

***Activities for recovery management
in response to the TEPCO Fukushima Daiichi
NPP accident***

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Introduction

Objectives and Working methods of the EGRM

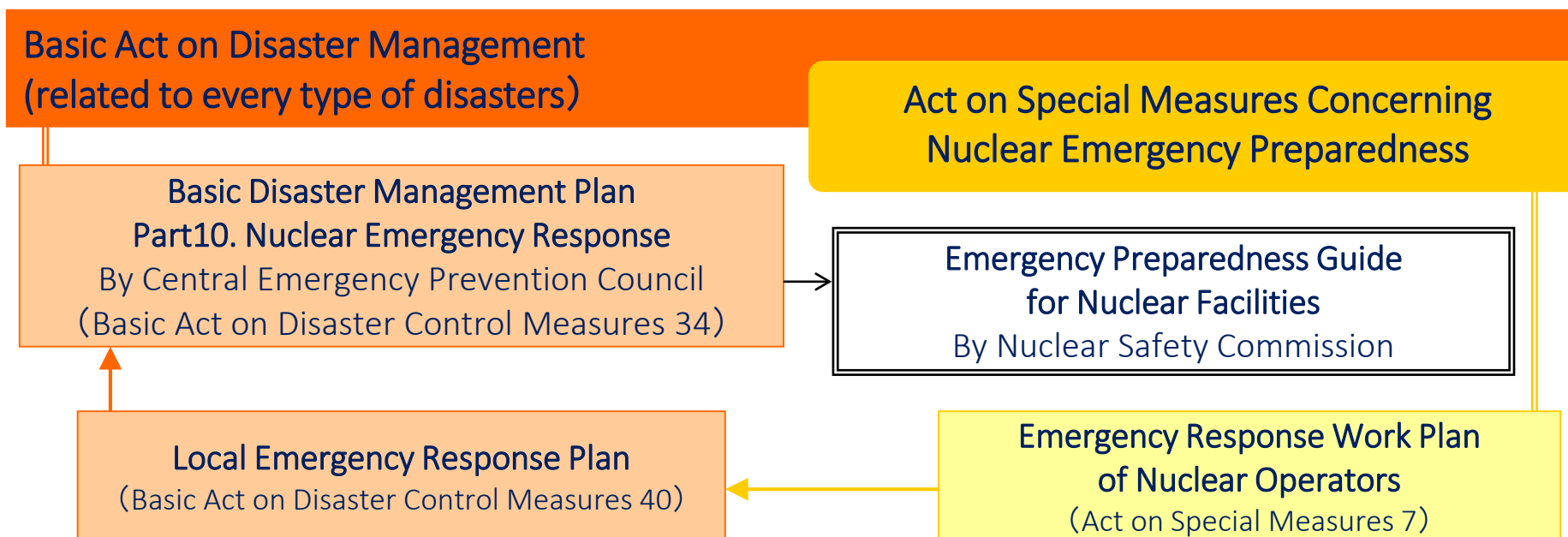
- To assist NEA member countries in planning and improving their preparedness for recovery by producing guidance on how to develop a nuclear and radiological post-accident recovery management framework which can be adapted to national conditions
- To collect and share key lessons that have been learned for recovery management from past events

Objective of this presentation

- To provide the overview of the preparations that were in place for the long term recovery management during the intermediate phase of emergency response in the TEPCO Fukushima Daiichi Nuclear Power Plants accident



Legal system of EPR prior to the accident



- Basic Act on Disaster Management
 - legal basis for the prevention of and response to disasters, covered all types of disasters
- Basic Disaster Management Plan
 - basis for comprehensive emergency management arrangements according to the emergency phases as well as role and responsibility of each organization
- Act on Special Measures Concerning Nuclear Emergency Preparedness
 - description of the responsibilities of the NPP operator, national and local governments
- Emergency Preparedness Guide for Nuclear Facilities
 - guidelines for specialized and technical matters related to protective actions



Legal basis for recovery management

- **Basic Act and Basic Plan** addressed all of the disaster phases of prevention, mitigation and preparedness, emergency response as well as recovery and reconstruction with roles and responsibilities among the national and local governments clearly defined
- **Act on Special Measures Concerning Nuclear Emergency Preparedness**
Chapter V: Measures for Restoration from Nuclear Emergency and Responsibilities for Their Implementation
 - ✓ Article 27 : Measures shall be implemented;
 - i. **investigation of the concentration or density** of radioactive materials, or of the **radiation dose**,
 - ii. **medical examination** of and **mental and physical health** consultation for residents,
 - iii. **public information** activities concerning the status of the contamination of radioactive materials in the protective action area
 - iv. Other measures for preventing the progression of a nuclear Disaster
- **Emergency Preparedness Guide** did not provide any criteria for long-term protective actions such as temporary relocation.



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- This map illustrates the evacuation zones around the Fukushima Dai-ichi Nuclear Power Station (NPS). The zones are color-coded and labeled as follows:
- Restricted Area (Blue outline):** The innermost zone, centered on the Fukushima Dai-ichi NPS.
 - Deliberate Evacuation Area (Pink):** Surrounds the Restricted Area.
 - Evacuation-Prepared Area in case of Emergency (Yellow):** The outermost zone.
- Key locations and distances from the NPS are marked:
- 15 March:** Restricted Area (Blue outline).
 - 22 April:** Restricted Area (Red outline).
 - 11 March:** 3km and 2km distances from the NPS.
 - 12 March:** 10km, 20km, and 30km distances from the NPS.
- Other locations shown include Soma City, Minami Soma City, Futaba Town, Okuma Town, Tomioka Town, Naraha Town, Hirono Town, Iwaki City, Koriyama City, Ono Town, Hirata Village, Kawauchi Village, Taniguchi City, Katsurao Village, Iitate Village, and Tsukudatemachi-Tsukidate. A legend in the bottom left corner defines the zone colors and specific spots recommended for evacuation.

Activities during intermediate phase

◆ 17 May 2011, **Roadmap** to return to normality by NERHQ

- June: Arrangements for long-term **health surveillance** (The Fukushima Health Management Survey);
- June-August: Detailed and comprehensive **monitoring plan** by the MEXT;
- August: **Long-term management of radioactive waste**;
 - ***Act on Special Measures concerning the Handling of Environmental Pollution*** by MOE (enacted on 26 August)
 - *Basic Policy for Emergency Response on **Decontamination** Works* by NERHQ
- 30 September, **Lifting the recommendation to shelter** by NERHQ;

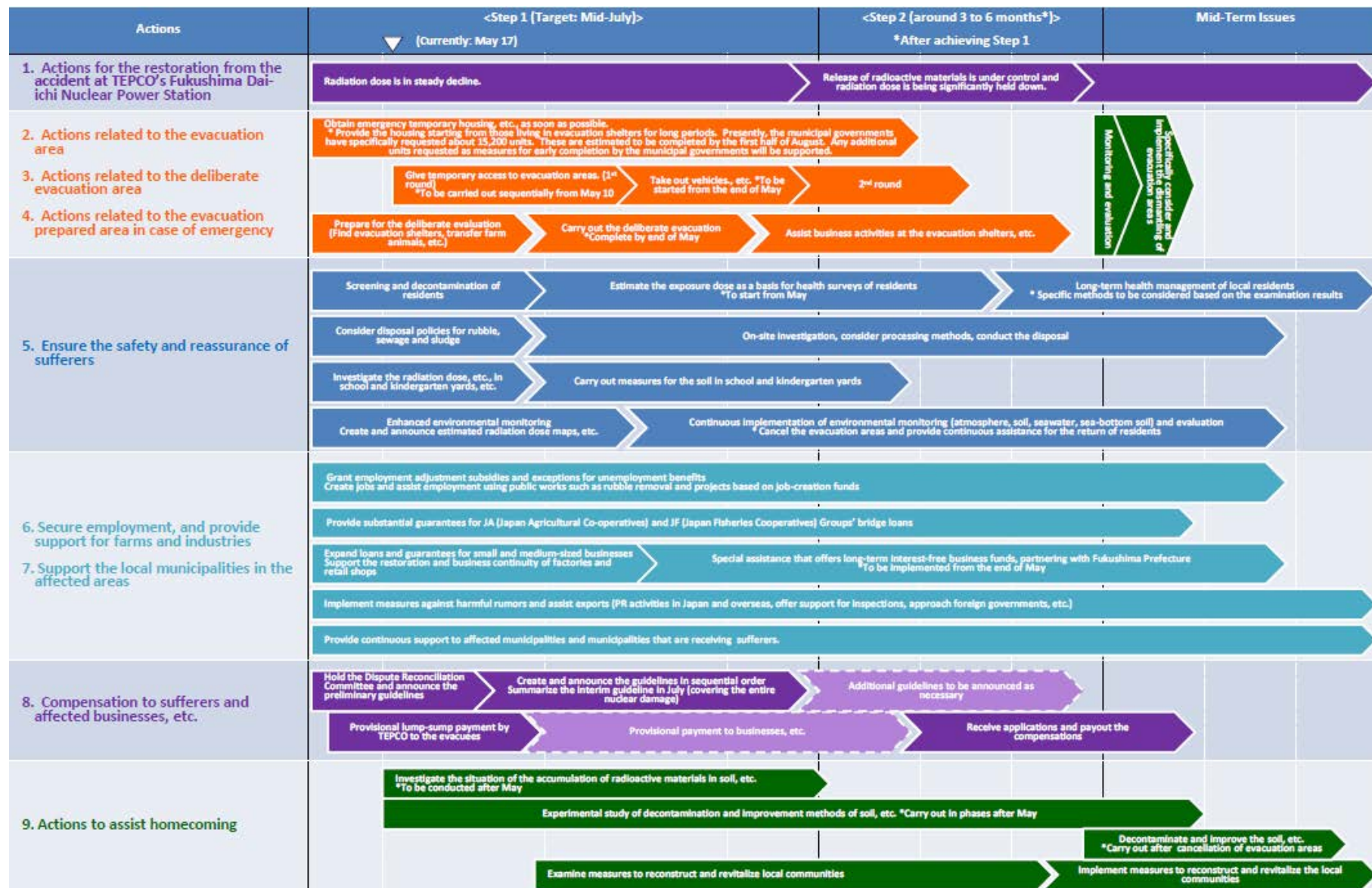
◆ 16 December, **Control of the situation** at NPP has been regained;

- 26 December, **Basic concept for rearranging** the evacuation areas
- January 2012, Act on Special Measures was fully enforced
- 30 March, **Rearrangement of the evacuation areas** started by NERHQ
- April: New **food regulation** came into effect by MHLW



Roadmap for Immediate action for the assistance of residents

(17 May, NERHQ)



Comprehensive Monitoring Plan (2 August)

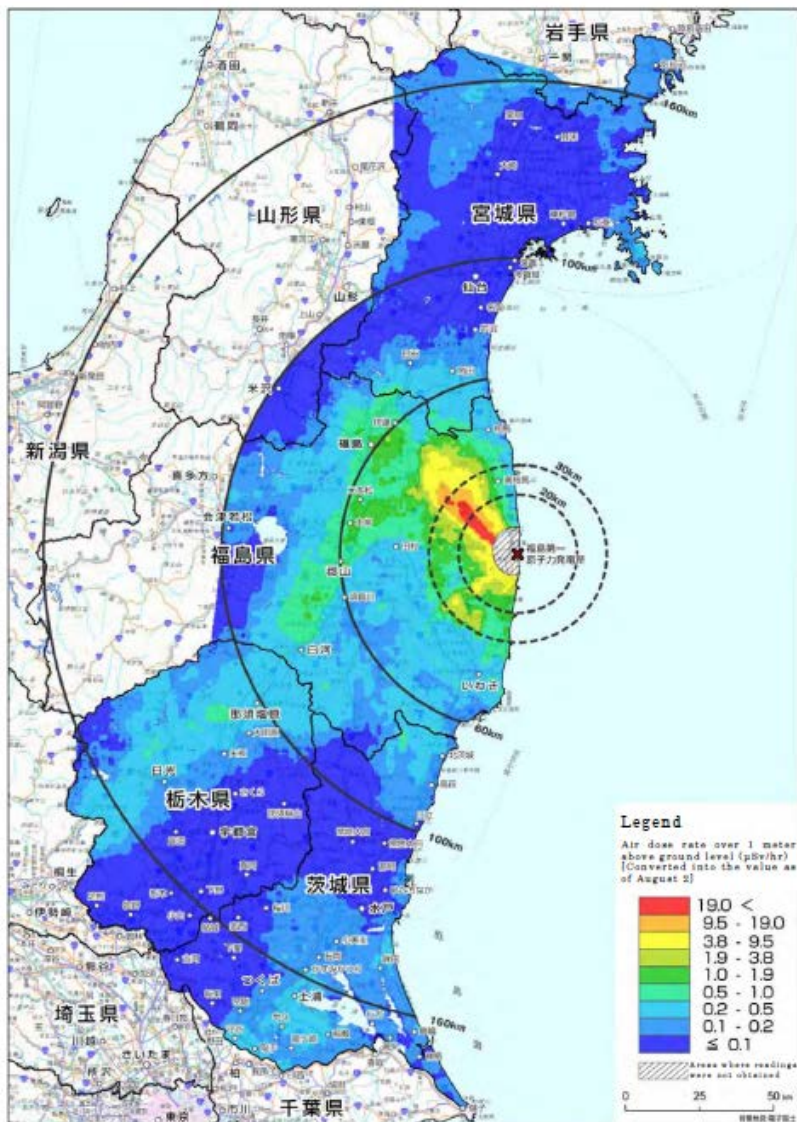
- To specify the roles of the organizations and to move on to a new stage of radiation monitoring for the purpose of assessing the overall impact in the surrounding environment and contributing to the review of the future countermeasures to be taken.
 - i. **Estimation of current** (external and internal exposure) **doses** of people living in the affected regions and their **potential doses** in the future
 - ii. Consideration and **planning of measures for reducing doses** in accordance with various circumstances
 - iii. Consideration and **judgment for lifting the designation of protected areas**, etc. through estimating future exposure as realistically as possible
 - iv. Preparation of **basic data for managing health of people** living in the affected areas
 - v. **Understanding of the behavior of radioactive materials** released in the environment



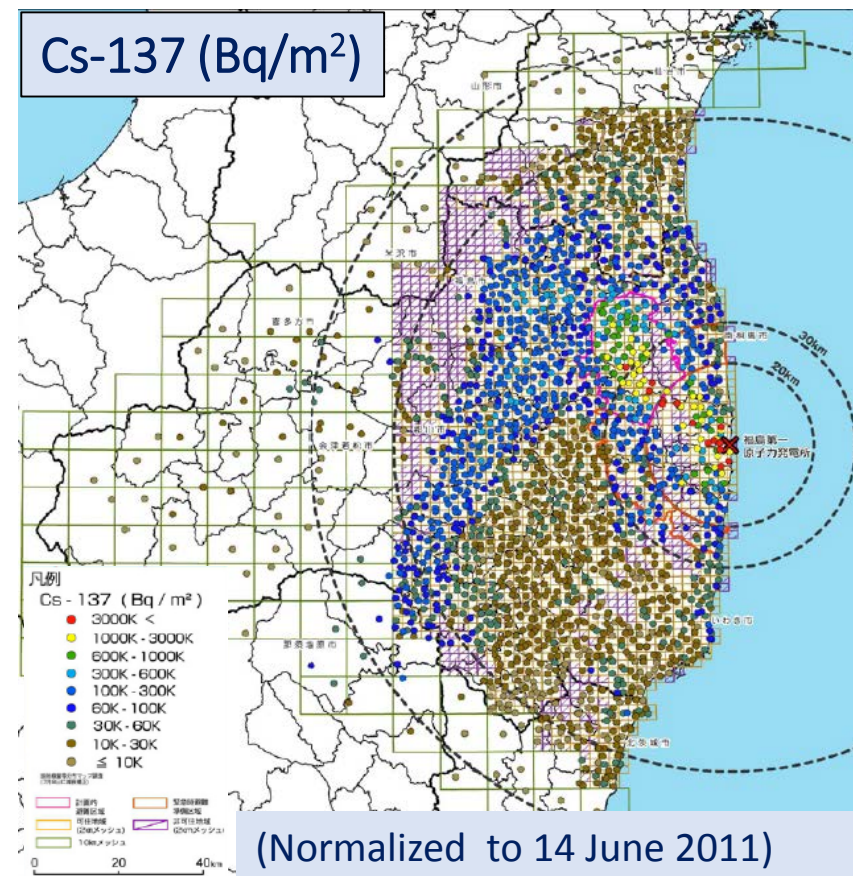
Aerial monitoring and mapping of radionuclide deposition

Results of aerial monitoring

- Campaign in June 2011, 2,200 locations at 2 X 2 km² within 80 km
- Cs-134, Cs-137, I-131, Te-129m, Ag-110m
Sr-89, Sr-90, Pu-238, Pu-239+240



Concentration of Cs-137 in soil



(<https://www.meti.go.jp/english/earthquake/nuclear/iaea/pdf/20110911/chapter4.pdf>)



NRA JAPAN

Health Surveillance for the Residents in Fukushima

Objectives:

- To monitor long-term health condition of resident in Fukushima and to promote their health

Contents:

- Basic survey

Subjects: Residents in Fukushima prefecture, 2.02 million

Methods: Self-administered **questionnaire survey**

Details: **Record of movement/behavior** since March 11 for estimation of external exposure dose

Implementation: Preliminary survey (June 30, 2011)

Full scale survey (August 26, 2011)

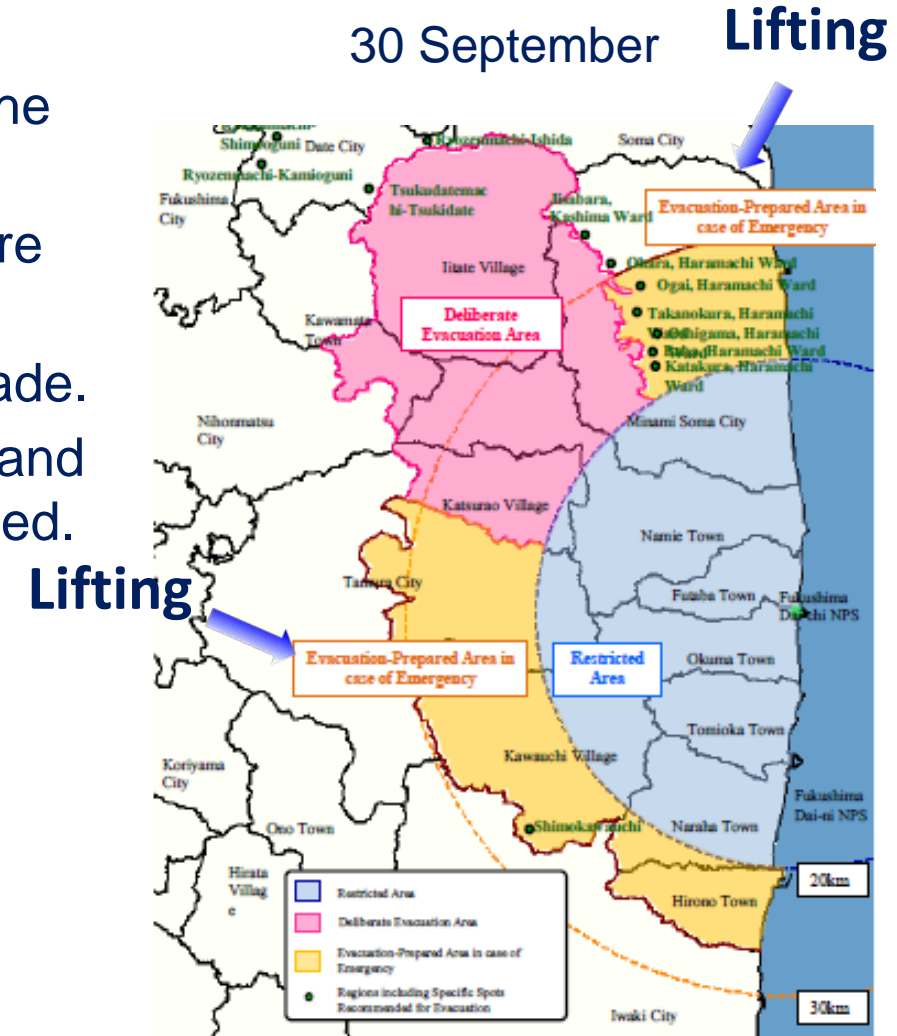
- Detailed survey

- **Thyroid gland examination** for children aged 18 and younger (target population: about 385,000)
- Comprehensive **medical checkups** (210,000)
- **Mental health and lifestyle** survey (20,000)
- Survey for **pregnant women** (15,000 in each year)



Lifting of evacuation prepared area

- On 4 August, NSC provided the “**Standpoint for the Termination of Urgent Protective Actions**”, responding to the request by the NERHQ.
 - The **criteria** for the application of current actions are no more justified (projected annual dose < 20 mSv).
 - Preparation for **long term protective actions** should be made.
 - A framework for **involvement** of related local governments and residents in the decision making process should be developed.
- On 9 August, the NERHQ prepared the following three requirements for lifting the protective actions were outlined:
 1. The safety status of the NPP;
 2. A decrease of the air radiation dose rate; and
 3. Restoring of the public service functions and infrastructure.



(<https://www.meti.go.jp/english/earthquake/nuclear/iaea/pdf/20110911/annex2.pdf>)



Post-accident issues concerning off-site remediation

The Act on Special Measures concerning the Handling of Environmental Pollution was enacted on 26 August 2011 and fully came into force on 1 January 2012.

Purpose

- To promptly reduce the impact of environment pollution on human health and living environment caused by radioactive materials by instituting measures of the national government, local governments, the relevant nuclear operator etc.

Disposal of contaminated wastes

- “**specified wastes**” managed by **MOE**
 - wastes within “**contaminated waste management area**”
 - wastes such as **sludge, disaster waste**,
concentration of radioactive cesium **exceeds 8,000Bq/kg**
- **Less than 8,000Bq/kg** managed by **the local government** (transfer, storage, disposal) ,
as well as the general industrial wastes



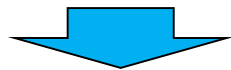
Decontamination based on the “Act on Special Measures”

Special decontamination area

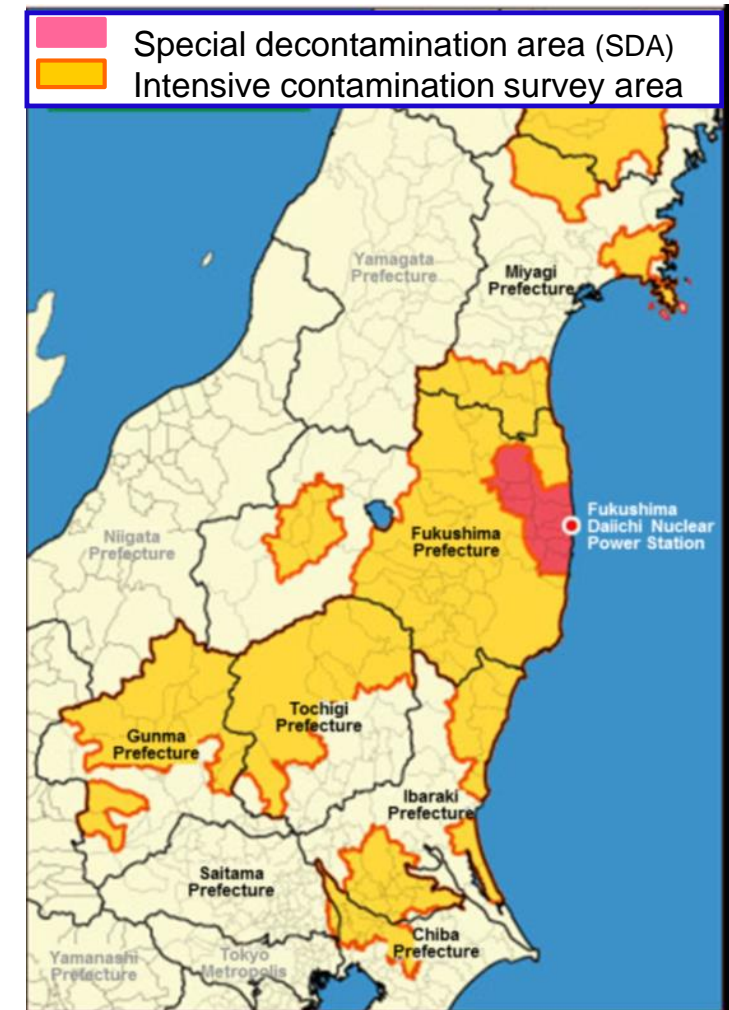
- ✓ 11 municipalities restricted area or deliberate evacuation area (**< 20km from the NPP or annual dose in the first year > 20mSv**).
- ✓ Implemented by the **national government**.

Intensive contamination survey area

- ✓ 104 municipalities in 8 prefectures, in which **over 0.23 μ Sv/h of air dose rate** is observed, were designated.
- ✓ Implemented by **each municipality**.



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



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



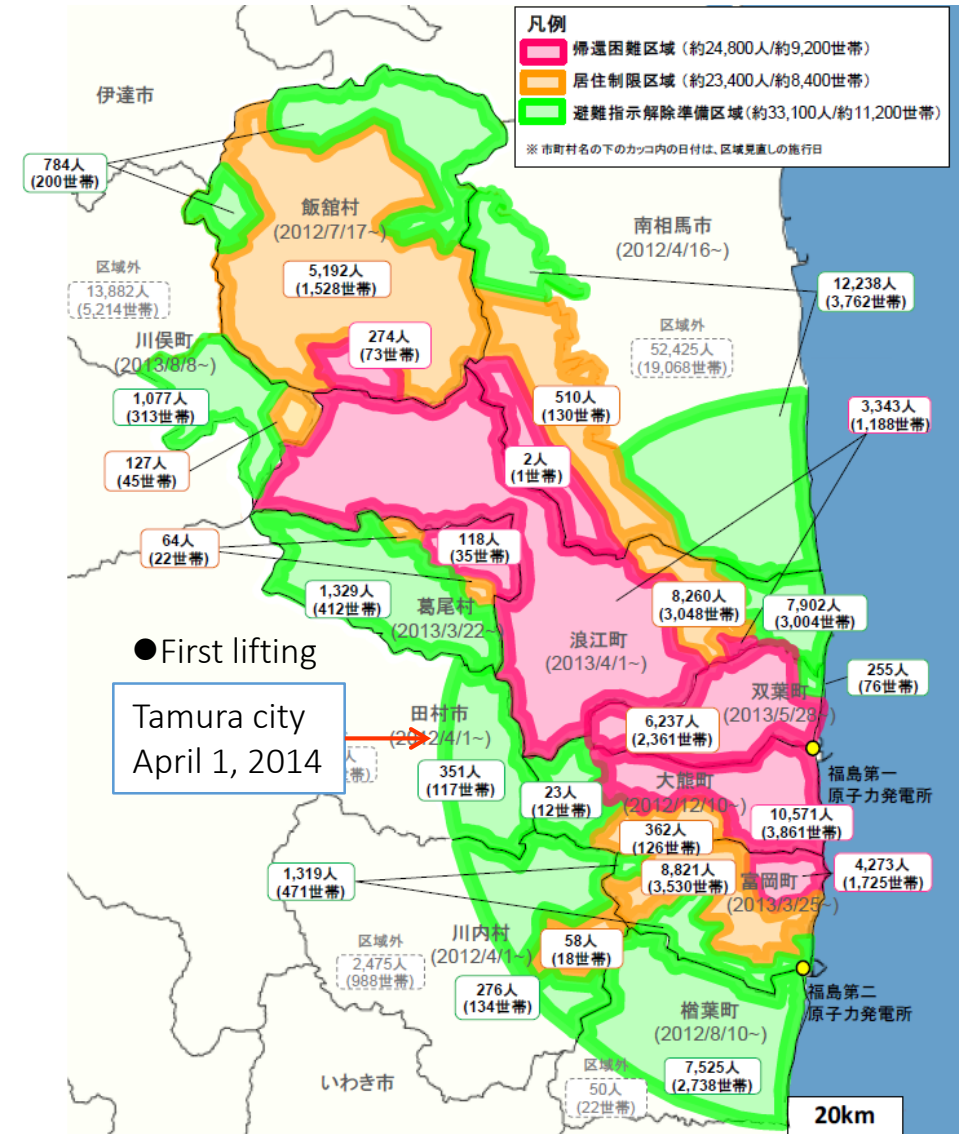
Rearrangement of restricted zones (26 December)

April 2012 – August 2013

<i>Lifting of Evacuation - Prepared Zone, < 20 mSv/y</i>
Decontamination <ul style="list-style-type: none"> ● 10 – 20 mSv/y (Dec. 2012) ● 5 – 10 mSv/y (March 2013) ● 1 – 5 mSv/y (March 2014)
<i>Restricted Zone, 20 mSv/y < < 50 mSv/y</i>
● Decontamination will be implemented at the level below 20 mSv/y by the end of March 2014.
<i>“Difficult to Return” Zone 50 mSv/y <</i>
● It will decide on measures while observing the effectiveness of model decontamination work.

● Lifting conditions

- ✓ Dose level < 20 mSv/y
- ✓ Infrastructures and live services
- ✓ Consultation with local governments and residents



Summary

- Although the general legal framework for post-accident recovery management was in place prior to the Fukushima Daiichi accident, specific policies, guidelines and criteria as well as overall arrangement were developed in the intermediate phase of the emergency response to the accident.
- During the preparation process several key issues were addressed to characterize the exposure situation, which included establishment of detailed environmental monitoring plans, long-term health surveillance, formalization of lifting protective actions being taken and the establishment of long-term plans for remediation.

