



Progress on Offsite Cleanup Efforts in Japan

Sep, 2012

Ministry of the Environment, Japan

Framework of Decontamination

Decontamination work has been planned and implemented in accordance with the Act on Special Measures Concerning the Handling of Radioactive Pollution, that came into force on January 1, 2012. Priority is given to areas where decontamination is needed from the viewpoint of human health protection. Removed soil, etc. generated from decontamination work is to be collected, transferred, temporarily stored, and disposed safely based on the Act.

Special Decontamination Area

- ◆ 11 municipalities in Fukushima prefecture (*), which are located in (former) restricted zone or planned evacuation zone, were designated.
- ◆ Decontamination is implemented by the national government in accordance with the implementation plan, which is prepared for each municipality taking into account its opinion.

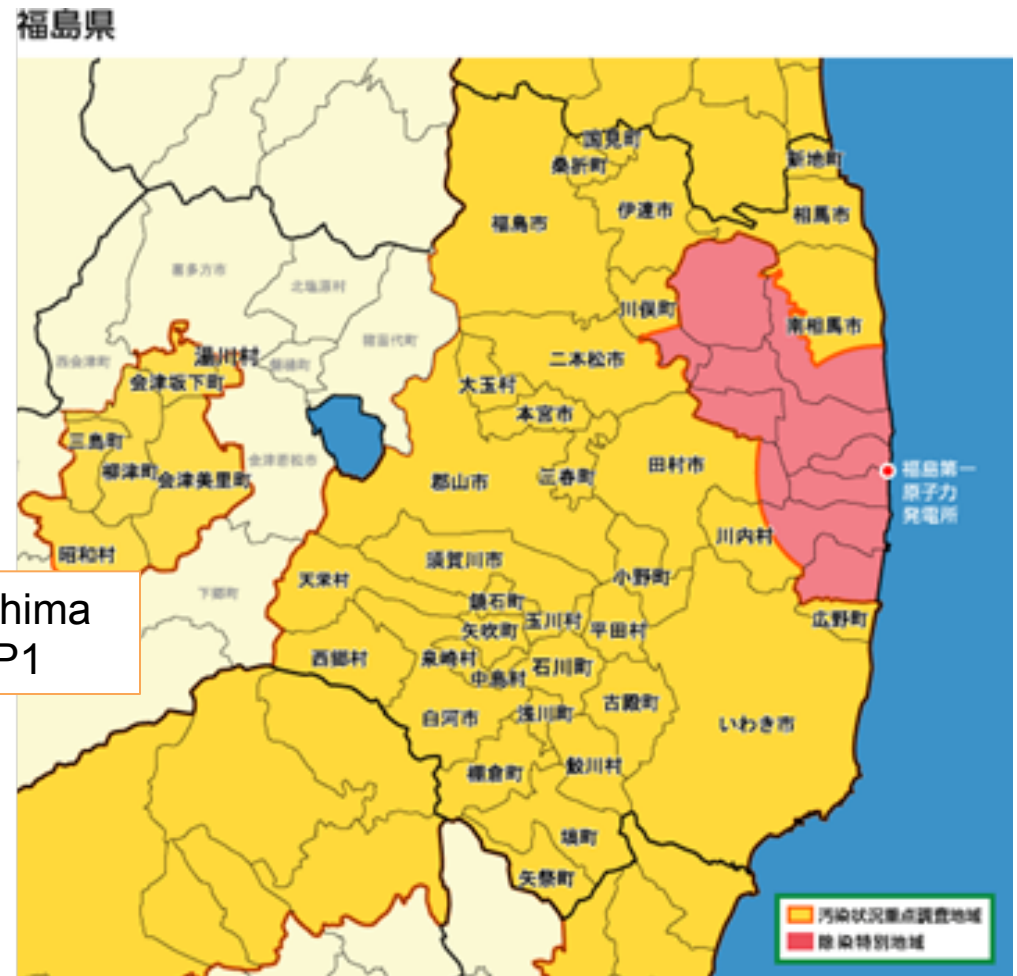
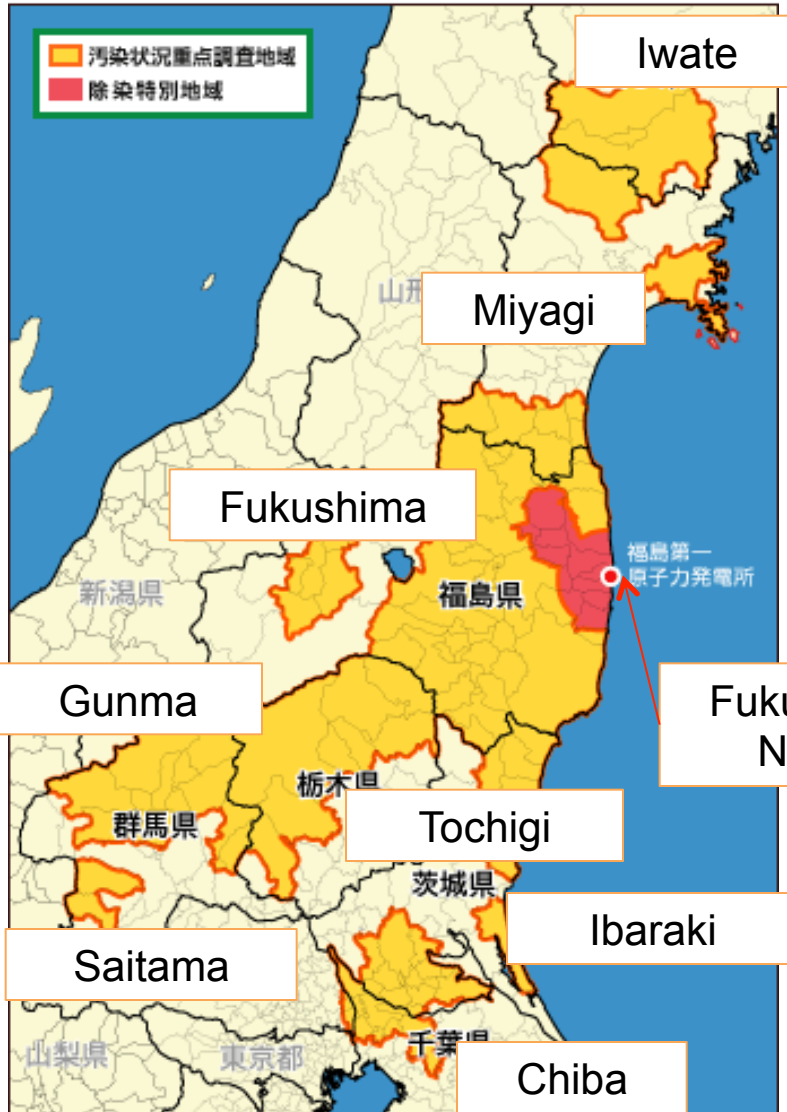
(*) Entire area of Naraha, Tomioka, Okuma, Futaba, Namie, Katsurao, and Iitate.
Some area of Tamura, Minami Soma, Kawamata, and Kawachi.

Intensive Contamination Survey Area

- ◆ 104 municipalities in 8 prefectures (*), in which over 0.23 $\mu\text{Sv}/\text{hour}$ of air dose rate (equivalent to over 1 mSv/Year) is surveyed, were designated.
- ◆ Decontamination is implemented by each municipality in accordance with its implementation plan, which is prepared based on the result of survey, etc.
- ◆ The national government will take financial and technical measures.

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

Special Decontamination Area and Intensive Contamination Survey Area



Basic Principles under the Act

Targets of the Decontamination

Additional * exposures over 20mSv/y

- Aim at stepwise and rapid reduction of those areas based on the ICRP Recommendation (2007).
 - * 'additional' means beyond natural background and medical exposure

Additional exposures < 20mSv/y

- As a long term goal, aim at reducing to 1 mSv/y or less
 - Reduce estimated annual exposure of the general public by 50 % in 2 years (by Aug 2013)
by radioactive decay, decay by natural factors and by decontamination
 - Reduce estimated annual exposure of children by 60 % in 2 years (by Aug 2013) by thorough decontamination of their living environment.
by radioactive decay, decay by natural factors and by decontamination
- The goals will be reviewed periodically

General Public

Children

Guidelines

-Helping understanding regulations under the Act-

- **Waste-related guidelines:** storage, maintenance and management standards and disposal standards
- **Decontamination-related guidelines:** methods for the investigation and measurement of the status of pollution, decontamination and other measures, collection, transfer and storage of the removed soil
- **Guidelines for decontamination workers:** exposure dose management methods, preventive measures against internal exposure, safety and health management systems



IAEA Mission

(IAEA's contributions as dispatching special missions to Japan)

1. 24 May- 2 June, 2011

IAEA International Fact Finding Expert Mission

2. 7-15 Oct., 2011

2nd IAEA International Fact Finding Expert Mission (to support the remediation of off-site area)

Advice (Example):

- The Japanese authorities involved in the remediation strategy are encouraged to cautiously balance the different factors that influence the net benefit of the remediation measures to ensure dose reduction. They are encouraged to avoid over-conservatism which could not effectively contribute to the reduction of exposure doses. This goal could be achieved through the practical implementation of the Justification and Optimization principles¹ under the prevailing circumstances. Involving more radiation protection experts (and the Regulatory Body) in the organizational structures that assist the decision makers might be beneficial in the fulfillment of this objective. The IAEA is ready to support Japan in considering revised, new and appropriate criteria.
- The central and local governments are encouraged to continue strengthening the involvement of and cooperation between various stakeholders. The Government might wish to strengthen the engagement of appropriate universities and/or academia in the process of further developing a stakeholder involvement strategy and implementation methods, which would be based on stakeholder needs and domestic cultural settings.

Progress in Special Decontamination Area

Decontamination Policy for Special Decontamination Area

Policy in FY 2012 and 2013

Decontamination will be implemented in accordance with implementation plans of each municipality, taking into account the level of air dose rate.

- ◆ **Area less than 20mSv/year**: Decontamination will be implemented, aiming for reducing additional exposure dose less than 1mSv/year as long-term goal.
- ◆ **Area from 20~50mSv/year**: Decontamination will be implemented, aiming for reducing exposure dose in residential and farmland area less than 20mSv/year by the end of FY 2013.
- ◆ **Area more than 50mSv/year**: Demonstration projects will be implemented. Lessons learnt will be reflected into future decontamination policy.

Policy After FY 2014

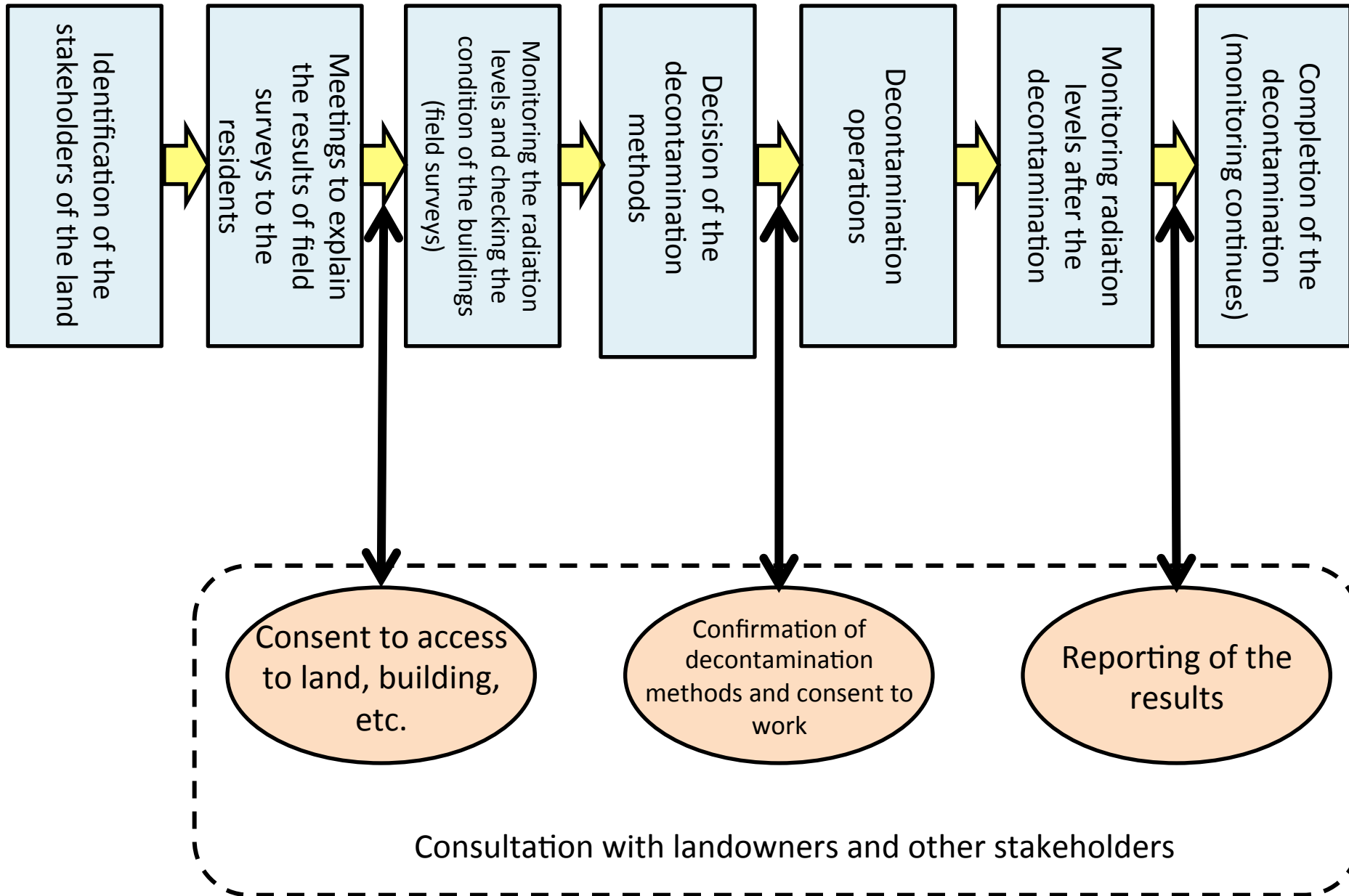
- ◆ Aiming for reducing additional exposure dose less than 1mSv/Y as long-term goal
- ◆ Check and evaluate two-year decontamination results, consider proper actions, and revise implementation plans as needed.

Progress of work in the Special Decontamination Area

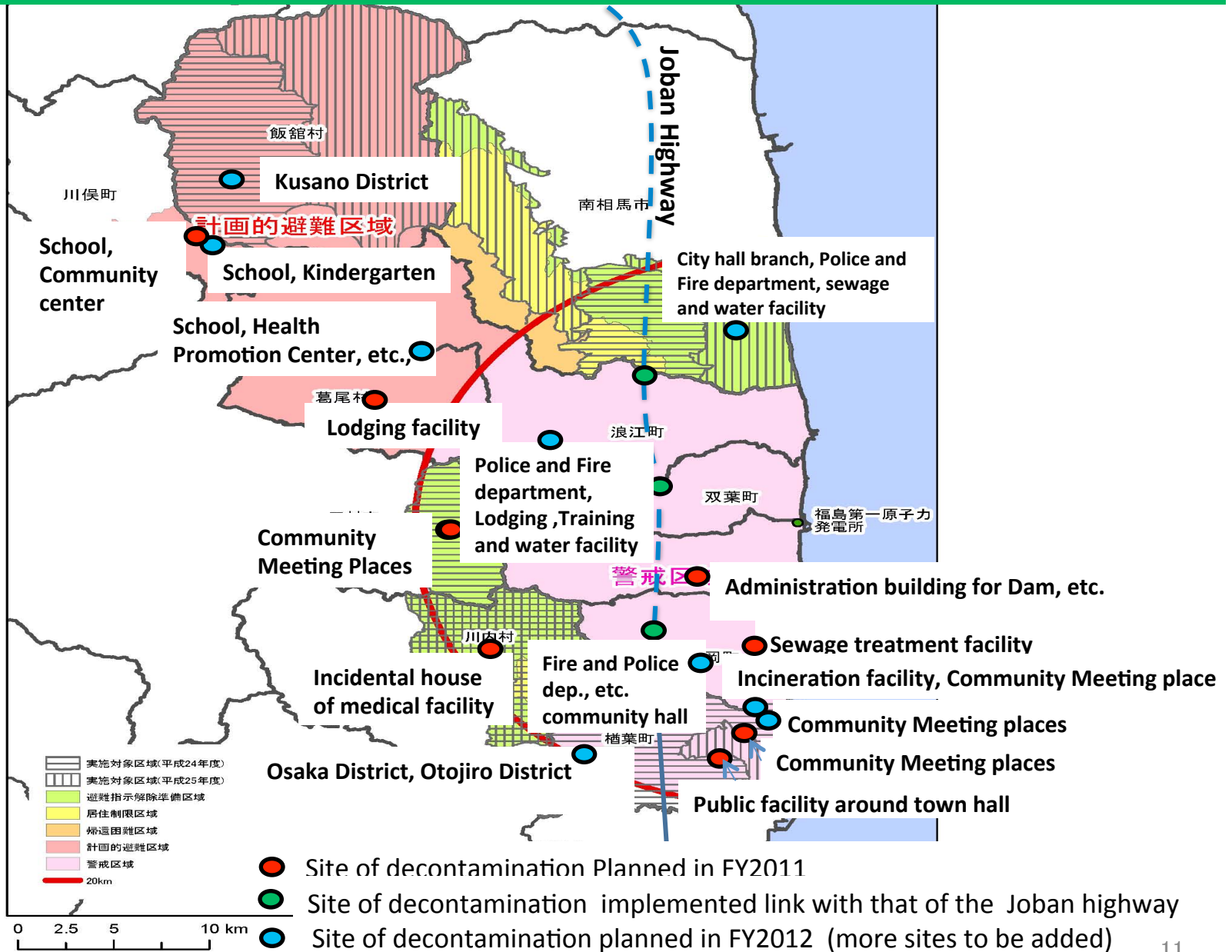
	Advance Decontamination (base facilities, etc.)	Advance Preparation (identification of owners of houses, etc.)	Formulation of decontamination plan	Full scale Decontamination Works	process securing temporary storage sites
Tamura city	○	○	○(Apr 13)	in operation (June 25)	○
Naraha town	○	○	○(Apr 13)	in preparation	○
Kawauchi village	○	○	○(Apr 13)	In preparation	○
litate village	○	○	○(May 24)	in preparation	○
Minami-Soma city	○	○	○(Apr 18)		in the local coordination process
Katsurao village	○	○	in the local coordination process		○
Kawamata town	○	○	○(Aug 10)		in the local coordination process
Namie town	○	○	in the local coordination process		in the local coordination process
Ookuma town	○	○	in the local coordination process		in the local coordination process
Tomioka town	○	○	in the local coordination process		in the local coordination process
Futaba town					

※Decontamination works in a municipality are to be implemented on the premises of formulation of the decontamination implementation plan and securement of temporary storage sites.

Flowchart of actions in the decontamination process



Decontamination situation in the Special Decontamination area



Decontamination Activities by Self-Defense Force

Iitate Village Office

Operation completed on Dec. 19



Measurement after cleaning ditches



Thorough removal of soil on asphalt surface

Average air dose rate
(1m, $\mu\text{Sv/h}$)

【asphalt】

2.94 → 1.96 (33% decreased)

【Lawn】

4.39 → 0.96 (78% decreased)

※promulgated on Dec. 22 by the
Ministry of the Environment

Namie Village Office

Operation completed on Dec. 15



Cleaning ditches



Cleaning stone pavement

Average air dose rate
(1m, $\mu\text{Sv/h}$)

【asphalt】

0.50 → 0.33 (34% decreased)

【Stone pavement】

0.53 → 0.39 (26% decreased)

※Promulgated on Dec. 22 by the
Ministry of the Environment

Decontamination Activities by Model Projects (Example1)

<Residential land>

roof: water cleaning,
cleaning with brush



wall: wiping



Gutter (vertical): high-pressure
water cleaning



Concrete floor:
High-pressure
water cleaning



Concrete floor:
Shot blast



Concrete floor:
Surface grinding
machine



Garden: removal
of topsoil



Decontamination Activities by Model Projects (Example2)

〈Street Surface〉

High-pressure water cleaning by vehicle for recovering functions of water drainage pavement



〈Roadside tree〉

Cleaning of trunk (with water and brush)



Surface grinding by shot blast



Removal of topsoil



Decontamination Model Work in the Joban Expressway

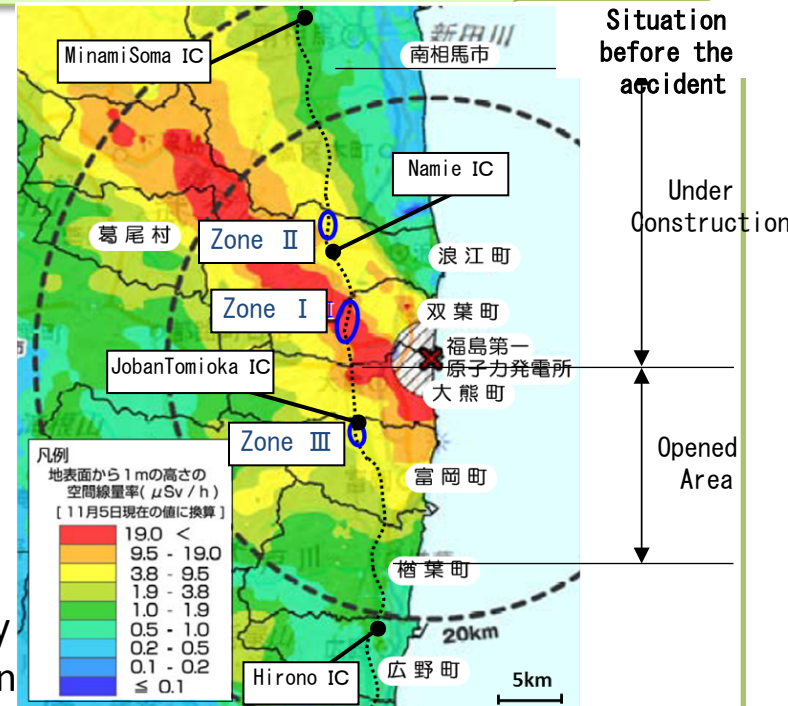
Objective

With a view to full-scale decontamination work in the future, decontamination with Various methods has been implemented and Evaluated in 3 zones, taking into account different status of road paving conditions and air dose rate.

Outline

- ◆ Period: March until the end of July, 2012
- ◆ Budget: Approximately 600 million yen
- ◆ Enforcement company: Taisei Construction Co., Ltd
- ◆ Demonstrated zones and outline of the result:

As for (zone I) in which the highest air dose rate is assumed, it is confirmed that air dose rate could be reduced significantly to less than $9.5 \mu\text{Sv/h}$ by performing careful decontamination and pavement construction. Also, in zone II & III, it is confirmed that air dose rate could be reduced to approximate $3.8\mu\text{Sv/h}$.



Decontamination Zone	Air dose rate	Situation before the accident	Road shape	Air dose rate at the center of expressway ($\mu\text{Sv/h}$)			
				Before	→	After	Decreasing rate
Zone I	More than $9.5 \mu\text{Sv/h}$ (equivalent to more than 50mSv/y)	Under Construction	Cutting interval	43.1	→	8.3	▲81%
			Landfill interval	11.6	→	4.2	▲64%
			Bridge interval	10.3	→	5.9	▲43%
Zone II	$3.8 \sim 9.5 \mu\text{Sv/h}$ (Annually equivalent to $20 \sim 50\text{mSv}$)	Under Construction	Cutting interval	5.8	→	2.3	▲60%
			Landfill interval	5.4	→	2.5	▲54%
Zone III	$3.8 \sim 9.5 \mu\text{Sv/h}$ (Annually equivalent to $20 \sim 50\text{mSv}$)	Opened	Cutting interval	5.1	→	4.1	▲20%

Progress
in Intensive Contamination Survey
Area

Procedure for Decontamination in the Intensive Contamination Survey Area

- ◆ Municipalities in the Area formulate decontamination implementation plans based on the Act on Special Measures concerning the Handling of Radioactive Pollution, and accordingly implement decontamination.
- ◆ The National Government shall provide a structure of financial measures (fund and subsidies) and of dispatch experts, etc..
- ◆ 78 out of 104 municipalities finalized their decontamination implementation plan after the consultation with the national government(as of Aug 10, 2012)
(Other 14 municipalities already formulated their decontamination plan before the entry into force of the Act)

Measures under the Act on Special Measures concerning Nuclear Emergency Preparedness

Basic Principles on Emergency Decontamination

+ decontamination implementation guideline by municipalities

Aug. 26, 2011 Determined by Nuclear Emergency Response Headquarters

Formulation of Plans in Municipalities

Start of decontamination by municipalities

The Act on Special Measures concerning the Handling of Radioactive Pollution

Aug. 30, 2011 officially announced and partially enforcement
Jan. 1, 2012 full –scale enforcement

Designate the intensive contamination survey area

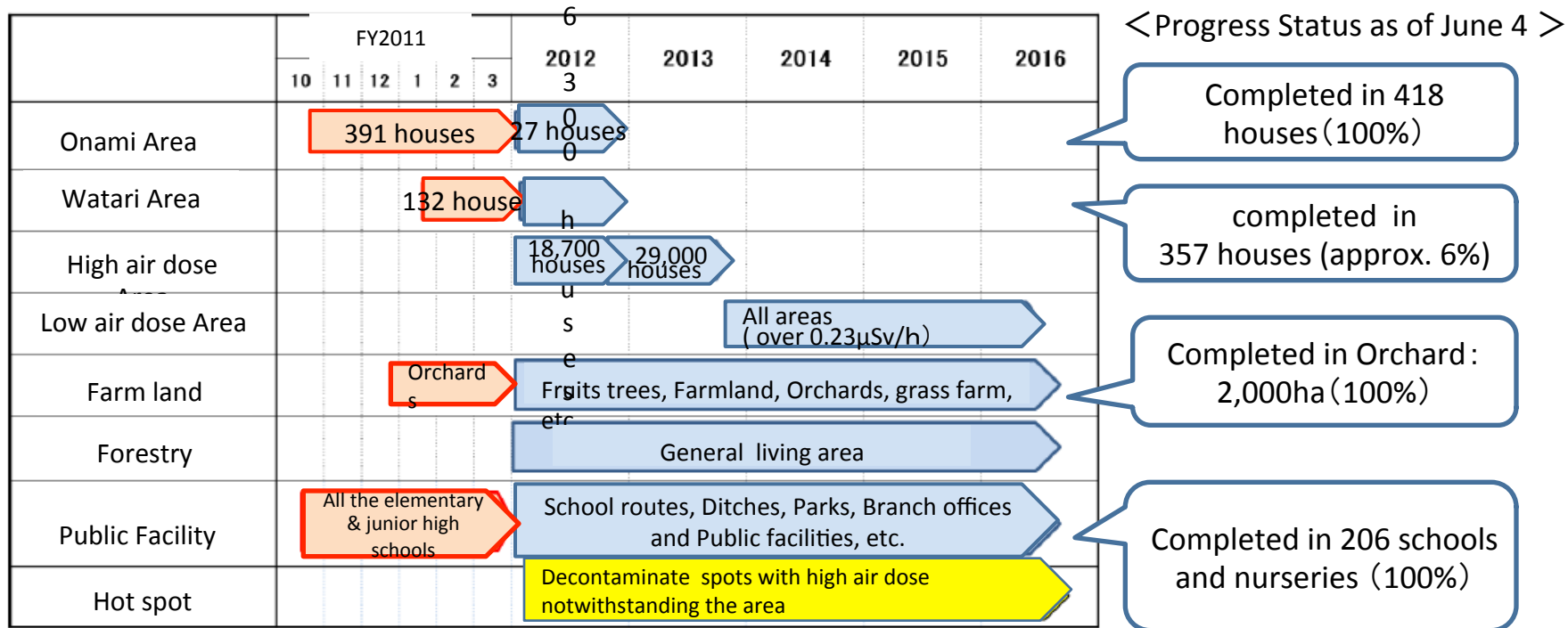
Formulation of decontamination implementation plan in municipalities

Implementation of full-scale decontamination by municipalities

migrate sequentially

Decontamination Progress Status in Intensive Contamination Survey Area (an example of Fukushima City)

- ◆ Already formulated decontamination implementation plan based on the Act on Special Measures concerning the Handling of Radioactive Pollution(May 21, 2011)
- ◆ Setting a planning term as the 5 years until Sep. 2016 (2 years as an intensive term), the City shall implement decontamination beginning from two areas in the City, where air dose rates are comparatively high, and public facilities for citizens especially for children.



: Decontamination completed

Efforts to secure Interim Storage Facility

Efforts to secure Interim Storage Facility

Oct., 2011 Ministry of the Environment formulated, officially announced and explained the Basic Principles for Interim Storage Facility (the roadmap) to the heads of relevant municipalities

Main Contents

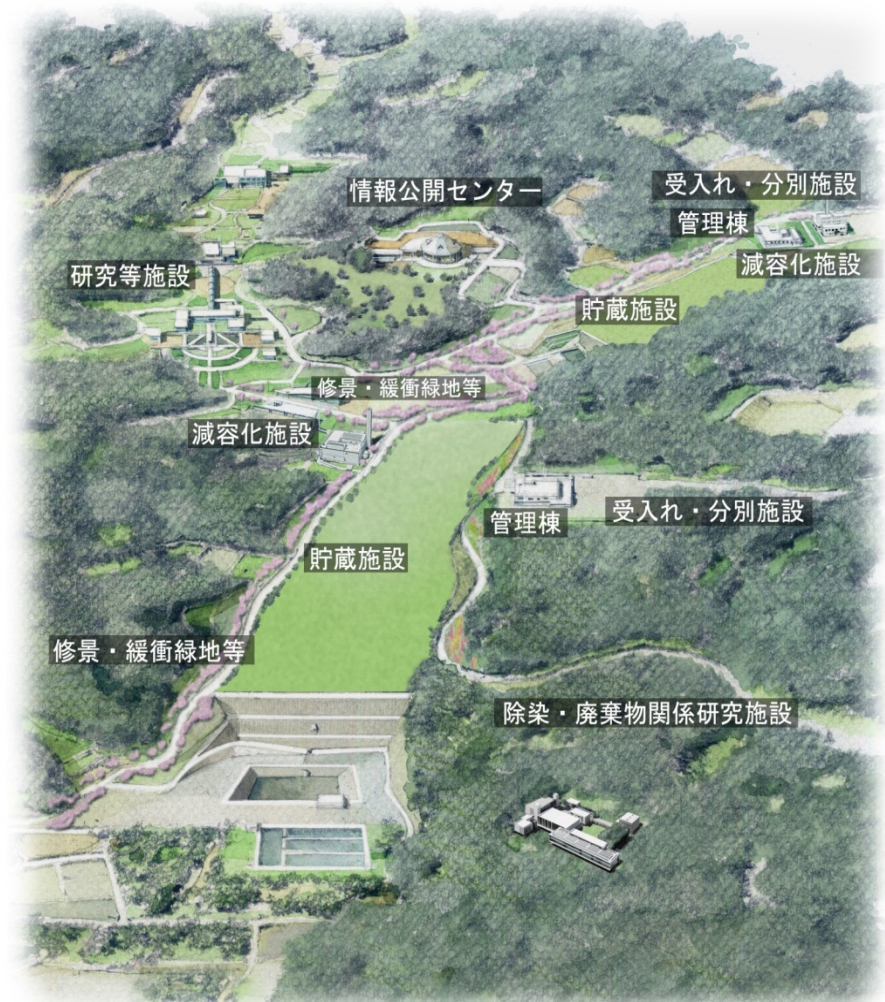
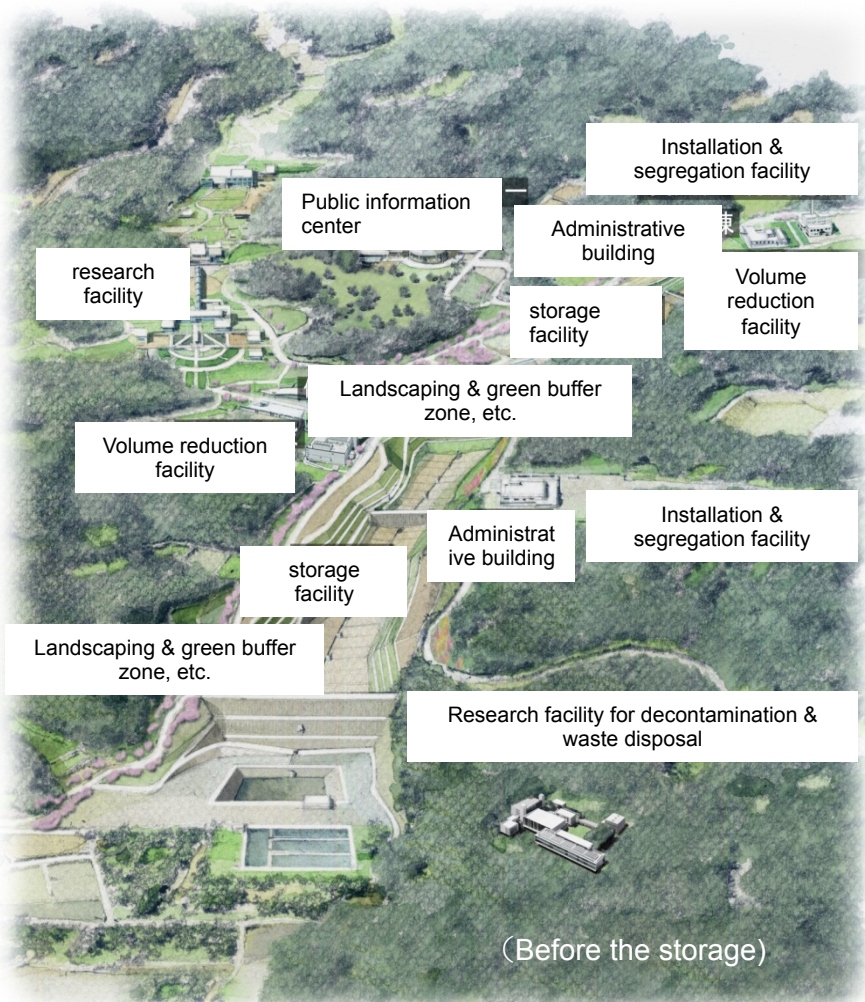
- The National Government shall secure, maintain and manage the facility
- The National Government shall make utmost efforts to start operation of the facility by January 2015.
- Location sites would be selected within FY 2012
- Target materials for storage is limited to soil and waste generated in Fukushima pref.
- Final disposal will be carried out outside Fukushima Pref. within about 30 years from the start of the interim storage.

Dec., 2011 The Ministry requested 8 towns in Futaba County and Fukushima Pref. to examine location sites in Futaba county

Mar., 2012 The Ministry explained the 8 towns and Fukushima Pref. that facilities may be located separately in 3 towns (Futaba, Okuma and Naraha)

Aug., 2012 The Ministry explained the sites proposed for investigation and the outline of the investigation plan to 8 towns and Fukushima Pref.

Overview of the Interim Storage Facility



❖ This picture indicates simulated facilities and structures as of this moment, so it could be modified in the future.

Challenges

Challenges

Challenges:

1. Demand for more efficient/effective technology for decontamination from the perspective of cost, time, etc. through demonstration project and R&D (incl. Soil/ Waste minimization and volume reduction)
2. Promotion of Public communication for securing temporary storage sites, interim storage facilities, etc.
3. Research on ensuring the behavior and environmental fate of Cesium, including the development of relevant transport modeling