

Decontamination Policies and Procedures in Japan



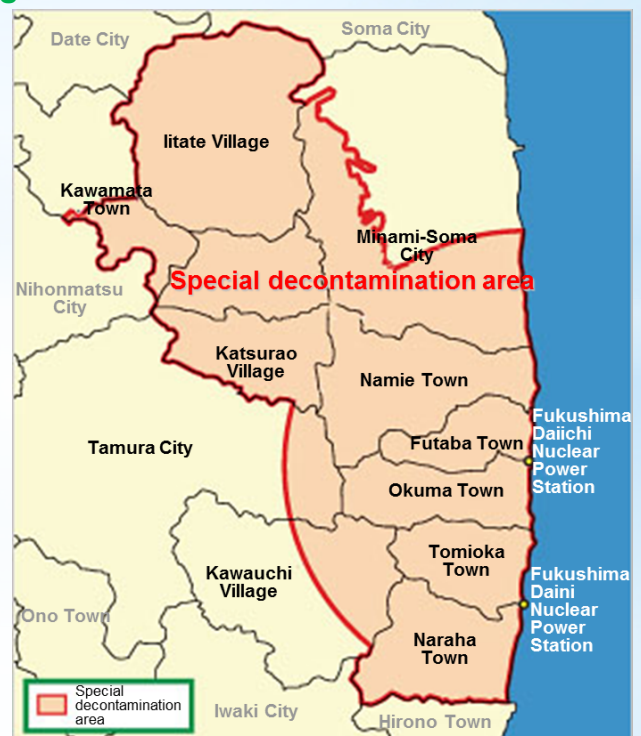
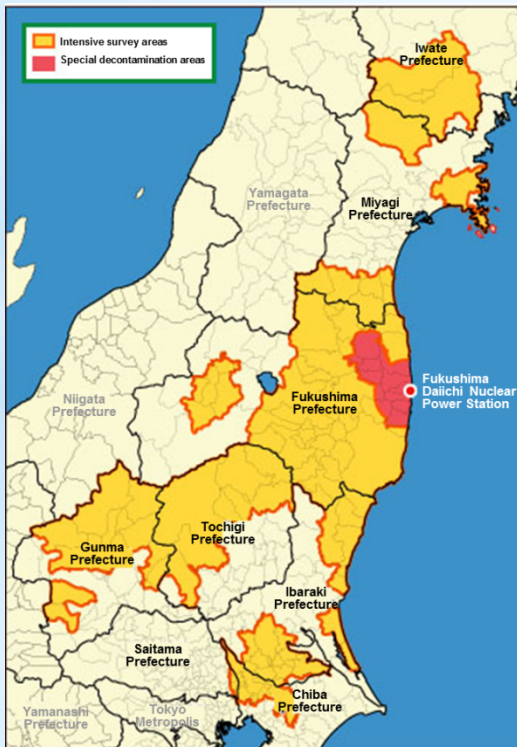
The “**Act on Special Measures Concerning the Handling of Radioactive Pollution**” was enacted in August 2011, in response to the unprecedented situation of radioactive pollution after the accident at TEPCO’s Fukushima Daiichi Nuclear Power Station.

With the “Basic Principles” and related orders for handling radioactive pollution established by the end of the year, the Act came fully into force on January 1, 2012.

Thus, a new policy framework for the off-site decontamination has been arranged, under which decontamination works have been steadily implemented under the responsibility of the national government.

- (1) There are two types of areas where decontamination is carried out: **Special decontamination areas**^{*1)} in which the national government carries out decontamination; and **Intensive Contamination Survey Areas**^{*2)} in which municipalities implement decontamination with financial and technical supports by the national government.
- (2) In special decontamination areas, the national government shall formulate **decontamination plans for each municipality** through the coordination process with it. Decontamination works are implemented pursuant to said decontamination plans.
- (3) Ahead of full-scale decontamination, advance decontamination has been implemented at public facilities such as municipal offices and community centers, which will be utilized as the centers for full-scale decontamination, and infrastructure facilities. In addition, **decontamination model demonstration projects** were conducted in FY 2011 so as to collect technological knowledge and know-how regarding effective decontamination methods, etc.

Special Decontamination Areas and Progress of the Decontamination



Progress of the Decontamination (As of end of November, 2012)

- Out of the eleven municipalities in the special decontamination areas, decontamination plans have been elaborated for eight municipalities (Tamura City, Minami-Soma City, Naraha Town, Kawamata Town, Namie Town, Kawauchi Village, Iitate Village, and Katsurao Village).
- Full-scale Decontamination work is underway at four of these municipalities (Tamura, Naraha, Kawauchi, and Iitate). Also, preparation work of decontamination is underway at Kawamata and Katsurao.

*1) Special Decontamination Area: 11 municipalities in (former) restricted area or planned evacuation area (<20 km from the NPP, or annual cumulative dose is >20 mSv) in Fukushima Prefecture.

2) Intensive Contamination Survey Area: designated 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 of additional dose) is observed.

Decontamination Policies

1. Basic Principles for Decontamination¹⁾

- (1) The priority shall be placed on area where decontamination is most urgently required from the view point of the protection of human health. Decontamination plans are established to cover such priority areas, and decontamination measures shall be implemented carefully taking into account the radiation levels. Living environment for children shall be especially prioritized.
- (2) In the area where the additional exposure dose is less than 20 mSv/y, it shall be aimed to reduce the additional dose to 1 mSv/y or lower as the long term goal.
- (3) As for the area where the additional exposure dose is 20 mSv/y or higher, it shall be aimed to reduce the area with a step-by-step but prompt approach; It should be noted that a long-term efforts is required in the area with significantly high exposure dose.
- (4) The removed soils, etc. generated from the decontamination works will be collected, transferred, temporarily stored, and disposed in a safe manner.

2. Decontamination Policies for the Special Decontamination Areas in FY 2012 and 2013²⁾

Policy in FY 2012 and 2013

Decontamination should be implemented taking into account the level of air dose rate.

- ◆ **Area less than 20mSv/year:** Aiming for reducing additional exposure dose less than 1mSv/year as long-term goal.
- ◆ **Area from 20~50mSv/year:** 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.

*1) In accordance with the Act on Special Measures concerning the Handling of Radioactive Pollution, the Basic principles were decided by the Cabinet on November 11, 2011.

*2) The Decontamination Policies in the Special Decontamination Areas (Decontamination Roadmap)" was drawn up and announced by the Ministry of the Environment on January 26, 2012.

Decontamination Methods in the Special Decontamination Area



There are three types of methods for reducing radiation dose levels: remove (removal of radioactive materials), block (shielding of radiation), and avoid (keeping distance). Decontamination works are implemented in an entire community using these types of methods in combination properly.

- (1) In order to reduce radiation dose in a wide area, decontamination works shall be carried out on buildings, streets, and farmlands, etc. in an entire community.
- (2) Specific decontamination methods shall vary in accordance with air dose rates of each area and particular characteristics or conditions of the objects to be decontaminated. Therefore, prior to implementing decontamination, air dose rates shall be measured and conditions of targeted lands and buildings, etc. shall be surveyed so that optimal decontamination methods shall be selected for each case.

Examples of Decontamination Methods (Residential Area)



Roof: Cleaning with a brush



Rainwater Guttering:
Removal of deposited materials



Rainwater Guttering (Downspout): High-Pressure water washing, vacuuming



Concrete Slab: High-Pressure water washing



Concrete Slab: Shot blasting



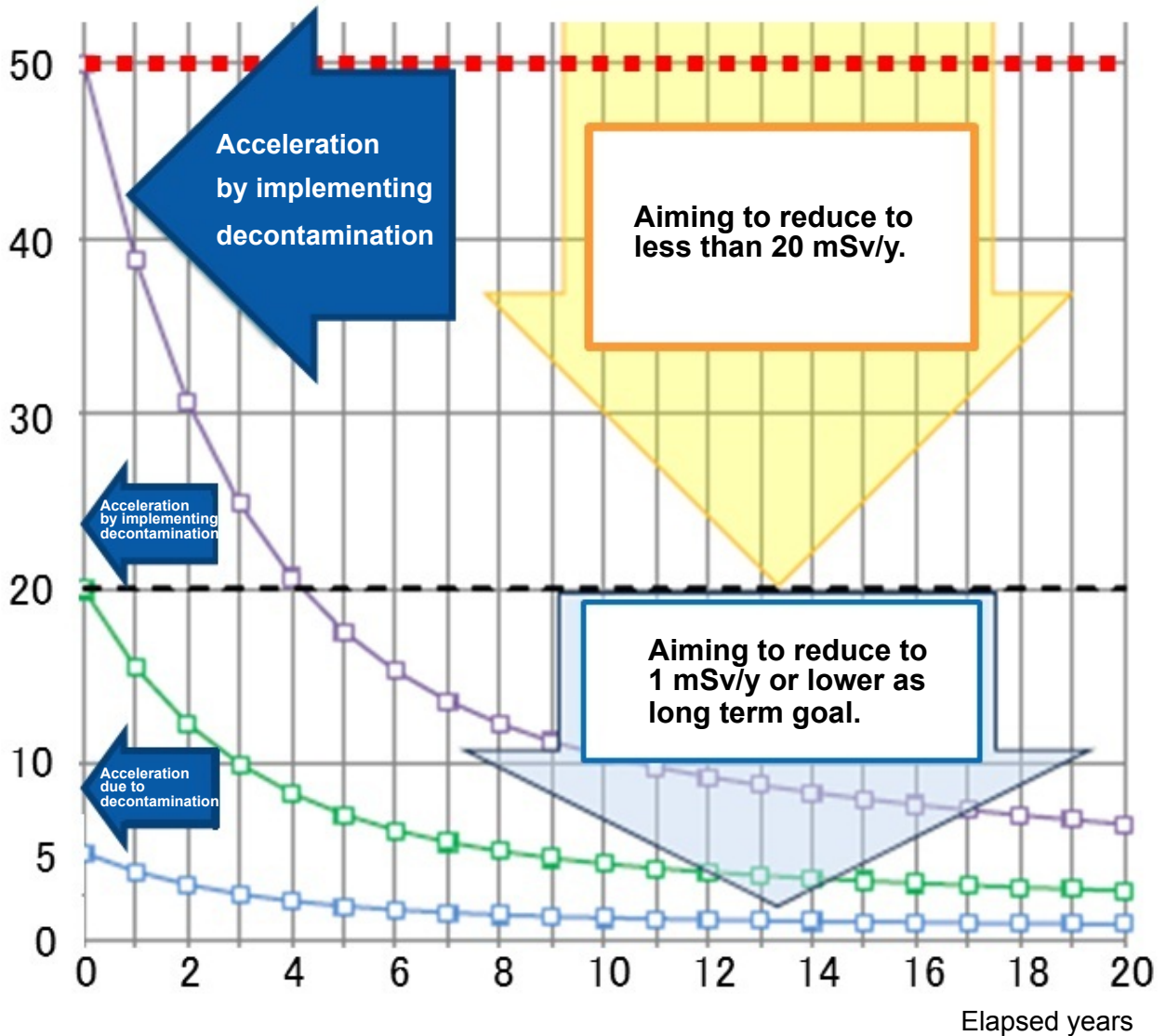
Yard: Removal of topsoil

Decontamination Effects



Decontamination works shall be implemented promptly and effectively, while utilizing such knowledge as gained through “decontamination model demonstration projects” and “decontamination technology demonstration projects”.

Changes in the estimated annual exposure dose rate (mSv/y)



- (1) Due to the characteristics of radioactive materials, the radiation dose will naturally decrease, so the additional exposure dose will likewise decrease. Decontamination can contribute to accelerate reduction.
- (2) It has become apparent through the projects that decontamination works could reduce air doses by considerable degrees, while the technologies currently deployed have a certain limits in terms of air doses reduction. The government will continue to seek new technologies and methods through decontamination technology demonstration projects, etc.

Findings from Decontamination Model Demonstration Projects and Decontamination Technology Demonstration Projects

Effects of Area-Wide Decontamination (Model Project Results)

- Areas with dose levels of about 30 mSv/y (5.7 μSv/h): Reduction to less than 20 mSv/y (3.8 μSv/h) was achieved
- Areas with dose levels of over 40 mSv/y (7.6 μSv/h): 40-60% reduction was achieved, but not to less than 20 mSv/y.
- Reduction rates tends to be high in the areas with higher air dose rates, and to be limited in the areas with lower air dose rates.

Source: “Summary of Reports on Decontamination Model Demonstration Projects in Restricted Areas, Planned Evacuation Areas, Etc.,” March 2012, Cabinet Office’s Team in Charge of Assisting the Lives of Disaster Victims, Government of Japan

Table: Model Project Results at Residential Zone & Surrounding Areas (Excerpt)

Decontamination Sites	Decontamination Methods	Mean Value Before Decontamination (μSv/h)	Mean Value After Decontamination (μSv/h)	Mean Air Dose Rate Decontamination Rate
Okuma Town	Removal of grass and topsoil, wiping of walls and roofs, etc.	11.5	3.9	66%
Namie Town	Removal of grass and topsoil, wiping of walls and roofs, etc.	10.0	5.7	43%
Tomioka Town	Removal of topsoil, High-pressure washing, pavement stripping, blast treatment, etc.	7.9	4.2	47%
Namie Town	Removal of grass and topsoil, High-pressure washing, etc	5.7	2.6	54%
Iitate Village	Removal of grass and topsoil, High-pressure washing, etc.	3.6	2.2	39%
Kawamata Town	Removal of grass and topsoil, High-pressure washing, brushing, etc.	3.0	1.7	43%
Katsurao Village	Removal of grass and topsoil, washing of roofs, wiping of walls, etc.	1.7	1.3	23%
Minami-Soma City	Removal of grass and topsoil, High-pressure washing, brushing, etc.	1.3	1.1	19%

Effects of Repeated Decontamination (Technology Demonstration Project Results)

- When continuously applying the same decontamination method to the same place and treatment time reaches a certain level, little further reduction was achieved.
- While the reason for this must be verified, this means that even if the same decontamination treatments are repeatedly applied, no significant degree of further decontamination effects can be expected.

*1 A technology which uses compressed air to emit a high-speed jet of a liquid mixture of water and abrasives to clean surfaces such as metal

*2 Measured values at a height of 5 mm, shielded by lead

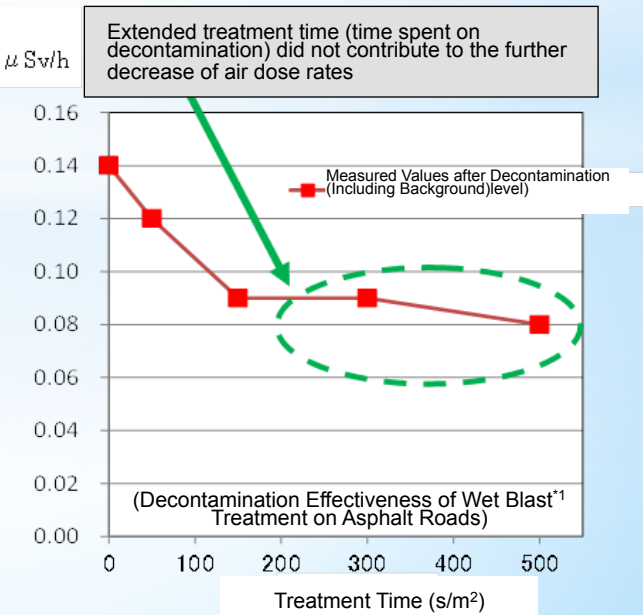


Figure: Change in Air Dose Rates ^{*2} by Treatment Time