils and etc which can be reused.” (R&D strategy, p.3)
 - “It can be considered to use removed soil and etc., which are originally precious resources, to reduce the volume of final disposal” (R&D strategy, p.3)
 - “Recycling of cleaned materials is a key for reducing the volume of final disposal”. (R&D strategy, p.4)

Problem 3: From “Reusing before **Final Disposal**” to “Reusing before **Interim Storage**”

- Originally, MOE said “reusing/recycling is necessary for reducing the volume of **final disposal.**”

But, recently

- “It will be considered to implement the volume reduction treatment and reusing of removed soil before transporting them in the Interim Storage Facility if local people understand and accept reusing cleaned materials.”(R&D Strategy, p.3)
- “try to implement reusing and recycling of possible removed soil without waiting completion of R&D.” (R&D Strategy, p.4)

= Collapsed logic failure

Pictures

1. Interim Storage Facility
2. Landfill Facility for Designated Waste
3. Demonstration Project for Recycling and Reusing
 - Demonstration Project for Removed Soil Recycling and Reusing in Nihonmatsu City
 - Demonstration Project for Removed Soil Recycling and Reusing in Minamisoma City (Widening Construction of JOBAN highway)
 - Harase District in Nihonmatsu city
4. Widening construction of JOBAN highway

Interim Storage Facility

● Place

- Futaba village and Okuma village (evacuation area)
- Close to Fukushima Daiichi Nuclear Power Station.

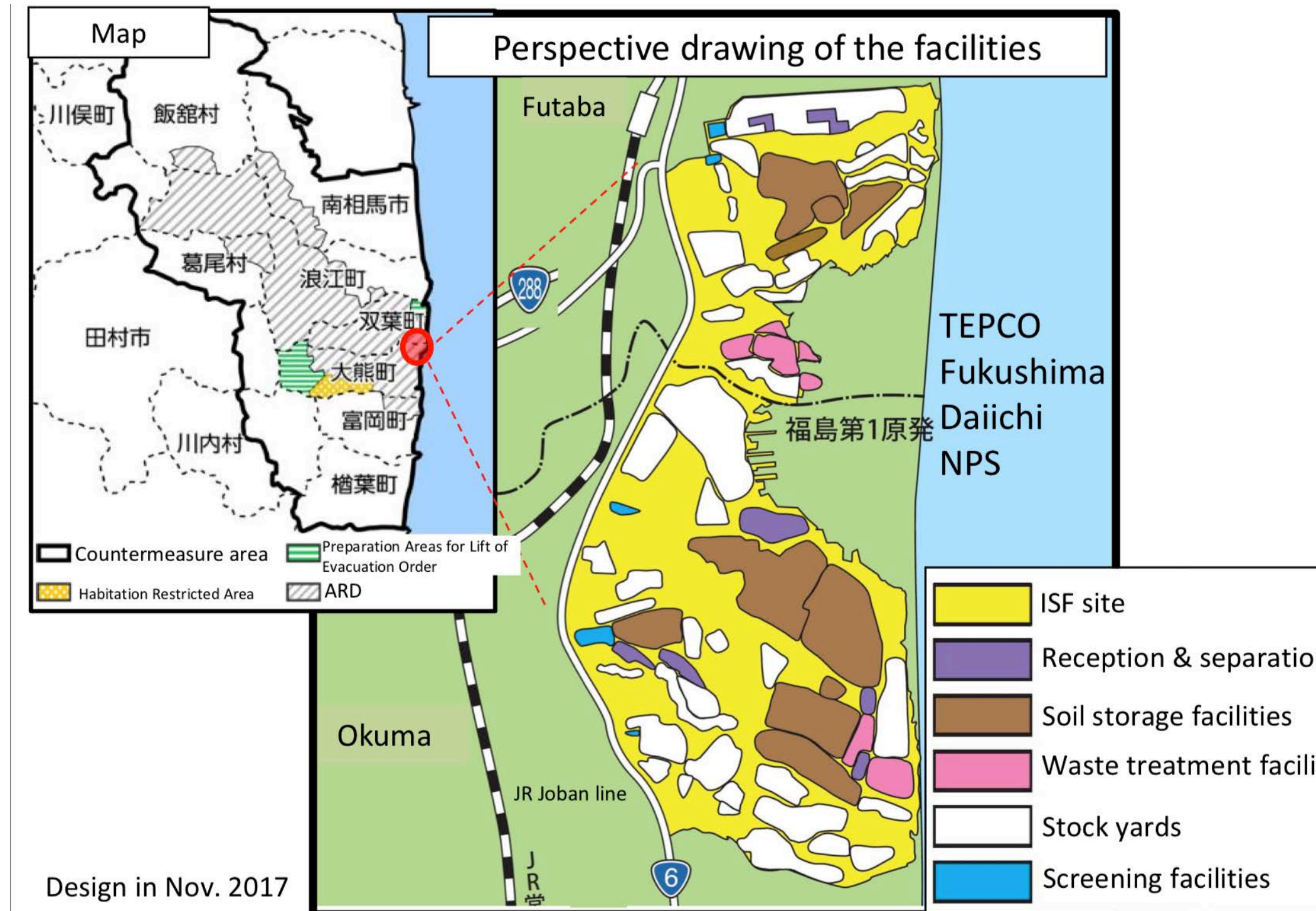
- Total Required Capacity = 16 – 20 million m³

<Soil>

- Below 8000Bq/kg … 10.06million m³
- 8000 – 10⁵ Bq/kg … 10.35 million m³
- Above 10⁵ Bq/kg … 10,000 m³

<Waste>

- Incineration Ash … 1.55 million m³
- Above 10⁵ Bq/kg … 20,000 m³



Interim Storage Facility



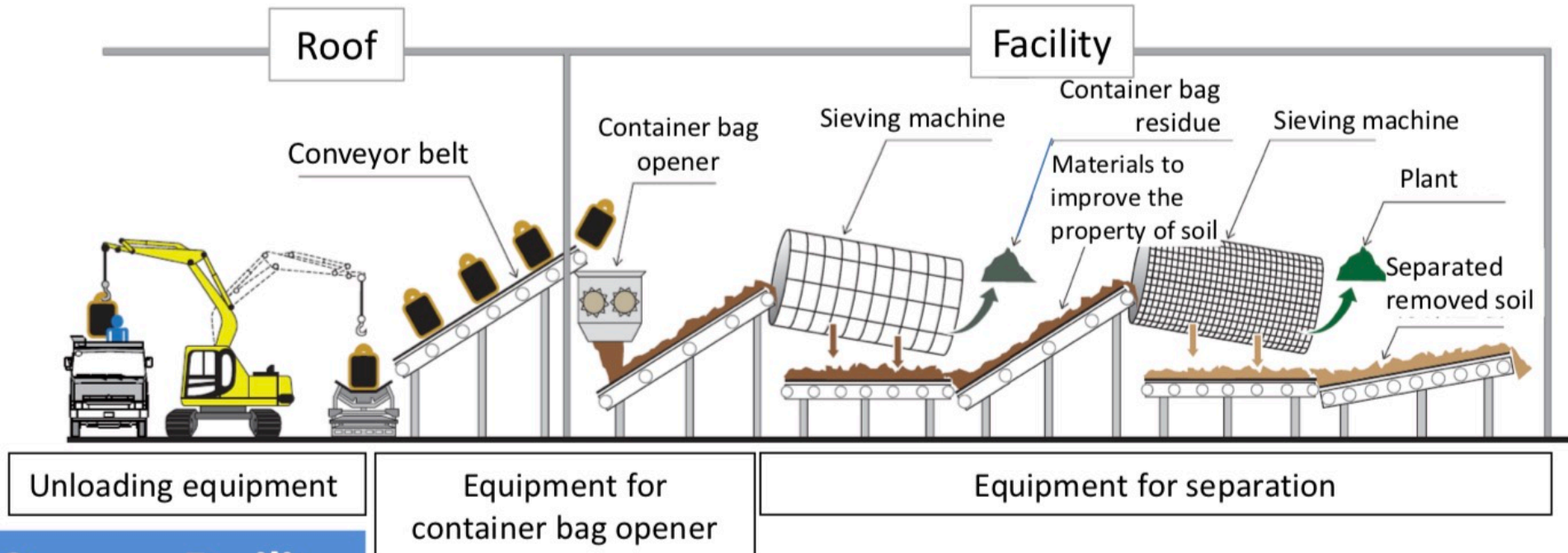
大熊②工区 土壌貯蔵施設
(撮影2019年02月18日)

Interim Storage Facility

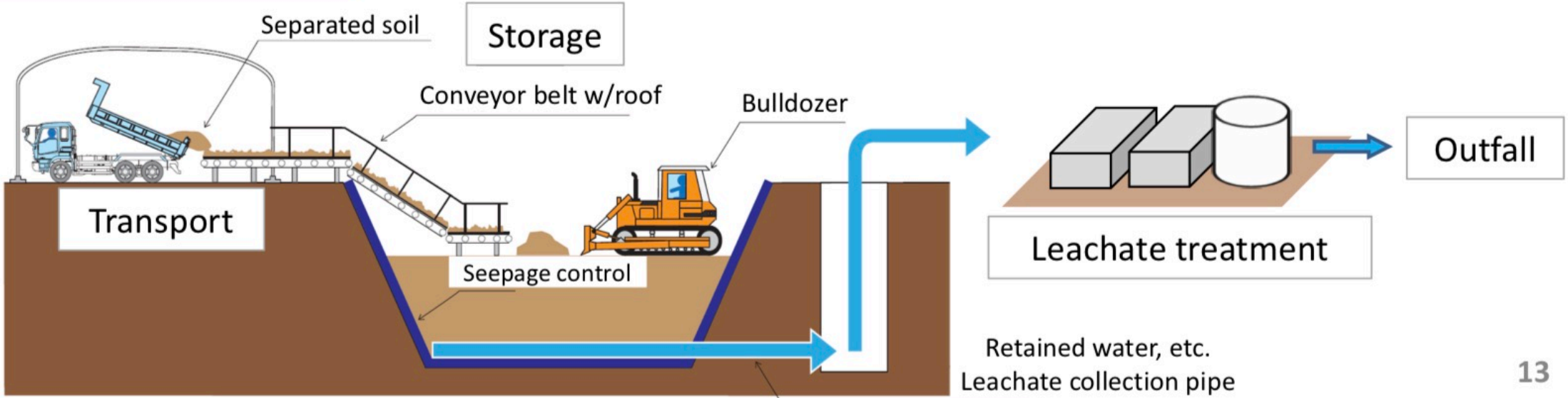
Soil Separation / Storage Facility

◆ Soil storage facility started the operation in October 2017 in Okuma and in December 2017 in Futaba

Soil Separation Facility



Soil Storage Facility



Visitor Center at Landfill Facility for Designated Waste



Kenichi Oshima
December 19,
2018

Landfill Facility for Designated Waste



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2018

Landfill Facility for Designated Waste



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December 19,
2018

Landfill Facility for Designated Waste



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December 19,
2018

下流側埋設廃棄物：非固形化廃棄物
(地盤改良用収納容器)



- ①縦 : 1 m 5 0 c m
- ②横 : 1 m 5 0 c m
- ③高さ : 5 0 c m
- ※6段積 覆土50cm
(覆土：ゼオライト混合土)

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2018

Landfill Facility for Designated Waste



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Landfill Facility for Designated Waste



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Landfill Facility for Designated Waste



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2018



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2018

Landfill Facility for Designated Waste

福島第二原子力発電所

浸出水調整槽

浸出水調整槽

浸出水処理施設

洪水調整池

2018年12月19日、
大島堅一撮影

FY 2016

Demonstration Project for
Recycling and Reusing

Implemented by MOE

平成28年度
除去土壌再生利用
実証事業

事業主体
環境省
Ministry of the Environment

受託者
VOREWS
Technology Research Association for
Volume reduction and Reclaim of Waste and Removing soil

除去土壌等減容化・再生利用技術研究組合
Technology Research Association for
Volume reduction and Reclaim of Waste and Removing soil

VOREWSは除去土壌を公共事業の資材として
再生利用する研究を行うために設立された技術研究組合です。
35法人が組合員として参画しています。

1
2
3
4
5

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December 19,
2018

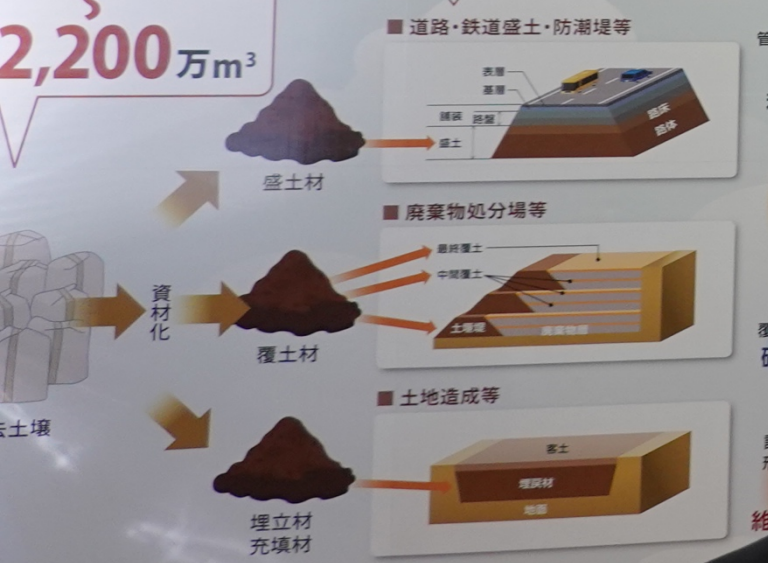
除去土壌を再生利用する目的

汚染で除去した土壌を土木資材に再生し、
最終処分量を減らします。

中間貯蔵開始後30年以内に、福島県外で最終処分を完了するために必要な措置
を講ずるものとしています。県外最終処分の実現に向けては、最終処分必要量を低減す
ることが鍵となることから、除去土壌等の減容・再生利用に係る技術開発、再生利用の促
進の取組等について検討を進めています。
資材の利用先を管理主体や責任体制が明確となっている公共事業等における人為
形質変更が想定されない盛土材等の構造基盤の部材に限定した上で、適切な管理
で再生資材を限定的に利用します。

1,600万m³
\$
2,200万m³

再生利用の例



本実証事業の内容

東部仮置場に保管されている除去土壌を使って、
試験盛土を施工し、再生利用の安全性等を確認します。

実証事業には、東部仮置場に保管
されている大型土のう袋約1,000
袋(小高区東部の除染で発生した
土壌、放射能濃度の平均値は約
2,000Bq/kgと推計)を利用します。
実証事業では、再生資材化した除
去土壌の安全な利用を段階的に
進めるため、再生資材化を行う工
程上の具体的な放射線に関する取
組及び土木資材としての品質
確保等について在り方の検討を
進めています。



■ 実証試験施工ヤードのレイアウト

平成28年度 除去土壌再生利用 実証事業



事業主体
環境省
Ministry of the Environment

受託者
VOREWS

本実証事業の具体的な流れ

飛散・流出防止措置を講じて実証事業周辺の安全を確実に確保しながら、事業を進め、
気象警報・注意報に留意し、強風や大雨等が見込まれる場合には作業を一旦中止し



Kenichi Oshima
December 19,
2018

除去土壌を再生利用する目的

除染で除去した土壌を土木資材に再生し、最終処分量を減らします。

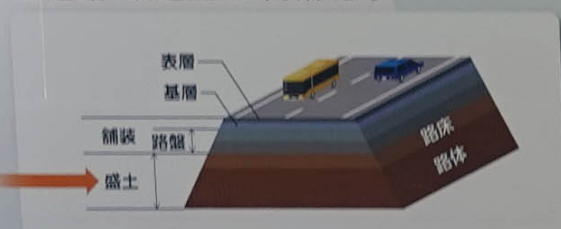
国は、中間貯蔵開始後30年以内に、福島県外で最終処分を完了するために必要な措置を講ずるものとしています。県外最終処分の実現に向けては、最終処分必要量を低減することが鍵となることから、除去土壌等の減容・再生利用に係る技術開発、再生利用の促進に係る事項等について検討を進めています。

再生資材の利用先を管理主体や責任体制が明確となっている公共事業等における人為的な形質変更が想定されない盛土材等の構造基盤の部材に限定した上で、適切な管理の下で再生資材を限定的に利用します。

約 1,600 万 m^3
約 2,200 万 m^3

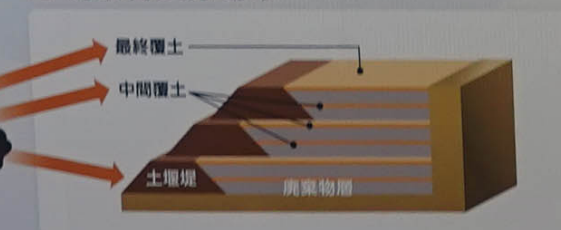
再生利用の例

■ 道路・鉄道盛土・防潮堤等



管理主体や責任体制が
明確となっている
公共事業等
利用先の限定

■ 廃棄物処分場等



粉じん発生防止等
拡散防止の
措置

■ 土地造成等



覆土等の遮へい措置
確実な遮へい

記録の作成・保管、
形質変更の管理等
適切な
維持管理・補修

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東部仮置場に保管されている除去土壌を使って、試験盛土を施工し、再生利用の安全性等を確認します。

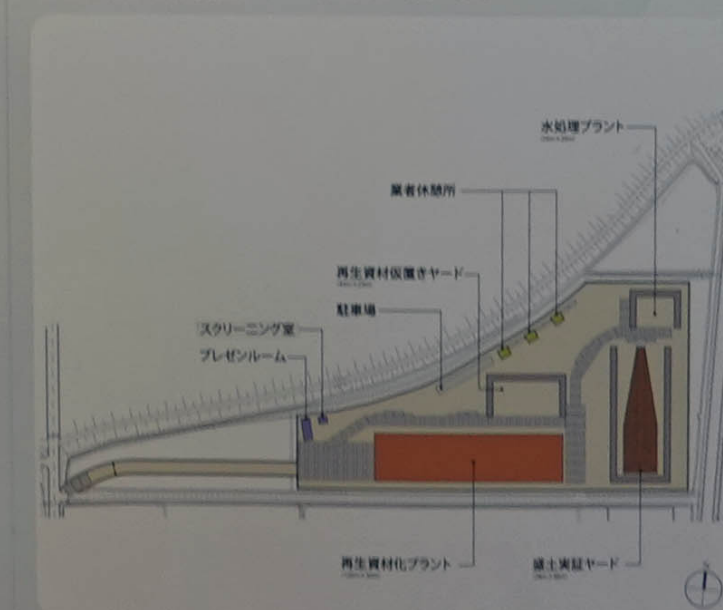
実証事業には、東部仮置場に保管されている大型土のう袋約1,000袋(小高区東部の除染で発生した土壌、放射能濃度の平均値は約2,000Bq/kgと推計)を利用します。実証事業では、再生資材化した除去土壌の安全な利用を段階的に進めるため、再生資材化を行う工程上の具体的な放射線に関する取扱方法及び土木資材としての品質を確保するための在り方の検討を進めることを目的としています。



■ 広域図



■ 実証試験施工ヤードのレイアウト



Kenichi Oshima
December 19,
2018

Demonstration Project of Regeneration and Reuse



Kenichi Oshima
December 19,
2018

Concepts on Safe Use of the Removed Soil after Recycling (June 2016)

【Basic Concept】

The removed soil should be used mainly for public projects with a responsible management system for the controlled materials (with a radioactivity level below 8,000Bq/kg in principle and set according to purpose) after necessary treatment, e.g. removal of debris, classification treatment. The use will be limited, such as the basic structure material of an embankment which is not assumed to change shape artificially, and be managed appropriately.

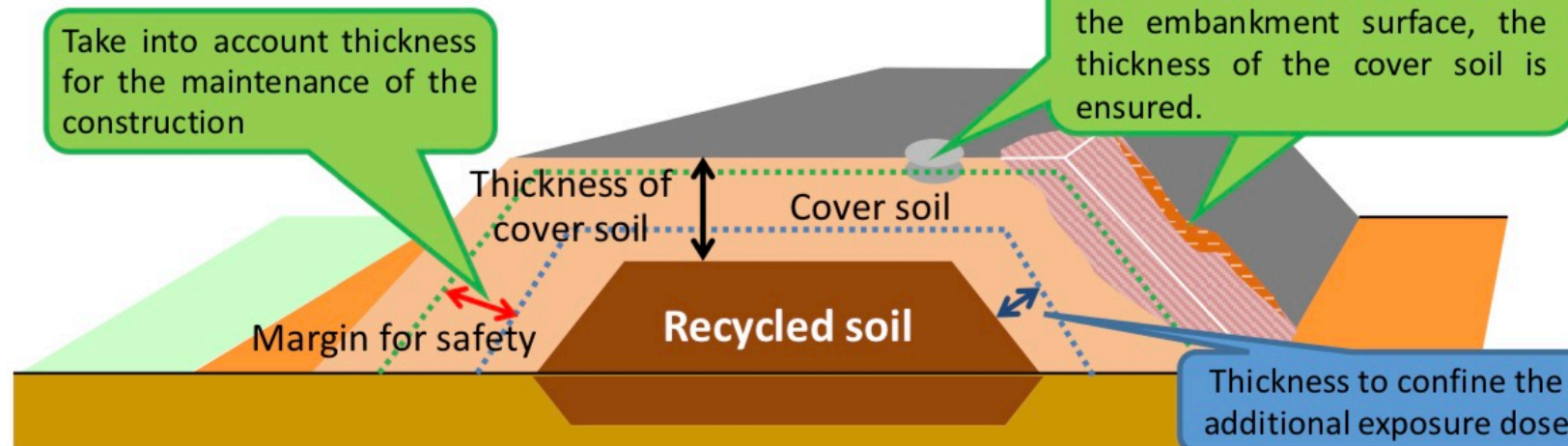
Limited use

- The use will be limited to the material which is not assumed to change shape artificially for a long time period, e.g. basic structure material of banking for coastal levees or seaside protection forests, embankment materials for roads, cover soil for waste disposal sites, landfill materials and basic structure for farms of flowers and energy crops.



Appropriate management

- The projects will be mainly public projects with a responsible management system.
- The radioactive cesium concentration in the removed soil should be limited in order to confine the additional exposure dose. The additional exposure dose should be below 1mSv/y during the construction and below 0.01mSv/y at the time of service.
- Covering soil should be installed, scatter and leakage should be prevented, ground form change should be observed, and the data should be recorded.



The thickness of cover soil should be designed to ensure the necessary thickness to confine the additional exposure dose, even when the general maintenance for the construction is conducted.

How to proceed recycling

As the environmental improvement towards the practical recycling of the removed soil, demonstration projects and model projects based on the above concepts should be implemented keeping the safety against radiation, studying specific verification of the management method and building stakeholders' and public understanding.

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Demonstration Project for Recycling in Minamisoma City

Demonstration project is currently being implemented in Minamisoma City, studying specifically on handling radiation during the procedure of recycling and ensuring the quality of the recycled soil as construction material in order to promote safe recycling and reuse of the removed soil in a step by step manner.

1. Preliminary treatment / quality control process (April 2017-)

1. Open sandbags and remove large stones and debris

Open large sandbags and remove large foreign materials



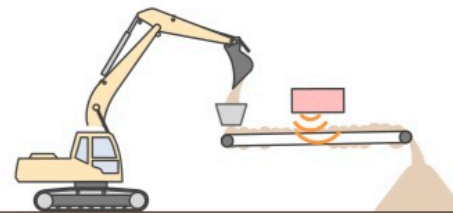
2. Further eliminate smaller debris

Eliminate small foreign materials through sieves



3. Classify soil by concentration

Measure radiation and classify soil

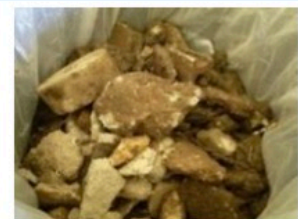


4. Control quality

Control quality of soil to be used for an embankment (such as water content and grain sizes)



vegetation



stones



pebbles

2. Test embankment process (May 2017-)

5. Construct test embankment / Monitoring

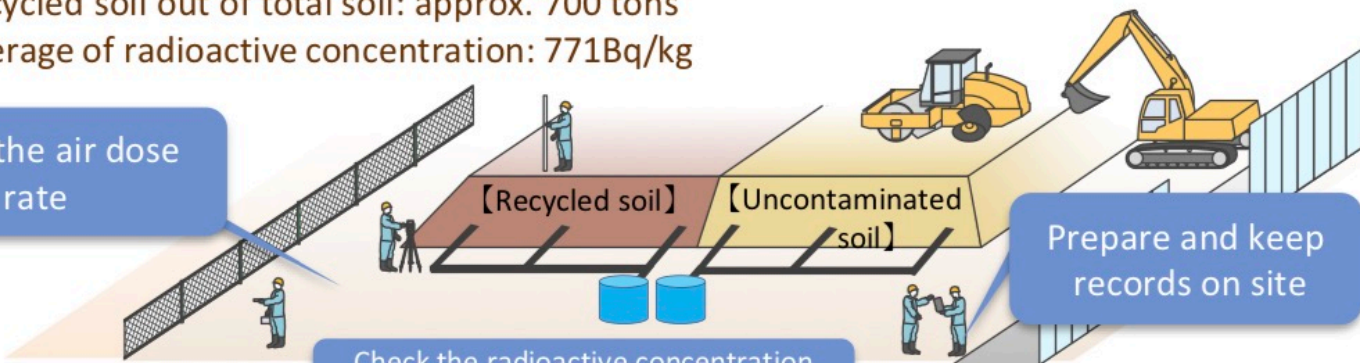
- Construct a test embankment (covered with uncontaminated soil by 50cm)
- Continue to measure the air dose rate and other indicators

Check the air dose rate

Check the radioactive concentration of leachate

Prepare and keep records on site

- Total amount of soil in embankment: approx. 4,000 tons
- Recycled soil out of total soil: approx. 700 tons
- Average of radioactive concentration: 771Bq/kg



Air dose rate was not much changed before and after opening of sandbags of the removed soil

Since the test embankment was constructed, **radioactive materials have not been detected in the leachate**

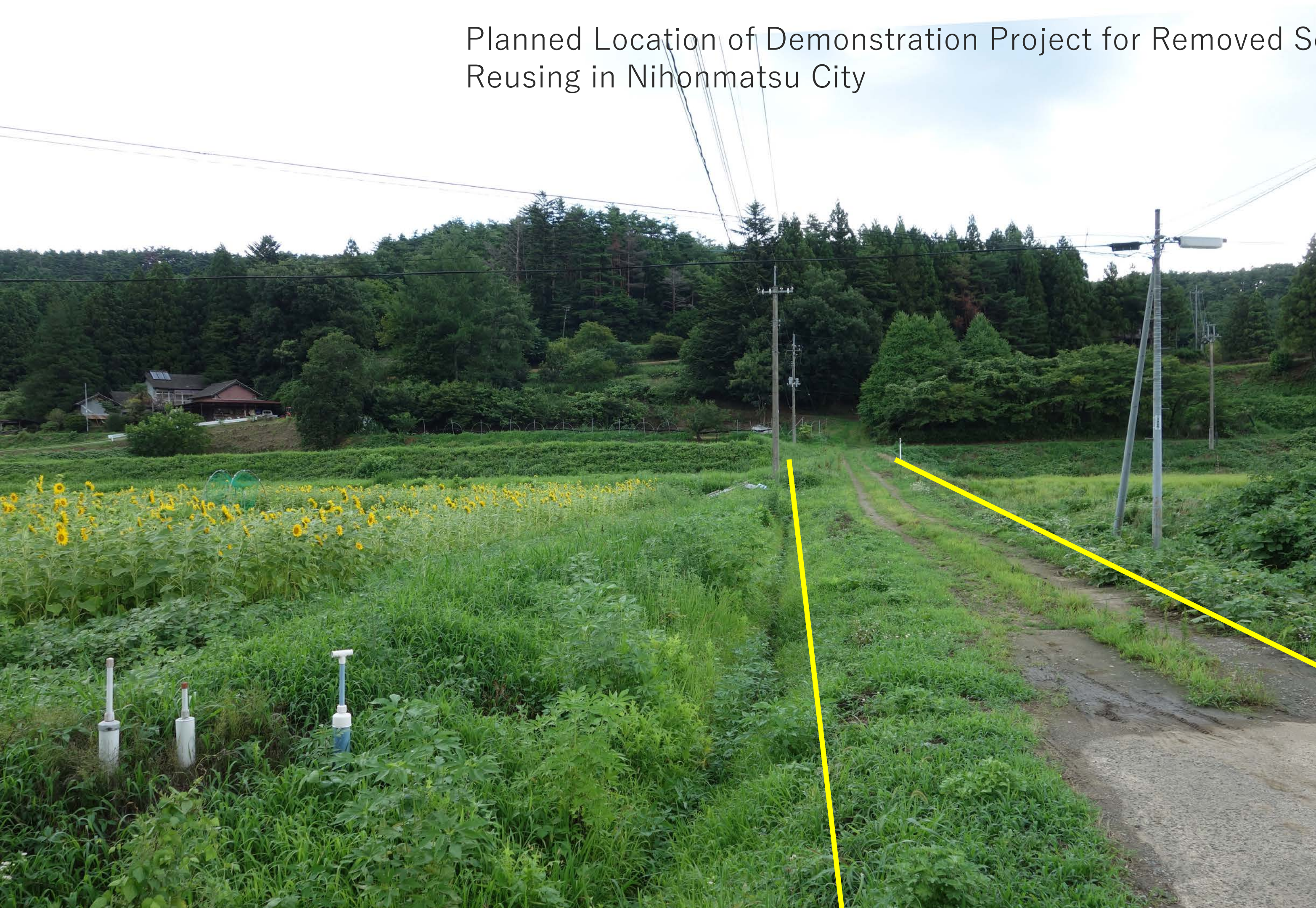
【Result of council of advisers】

- ◆ **Confirmed safety in this method** for recycling demonstration
- ◆ To accumulate data continuously conducting demonstration project

A Temporary and easy Storage of Removed Soil in Nihonmatsu city



Planned Location of Demonstration Project for Removed Soil Recycling and Reusing in Nihonmatsu City



Kenichi Oshima
August 10, 2018

Demonstration Project for Removed Soil Recycling and Reusing in Minamisoma City (Widening Construction of JOBAN highway)



Kenichi Oshima
July 21, 2019

Tough decision by Nagadoro

- Background

- Nagadoro borough is remained as an area designated as an “Areas where Returning is Difficult” in Iitate Village.
- In an Areas where Returning is Difficult, no decontamination work will never be implemented. But people wants their own hometown back to the original state.

- Plan

- If an area is designated as a Zone Designated for Reconstruction and Recovery (Reconstruction Hub), the government will implement decontamination works. Under the table, the government had a meeting with some of Iitate village before designating Nagadoro as a Zone Designated for Reconstruction and Recovery. In the case of Nagadoro, the government suggested the plan of recycling tying with a Zone Designated for Reconstruction and Recovery. People did not want removed soil under their own land, but, after a tough decision by Nagadoro people, Nagadoro borough and Iitate village accepted the government’s suggestion and requested the government to be designated as a Zone Designated for Reconstruction and Recovery.”

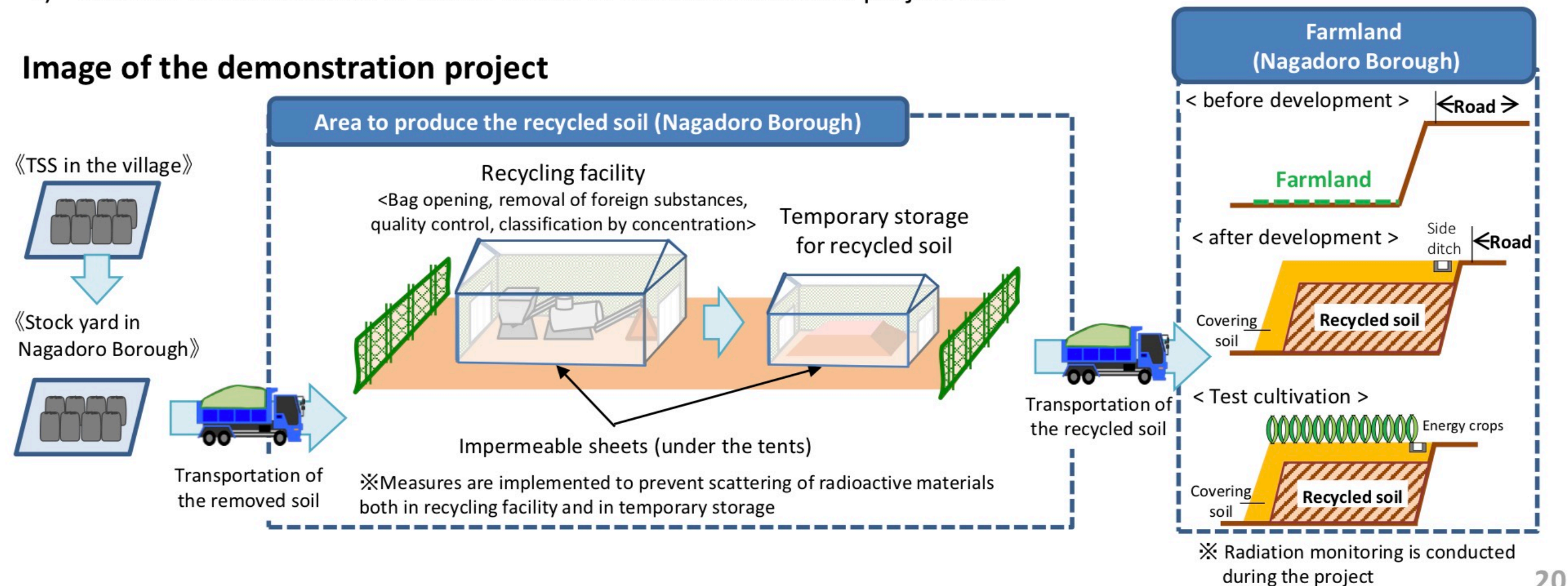
Demonstration Project for Recycling in Iitate Village

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

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

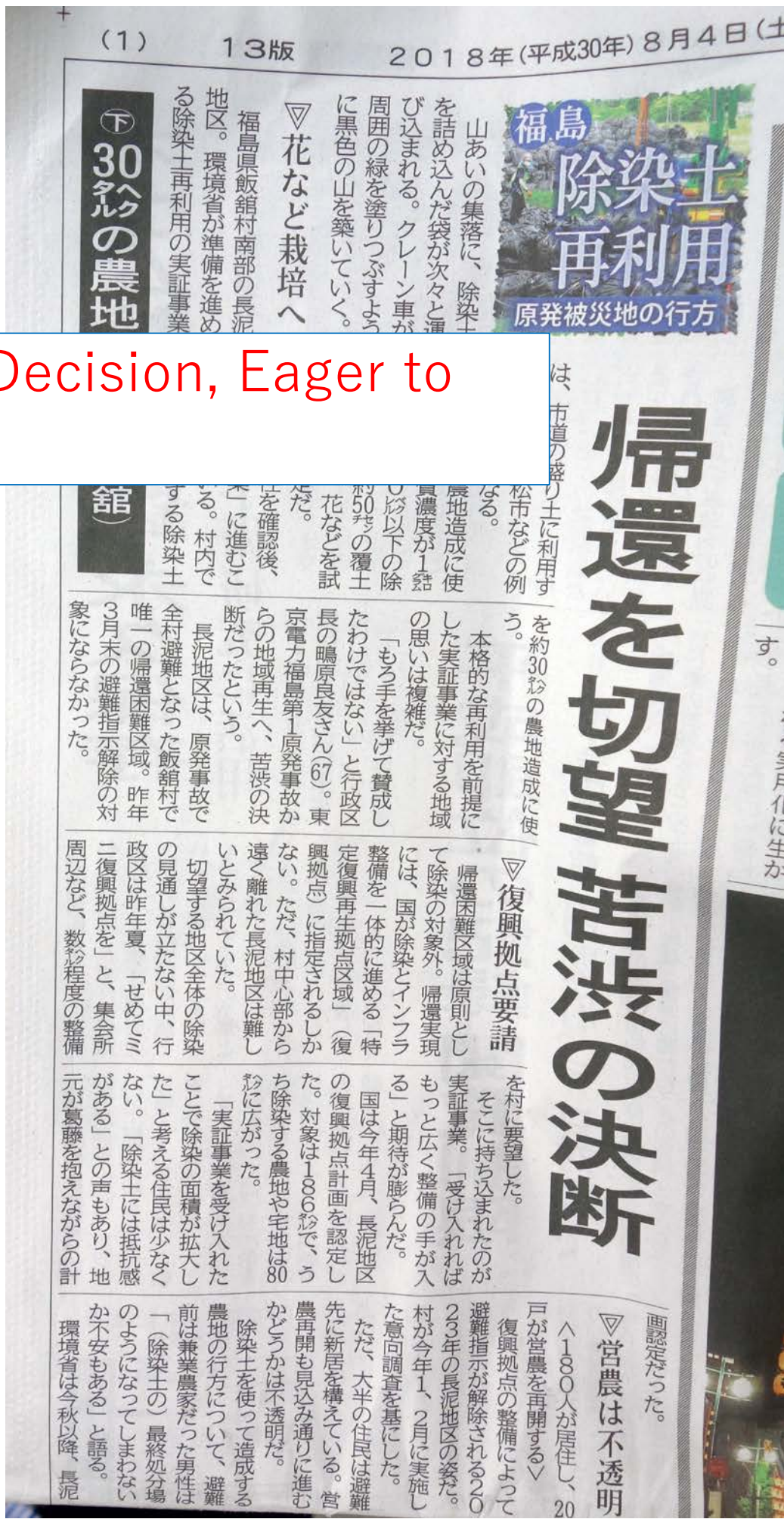
Image of the demonstration project



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Media Report: Reuse of Contaminated Soil
 Kahoku Shimpo, August 2, 4, 2018

Tough Decision, Eager to Return



『河北新報』 2018年8月4日



No Progress on transport
 No Restored Life

『河北新報』 2018年8月2日

Farmland in Nagadoro District
(Areas where Returning is Difficult)
in Iitate Village



Kenichi Oshima
August 10, 2018

Farmland in Nagadoro District
(Areas where Returning is Difficult)
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Kenichi Oshima
August 10, 2018

Farmland in Nagadoro District
(Areas where Returning is Difficult)
in Iitate Village

Demonstration Project was being
implemented.



2018年12月19日、
大島堅一撮影



Kenichi Oshima
December 19, 2018

Farmland in Nagadoro District
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Demonstration Project was being
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2018年12月19日、
大島堅一撮影



Kenichi Oshima
December 19, 2018

Problems 4: Decision making process and democracy

- Decision making process of demonstration project
 - Rough and ready method
 - ※ Harase area in Nihonmatsu city — Noticed on a piece of circular paper in a very small local community
 - Tough Decision by local people
 - ※ Farmland regeneration in Zone Designated for Reconstruction and Recovery (Nagadoro borough in Iitate village)
 - Small scaled decision making
- Very looser and poorer regulation than by Nuclear Regulation Committee
- Using of recycled materials can be conducted all over Japan
 - It is not Fukushima specific issue, but no decision making process exists in Japan.
 - From Demonstration in Fukushima to implementation nationwide ?
 - ※ In the stage of implementation, no acceptance by local people is necessary because safety is verified in demonstration projects.

Conclusions

- Area decontamination was completed in 2018
- But still there are difficult problems caused by decontamination works.
 - Weak management of radioactive materials.
 - Inside/Outside Fukushima
 - Double Standard
 - Reusing/Recycling
- Democratic decision making process is necessary to solve this problems.