# Remediation Efforts in Japan

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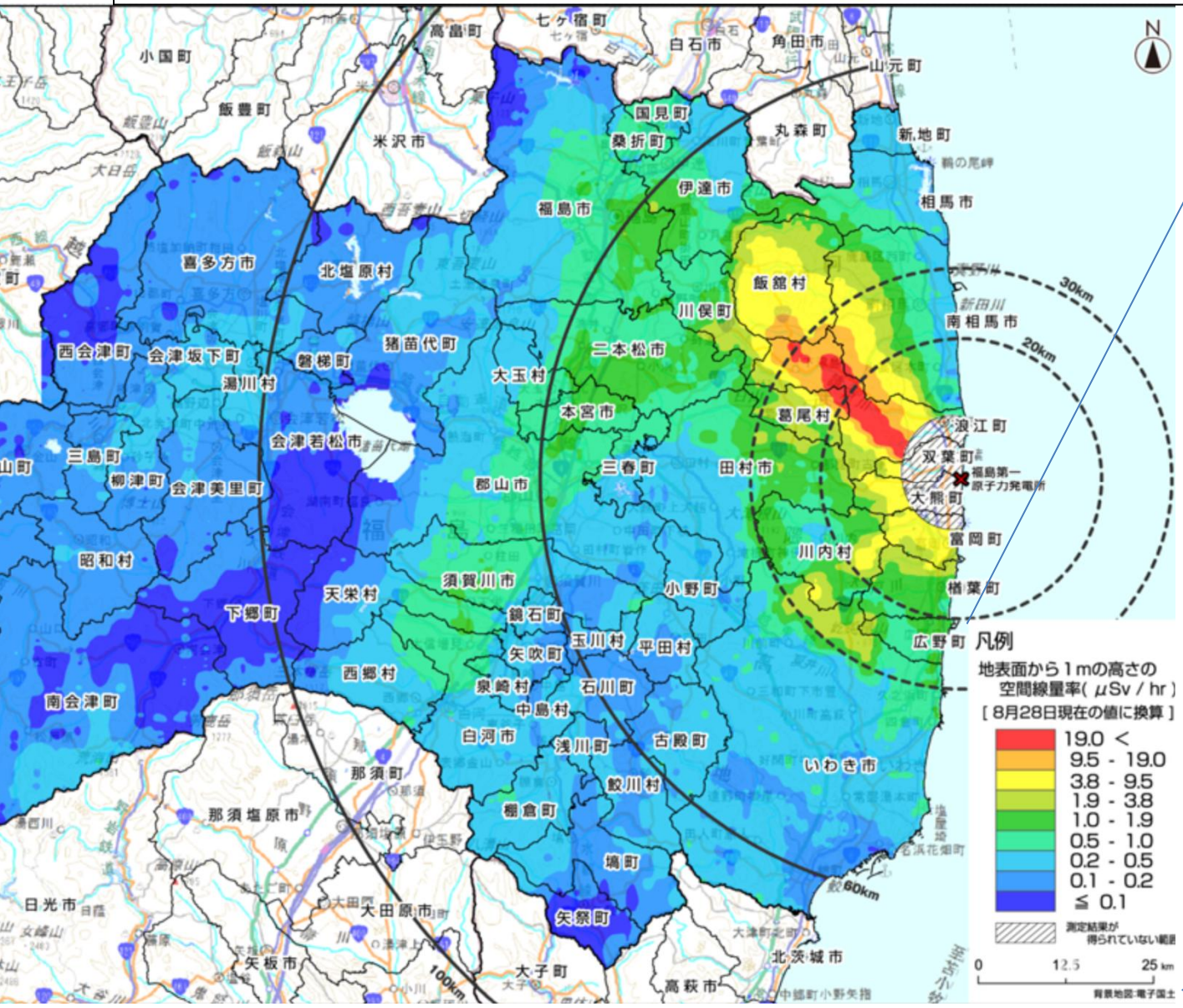
Radioactive materials spread widely including to the area in NW direction where high dose areas are distributed.

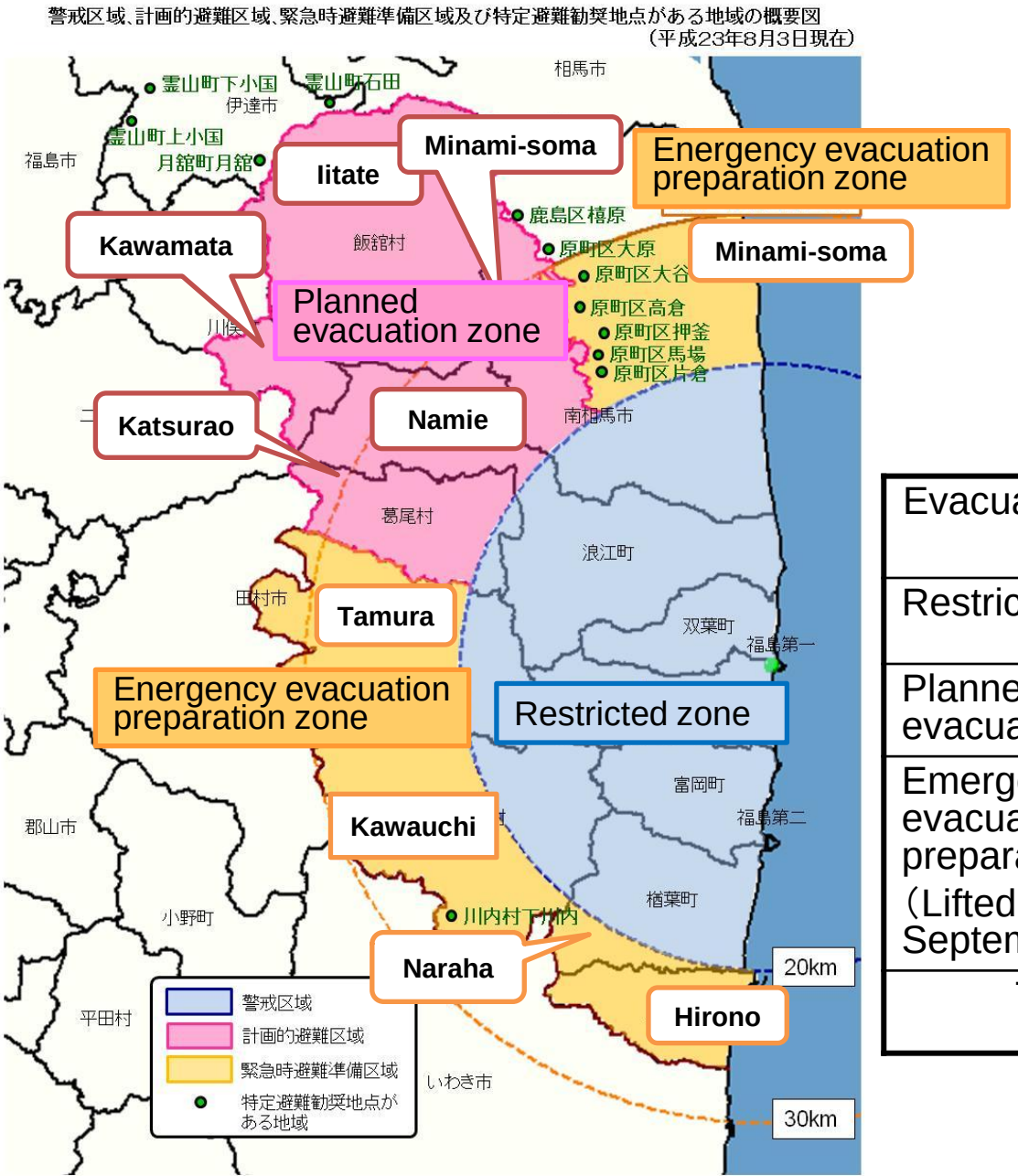



Monitoring results
（Air dose rate)

凡例
地表面から１mの高さの
空間線量率( μSv / hr )
[ 8月28日現在の値に換算 ]
19.0 <
9.5 - 19.0
3.8 - 9.5
1.9 - 3.8
1.0 - 1.9
0.5 - 1.0
0.2 - 0.5
0.1 - 0.2
≦ 0.1
測定結果が
得られていない範囲
0
12.5
25 km
背景地図:電子国土

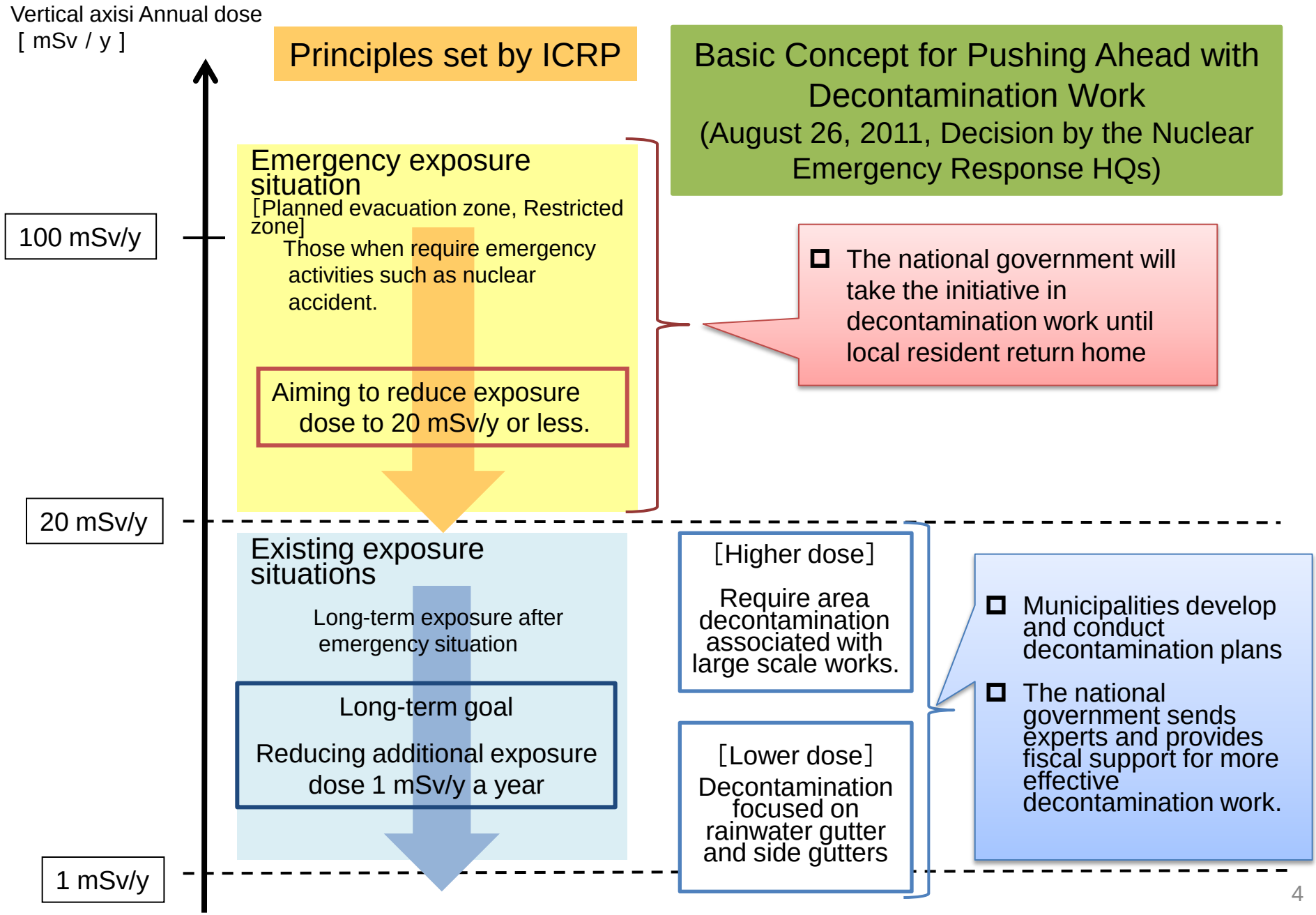
* Based on airborne monitoring survey by MEXT (published on Sept. 12,2011)

# Restricted zone, Planned evacuation zone, Former energency evacuation preparation zone and specified evacuation recommendation zone




| Evacuation zones | Population (thousand) |
|---|---|
| Restricted zone | 78 |
| Planned evacuation zone | 10 |
| Emergency evacuation preparation zone （Lifted on September 30. | 58 |
| Total | 150 |

# Basic Concept for Pushing Ahead with Decontamination Work



# Long-term and Provisional Goals for the Decontamination

Basic Policy for Emergency Response on Decontamination Work
(August 26, 2011, Decision by the Nuclear Emergency Response HQs)

① Aim at stepwise and rapid reduction in areas where 20 mSv/y or larger additional radiological exposures is assumed, based on ICRP recommendation (2007)..

## Long-term goal

② Aim at reducing 1 mSv/y or less of additional (beyond natural background exposure) in the area where additional radiological exposure is lower than 20 mSv/y.

## Provisional goal

**General Public**

③ Specifically, reduce estimated annual exposure by the general public by 50 % in two years

- By radioactive decay and decay by natural factors: by 40 % in two years
- By decontamination: by 10 %

**Children**

④ Reduce estimated annual exposure by children by 60 % compared to the current level in two years by through decontamination of their life environment.

- By radioactive decay and decay by natural factors: 40 % in two years
- **By decontamination of children's living enironment: 20 %**

⑤ The goals will be reviewed periodically based on the results of detailed monitoring, investigation of actual radiation exposure to children and results of future decontamination.

# Decontamination of area with evacuation instruction

## Framework of the policy on urgent decontamination

① Decontamination of area where evacuation instruction has been issued because of the potential of exceeding 20 mSv of annual cumulative dose (planned evacuation zone) will require high level technologies as well as consideration of the safety of workers involved.

② In the restricted area of 20 km radius from the Fukushima Daiichi NPP, administrative functions of the municipalities have been moved, and access to the area is restricted.

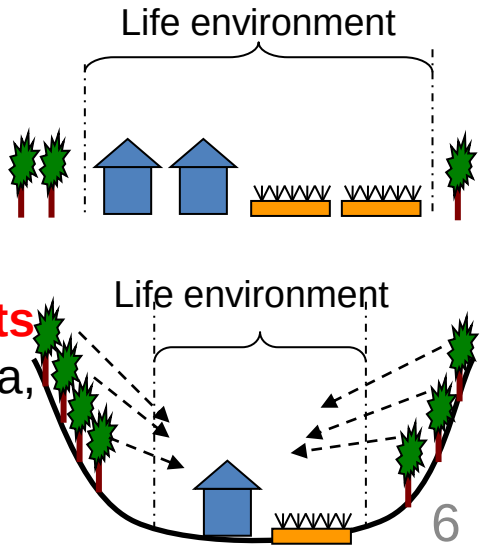
→ **The government has the initiative for decontamination, in cooperation with the municipalities.**

## Model decontamination program

① Initiate a model program at every municipality※ in restricted area,

② Reduce ambient dose rate **by large scale area decontamination,**

③ **Verify effectiveness of decontamination and its results** appropriate for land utilization types (settlement, urban area, etc.) and topographic features (plane, valley, hill, etc.)




※Tamura, Minamisoma, Futaba, Okuma, Tomioka, Naraha, Namie, Hirono, Kawamata, Katsurao, Kawauchi, Iitate

# Decontamination of Areas with 1 – 20 mSv of Additional Annual Dose

## Framework of the policy on urgent decontamination

- Administration function remains and residents live in the area. Systematic community by community decontamination will be most effective where individual circumstances and needs of the residents have been understood.

→ **Decontamination programs developed and implemented by the municipalities**

→ Supported by the state in terms of sending experts, financial support, providing information to the resident on monitoring results and points to be noted during the decontamination, and providing radiation detectors,（Briefings were held twice for municipalities in Fukushima)

## Guideline for decontamination work

The state will provide instructions for efficient and effective decontamination by municipalities, including.

① Development of decontamination program: Program development procedures such as defining goals, prioritization, before program monitoring, etc.

② Decontamination methods: Decontamination strategy and methods depending on type of objects such as house/garden, road, school, street trees, forest, farm land, rivers and lakes.

③ Points to be noted during the work: Points to be noted for ensuring workers safety.

④ Installation and management of temporary storage of removed soil: Temporary storage method (pile up, underground), proper shielding, monitoring, etc.

⑤ Actions after the decontamination: Continuous monitoring, etc.

## Decontamination program

Developed by municipalities based on the Guideline, including

① Decontamination policy goals, priorities, etc)

② Decontamination areas

③ Implementer

④ Decontamination methods

⑤ Schedule

⑥ Installation of a tentative storage

# Financial Support for Decontamination

**Objective/program**

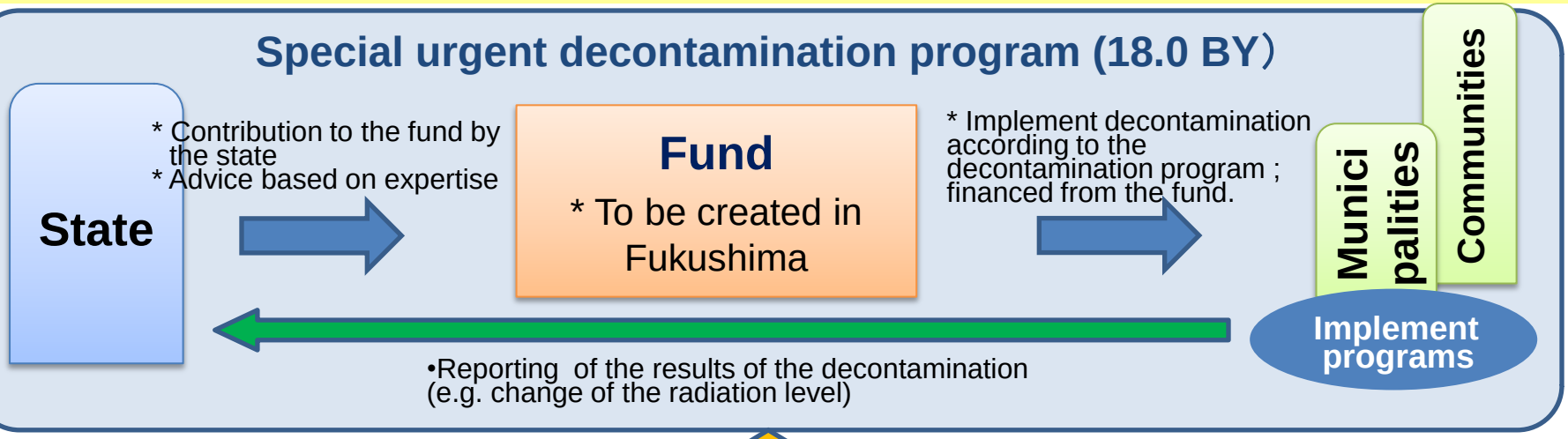
Secondary supplemental budget in 2011

Protect health of residents including children from the nuclear emergency by reducing the radiation level at schools and parks that children and residents often use as well as verifying levels in Fukushima .

① Special urgent decontamination program
- Radiation reduction in public facilities such as schools and parks, and along school routes.
- Support installation of air conditioning systems at school, etc.

② A program to develop a decontamination guideline

## Special urgent decontamination program (18.0 BY)




**Linkage**

## A program to develop a decontamination guideline (0.2 BY)

Develop a guideline and review the product based on the results of the decontamination activities in Fukushima as well as analysis on efficient and effective decontamination methods.

# Budget for Decontamination（220 Billion Yen (BY)）

Cabinet decision: 217.9BY for decontamination for the foreseeable future based on the urgent implementation basic policy from the remediation/restoration reserve

## Rapid implementation of the “Basic Policy for Emergency Response on Decontamination Work” (August 26, Cabinet decision)

- Budget required in the foreseeable future for implementing urgent decontamination is estimated to be 220 BY
- It is appropriated from East Japan Great Earthquake reconstruction reserve budget

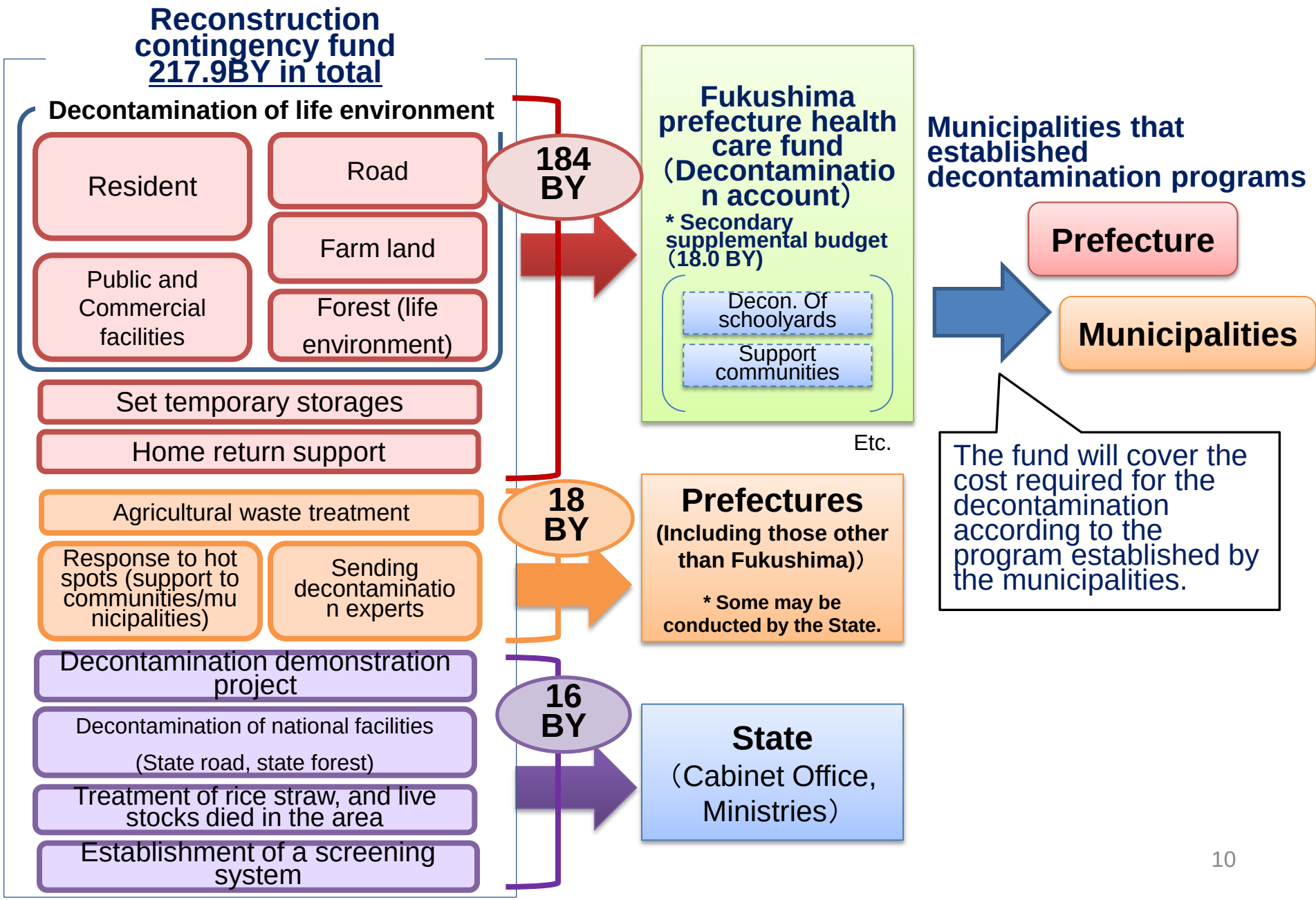
［Programs requiring urgent and rapid implementation in the foreseeable future］

① Decontamination demonstration program in 12 municipalities including evacuation zones.
② Decontamination of living environment beginning in locations with the highest radiation levels in areas with additional annual dose estimate of 1-20 mSv
③ Construction of facilities required for temporary storage of soils generated from the decontamination
④ Decontamination of places where radiation level is locally high, such as gutters and rainwater gutters (including in areas other than Fukushima)
⑤ Sending decontamination experts（including in areas other than Fukushima), etc.

* Following programs shall be conducted directly by each responsible Ministry;
decontamination demonstration program at evacuation zone, decontamination of state owned roads, forest and other facilities, treatment of highly contaminated rice straw and domestic and farm animals that died in the restricted area.

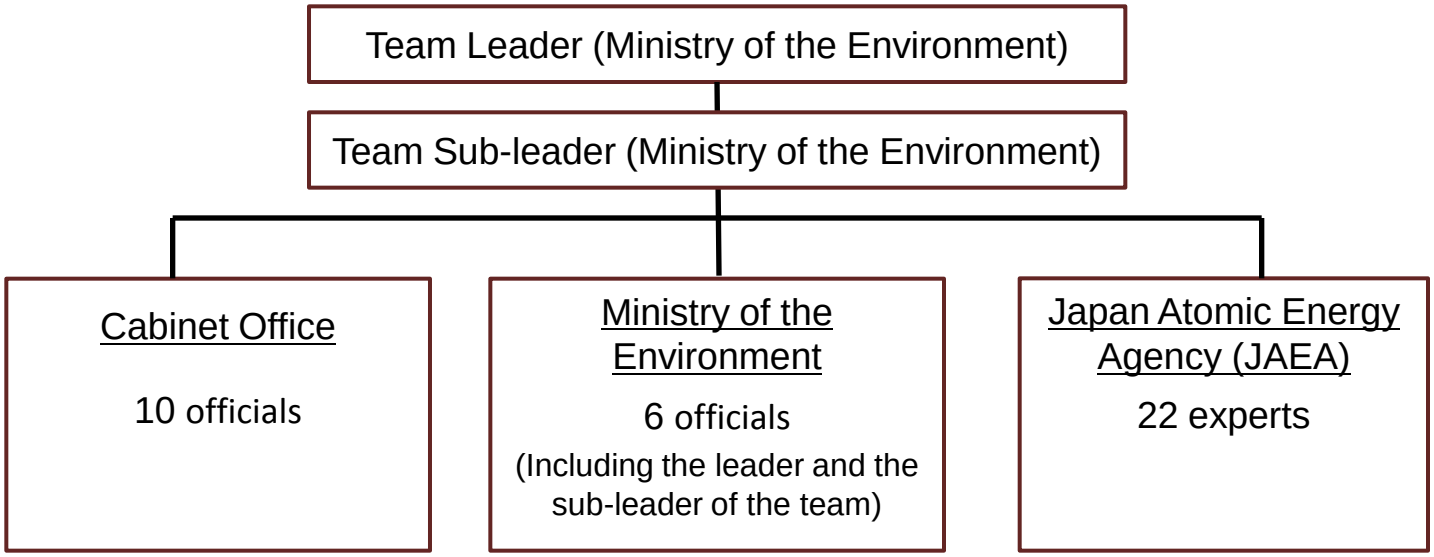
On Sept. 9, appropriation of the reserve 217.9BY was decided in the Cabinet meeting.

# Image of entire program conducted using the supplemental budget



# Fukushima Decontamination Promotion Team

- A team consisting of government officials and JAEA's experts has been established in the city of Fukushima since August 24 so as to promote decontamination in Fukushima Prefecture.
- Communicating and coordinating with the local municipalities; assisting them in their preparation of decontamination plans, for example, by dispatching experts, in collaboration with the Local Nuclear Emergency Response Headquarters.
- Promotion of model decontamination projects in 12 municipalities of high dose



# Expert Dispatch System

**Fukushima Decontamination Promotion Team**

Dispatch team officials and 32 experts to the municipalities since September 2011
- to provide necessary information
- to promote communication and coordination
- to assist in their development of decontamination plans

**Expert Team including experts of JAEA (32 experts)**

**Technical support**

**Decontamination Plans**

**Governmental plans**

**Areas（over 20 mSv/yr doses)**

**Municipal plans**

**Areas（1~20 mSv/yr doses）**

**Areas with less than 1 mSv/yr doses**

# Overview of the Decontamination Demonstration Test

1.Description

Decontamination of rather wide area including lands with different utilization forms such as residence, road, and farming.

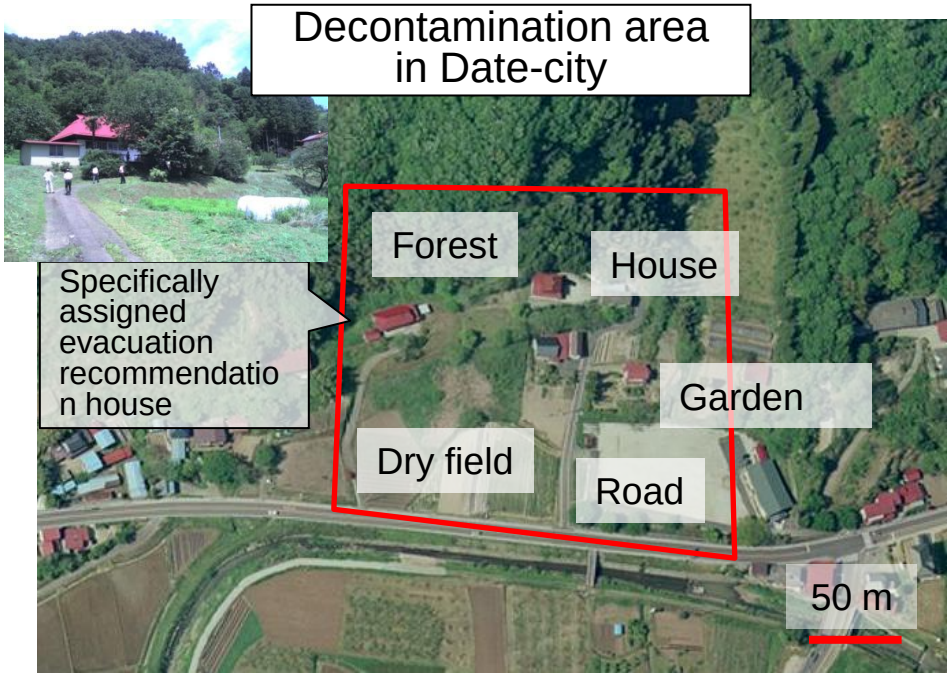
2. Decontamination technologies for each object

① Houses (Roof, wall, rainwater gutter,): High pressure spray, brushing, etc.
② Gardens (concrete, plant, soil): High pressure spray, mowing, removal of surface soil, etc.
③ Rice fields, dry fields: Removal of surface soil, absorption on poly-ion, use of heavy equipment, etc.
④ Forest: Collection of fallen leaves and leaf mold, planning, removal of surface soil, etc.
⑤ Gutter：Brushing, grinding, etc.

3. Locations

Select sites in Date-city and Minami-soma city.

Decontamination area in Date-city

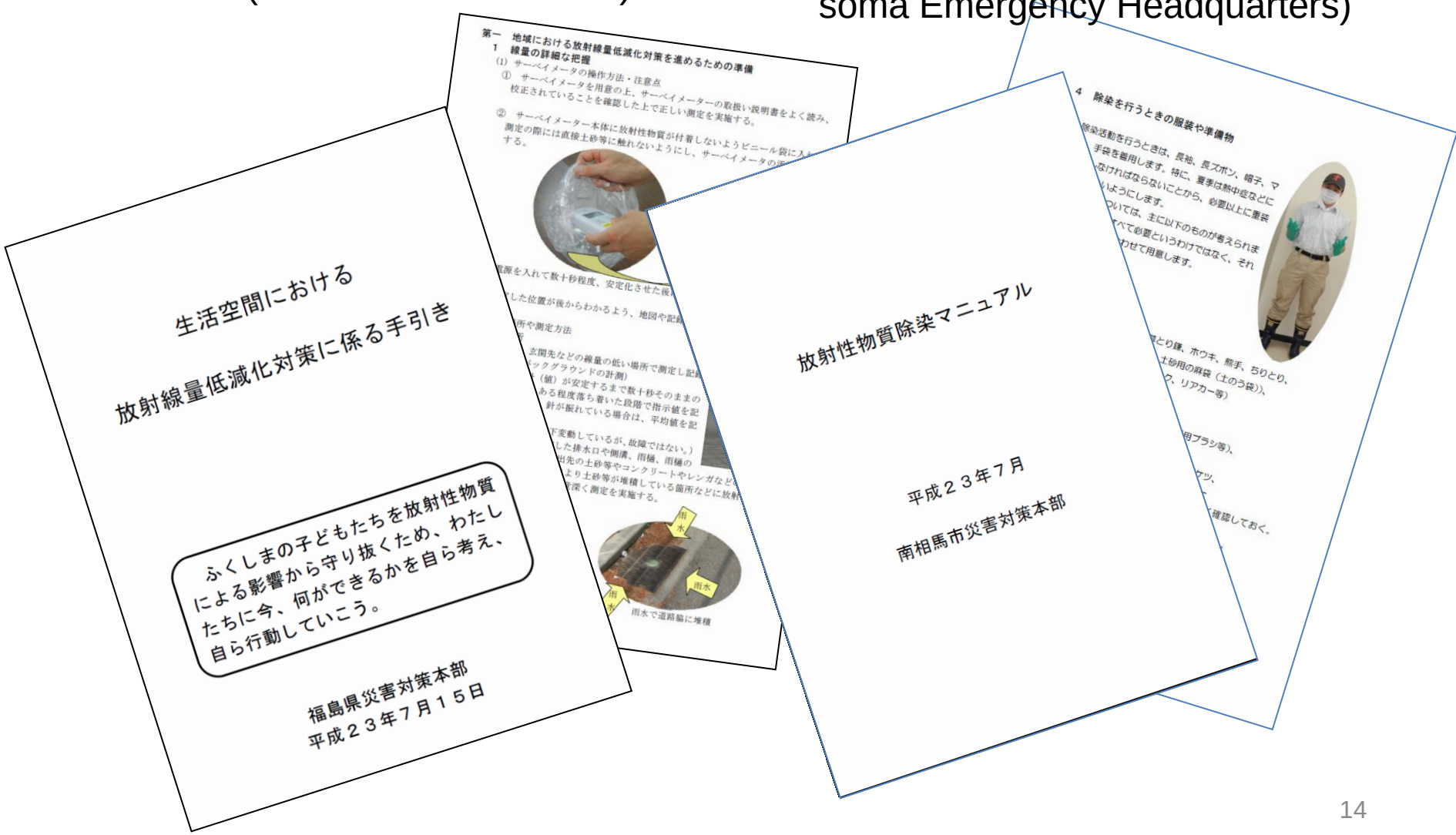



Decontamination area in Minami-soma-city

# Actions by municipalities (Example)

Guide for reducing radiation doses at living environment (Fukushima Prefecture)

Radioactive materials decontamination manual (Minami-soma Emergency Headquarters)



# Results of decontamination demonstration test in living area
(June 30, July 1, 2011)

- **Farmer in Nihonmatsu-city**

Air dose rate: 0.8 μSv/h, Work hours: 33 minutes (soil backfilling is not included)
Contamination of worker after the work: No
Radioactivity concentration in air: < Below Detection limit (3E-7 Bq/cm3 for Cs-137)

## Removal of grasses (Dokudami)

作業中の空間線量率　1.0μSv/h
作業時間　13分、10分
作業員の外部被ばく線量　0μSv
作業員の汚染:なし（手袋　500cpm）
ゴミの量　草2袋　土2袋

| | |
|---|---|
| 地上から1m | 1.08 |
| 地上から1cm | 1.60 (1,000) |

Radioactivity concentration of the removed grass
(Cs-134:12,000Bq/kg, Cs-137:13,300Bq/kg)

| | 草の除去 |
|---|---|
| 地上から1m | 1.10 |
| 地上から1cm | 1.60 – |

Radioactivity concentration of the removed soil
(Cs-134:16,800Bq/kg, Cs-137:18,300Bq/kg)

| | 表土の除去 |
|---|---|
| 地上から1m | 1.10 |
| 地上から1cm | 1.00 (650) |

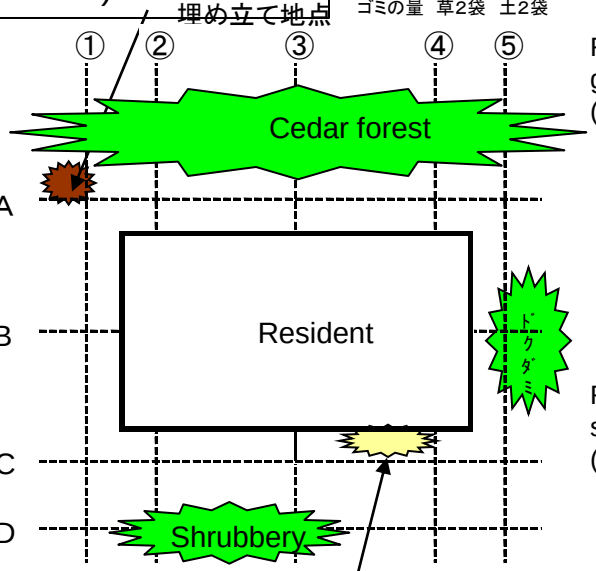
## Removal of soil under the eaves

作業中の空間線量率1.05μSv/h
作業時間10分
作業員の外部被ばく線量　0μSv
作業員の汚染:なし
（手袋　360cpm）
ゴミの量　土3袋

| | 1.05 | | |
|---|---|---|---|
| | ① | ② | ③ |
| 地上から1cm | 3.8 (2,150) | 4.5 (2,100) | 3.3 (1,900) |

| | 表土の除去 | | |
|---|---|---|---|
| 地上から1m | 0.80 | | |
| | ① | ② | ③ |
| 地上から1cm | 1.4 (1,000) | 1.17 (610) | 1.0 (450) |

| | 埋め戻し | | |
|---|---|---|---|
| 地上から1m | 0.83 | | |
| | ① | ② | ③ |
| 地上から1cm | 1.08 (800) | 0.99 (580) | 0.95 (450) |


Removal of soil under the eaves

Radioactivity concentration in the soil removed from the place under the eaves
(Cs-134:14,700Bq/kg, Cs-137:16,200Bq/kg)

## Backfill of soil

Before excavation
1m　:1.0μSv/h

深さ25cm

Removed soil from the place under the eaves
1cm:3.3μSv/h
GM管:2100cpm

1m　:1.1μSv/h
1cm:1.0μSv/h
GM管:530cpm

(注)数字は原則μSv/h、(　)内の数字はcpm（GM管サーベイメータによる計数率）

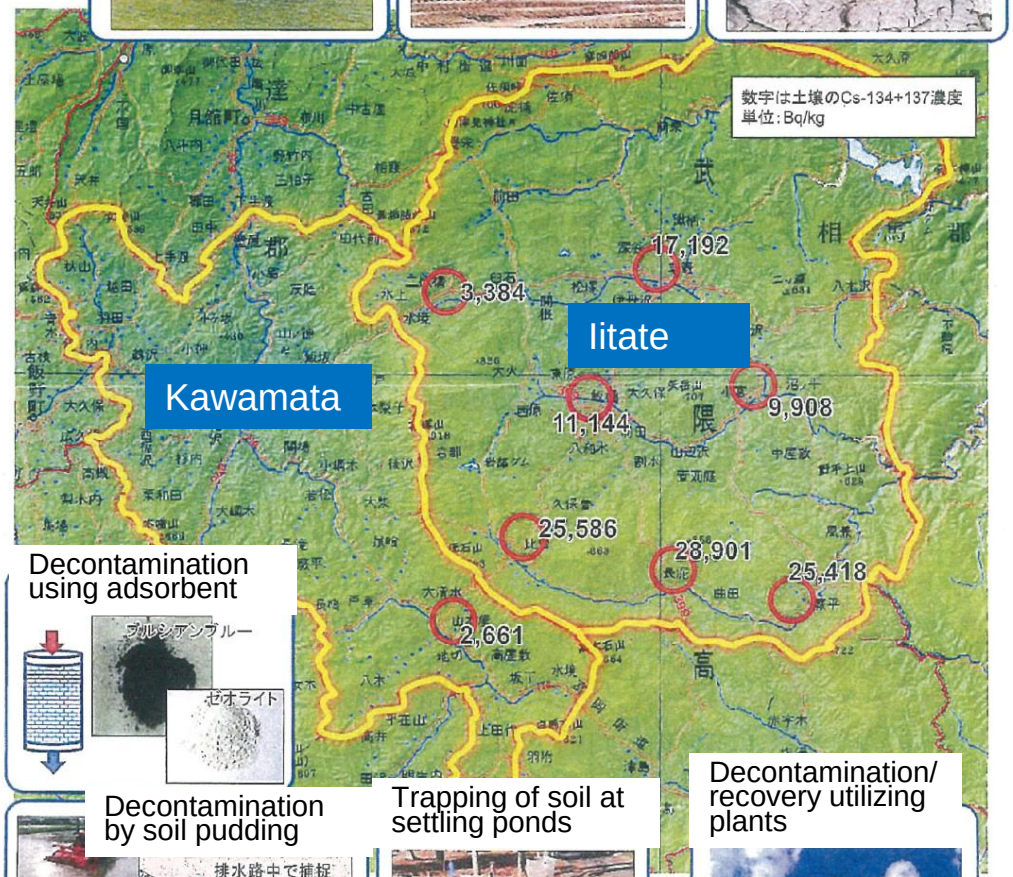
# Actions Aiming at Returning Residents to their Home Land (MAFF)

Contamination : High

Removal of grass

Removal of surface soil

Removal of soil using surface fixation agent




Decontamination using adsorbent




Decontamination by soil pudding


Trapping of soil at settling ponds

Decontamination/ recovery utilizing plants

Contamination : Medium

Contamination : Low

# The Image of Remediation Activities

Schoolyard

Rain water gutter（before）

Wash wall with high-pressure water

Side ditch

Pare off surface soil of farmland

Temporary storage of removed soil

Side of the road

# Framework of the Decontamination Work

**Commitment under the Act on Special Measures Concerning Nuclear Emergency Preparedness**

**Basic Principles on Emergency Decontamination Work**
**＋ Municipality Decontamination Guidelines**

Determined by the Nuclear Emergency Response Headquarters on August 26

**Around 220 billion yen was secured on September 9 as reserve funds for restoration and reconstruction in the aftermath of the Great East Japan Earthquake**

**(Area directly controlled by the national government)**
**Implementation of model projects and other procedures**

**To be reflected in the guidelines and other instructions**

**Municipality plan formulation**

**Decontamination started by municipalities**

**Phased shift**

**The Act on Special Measures concerning the Handling of Radioactive Pollution**

Enacted on August 26; lawmaker-initiated legislation promulgated and partially enforced on August 30

**Basic principles approved by the Cabinet**

**Enactment of ordinances and ministerial orders to provide for the requirements for area designation, treatment standards, etc.**

**Designation of a specific area for decontamination**

**Designation of an intensive contamination survey area**

Full enforcement from January 1, 2012

**Decontamination plans formulated by the national government**

**Decontamination plans formulated by municipalities, etc.**

**Full-scale decontamination implemented by the national government**

**Full-scale decontamination implemented by municipalities, etc.**