

Current Status and Efforts regarding the TEPCO Fukushima Dai-ichi Accident

Nuclear and Industrial Safety Agency,

Government of Japan

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1. Efforts to bring the Fukushima accident under stable control

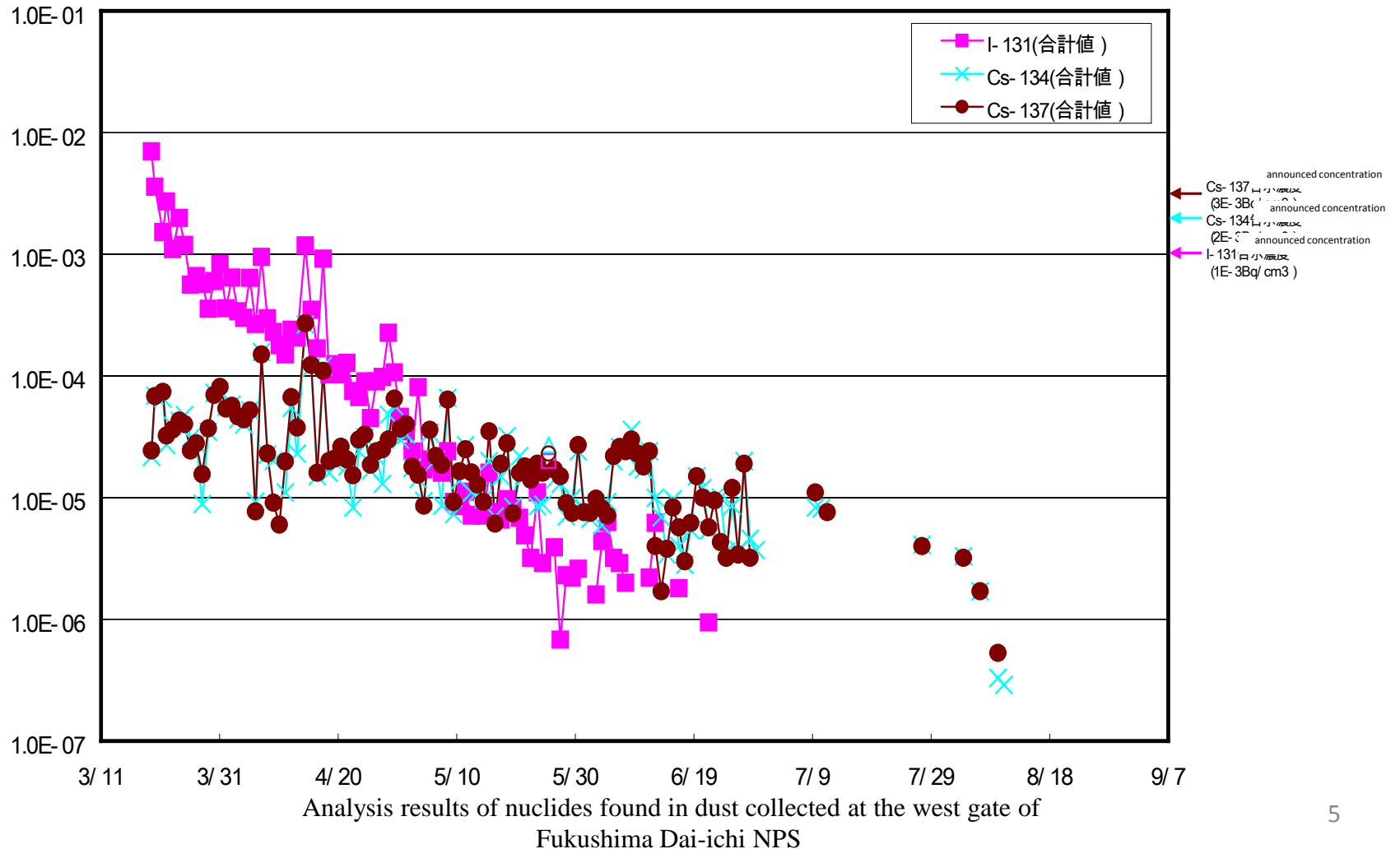
(1) Current Status

Undertaking measures in a comprehensive manner to achieve the cold shutdown of reactors and mitigate additional releases of radioactive materials to the greatest possible extent

- Conducting cooling by processing accumulated contaminated water and circulating it, leading to:
 - Reactor vessels (Units 1-3): Trending steadily at around 100°C
 - Spent fuel pools: Trending at 20 ~ 40°C
- Dispersing antiscattering agents and removing debris, to help hold down the release of radioactive materials
- Substantially decreased radiation entering the sea by installing a silt fence; installed and are now operating a circulating seawater decontamination system
- Decreases in the air dose rate measured by monitoring posts prove the validity of these claims. The GOJ publicly releases these results.

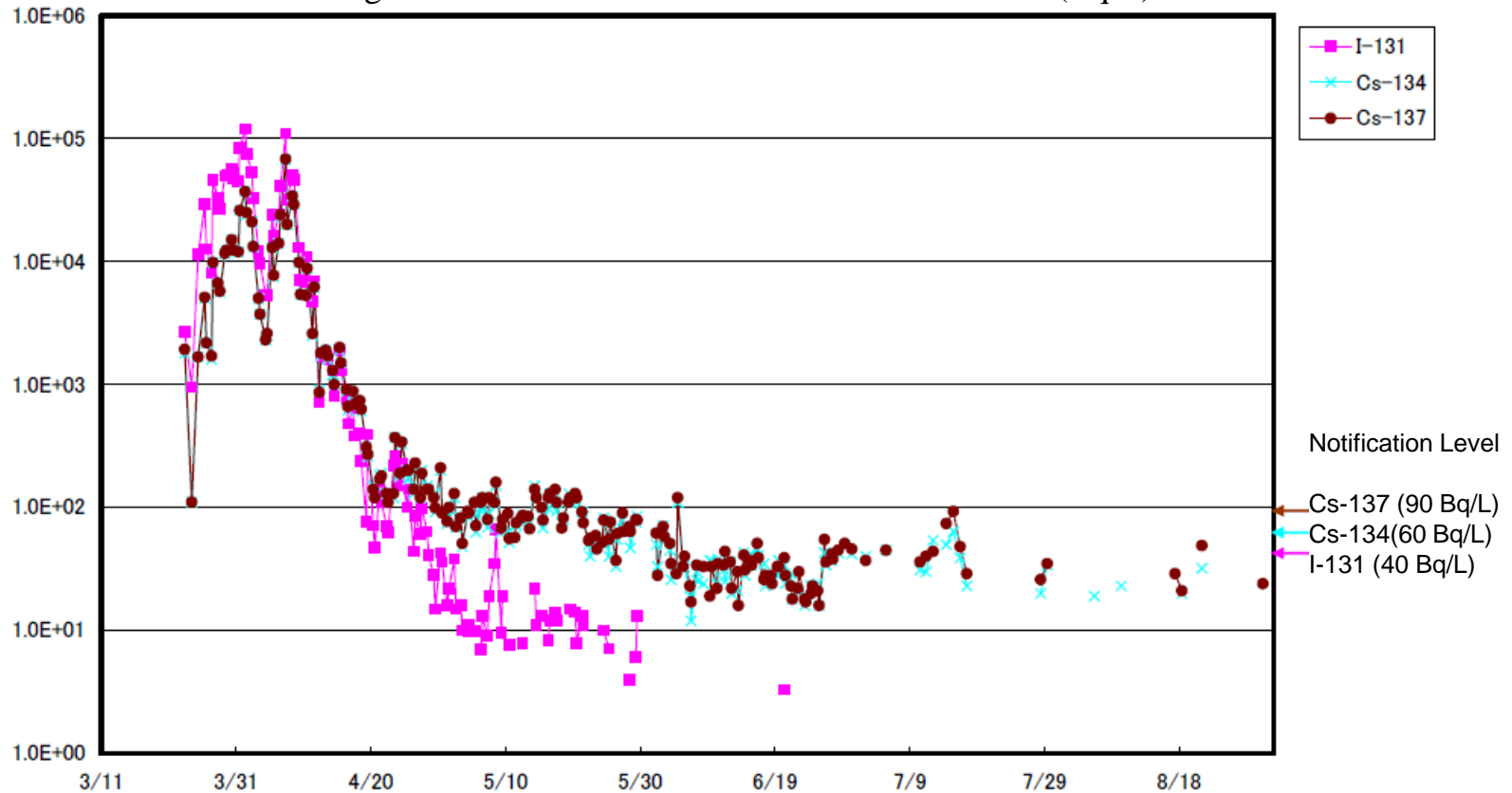
Transition of the air dose rate at the Fukushima Dai-ichi Nuclear Power Station

Analysis results of nuclides found in dust collected at the west gate of Fukushima Dai-ichi NPS (Bq/cm³)



Transition of the concentration of radioactive materials in seawater at the Fukushima Dai-ichi Nuclear Power Station

Radioactivity concentration of seawater at the northern side of the water discharge canal of Units 5 and 6 of Fukushima Dai-ichi (Bq/L)



Status of Units 1, 2 and 3 of Fukushima Dai-ichi NPS (As of September 14)

Item	Unit 1	Unit 2	Unit 3	Unit 4
Status of water injection into the reactor	Fresh water feeding via feed water system Flow rate: 3.7m ³ /h	Fresh water feeding via feed water system Flow rate: 3.7m ³ /h	Fresh water feeding via feed water system and core spray system Flow rate: 7.0m ³ /h	<i>Unit 4 is not subject to these efforts (fuel already removed from the reactor prior to the earthquake)</i>
Temperature around the reactor vessel	Temperature in feed-water nozzle: 90.0°C Temperature at reactor vessel bottom: 84.9°C	Temperature in feed-water nozzle: 106.6°C Temperature at reactor vessel bottom: 114.4°C	Temperature in feed-water nozzle: 105.8°C Temperature at reactor vessel bottom: 101.3°C	
Situation of the spent fuel pool	Water temperature has been stabilized at approximately 30°C by means of an alternative cooling system	Water temperature has been stabilized at approximately 34°C by means of an alternative cooling system	Water temperature has been stabilized at approximately 33°C by means of an alternative cooling system	Water temperature has been stabilized at approximately 41°C by means of an alternative cooling system

* These data may be modified pending the results of TEPCO evaluations.

(2) “Roadmap”

Under the “Roadmap” laid out:

•Step 1

Targets: Steadily decrease radiation releases, make progress in efforts to cool the reactors and spent fuel pools, make progress in the treatment of accumulated water → *completed*

•Step 2

Targets: Bring the release of radioactive materials under control between Oct. 2011 and Jan. 2012, hold down radiation exposure dose significantly through achieving cold shutdown of the reactors

•Mid-term challenges

Removing spent fuel from the spent fuel pools, designing and constructing barriers for groundwater, continuing with decontamination efforts

Long-term challenges

Among others, includes the reconstruction of primary containment boundaries, the extraction and storage of debris, the management and disposal of radioactive waste, and decommissioning.

(2) Roadmap

Current Status of “Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO” (Revised edition)

August 17, 2011
Nuclear Emergency Response Headquarters
Government-TEPCO Integrated Response Office

Red colored letter: newly added to the previous version, ☆: already reported to the government, Green colored shading: achieved object

Issues	As of Apr. 17	Step 1 (around 3 months)	Step 2 (around 3 to 6 months after achieving Step 1) current status (as of Aug. 17)	Mid-term issues (around 3 years)	
I. Cooling	(1) Reactor	Fresh water Injection	Cooling by minimum injection rate (injection cooling) → Circulating water cooling (start) ☆ Consideration and preparation of reuse of accumulated water Nitrogen gas injection ☆ Improvement of work environment ☆	Stable cooling Circulating water cooling (continued) Nitrogen gas injection (continued)	Cold shutdown condition Continuous cold shutdown condition Protection against corrosion cracking of structural materials* <small>*partially ahead of schedule</small>
			(2) Spent Fuel Pool	Fresh water Injection	Reliability improvement in injection operation / remote-control operation *ahead of schedule Circulation cooling system ☆ (installation of heat exchanger) *partially ahead of schedule
II. Accumulated Water	(3) Accumulated Water	Transferring water with high radiation level → Installation of storage / processing facilities ☆			Secure storage place Expansion ☆ / consideration of full-fledged processing facilities Decontamination / desalt ☆ processing (reuse), etc Storage / management ☆ of sludge waste etc. Mitigation of contamination in the ocean
		Storing water with low radiation level → Installation of storage facilities / decontamination processing			

(2) Roadmap

Current Status of “Roadmap towards Restoration from the Accident at Fukushima Daiichi Nuclear Power Station, TEPCO” (Revised edition)

Appendix 3

August 17, 2011
Nuclear Emergency Response Headquarters
Government-TEPCO Integrated Response Office

Red colored letter: newly added to the previous version, ☆: already reported to the government, Green colored shading: a

Issues	As of Apr. 17	Step 1 (around 3 months)	Step 2 (around 3 to 6 months after achieving Step1) current status (as of Aug. 17)	Mid-term issues (around 3 years)
Mitigation	(4) Ground water	Mitigation of contamination of groundwater	(Sub-drainage management with expansion of storage / processing facilities) Design / implementation of impermeable wall against groundwater	Mitigation of contamination of groundwater
		Consideration of method of impermeable wall against groundwater		Establishment of impermeable wall against groundwater
(5) Atmosphere / Soil	Dispersion of inhibitor	Removal of debris	Dispersion of inhibitor (continued)	Dispersion of inhibitor
			Removal of debris (continued)	Removal / management of debris
			Installation of reactor building cover (Unit 1) ☆	Removal of debris / installation of reactor building cover (Unit 3&4)
			Removal of debris (top of Unit 3&4 R/B)	
Consideration of reactor building container	Start of installation work of reactor building container			

Situation regarding radiation exposure (Local residents)

- Local authorities have launched the “Health Management Survey in Fukushima Prefecture,” which targets 2 million people:
 - A basic survey based on behavioral records.
 - A detailed survey, based on the results of the basic survey implemented (estimated to be conducted on 200,000 people)
 - Supersonic thyroid examinations, to be implemented on all residents who were 18 years old or younger at the time of the accident

Situation regarding radiation exposure (Workers at the plants)

- The total values of external and internal exposure:
 - 22.4 mSv (the average of 3,715 people, March)
 - 3.9 mSv (the average of 3,463 people, April)
 - 3.1 mSv (the average of 2,712 people, May)

- In March, it was confirmed that six people had exposure exceeding 250mSv, which is the dose limit for emergency workers

(3) Additional information and knowledge

- *Earthquake and tsunami*

TEPCO has reported to the government its analysis indicating that the major facilities' safety functions were maintained.

- *Nuclear reactors and spent fuel pools*

According to TEPCO's report, there is a high probability that the exposure of fuel has been avoided by maintaining the water levels of the spent fuel pools.

2. Responses to people affected by the accident

(1) Comprehensive monitoring plan

□ *Implementation plan*

1) General environment

- Nationwide monitoring
- Monitoring of the land area, mainly around TEPCO's Fukushima NPSs
- Sea area monitoring
- Monitoring at schools and other such locations

2) Plan for the monitoring of ports, airports, parks, sewage, etc.

3) Plan for the monitoring of the water environment (water resources, rivers and lakes, groundwater, and bathing resorts), natural parks, and waste

4) Plan for the monitoring of cultivated soils, forests, and pasture grass

5) Foodstuffs (agricultural products, forestry products, livestock products, fishery products, etc.)

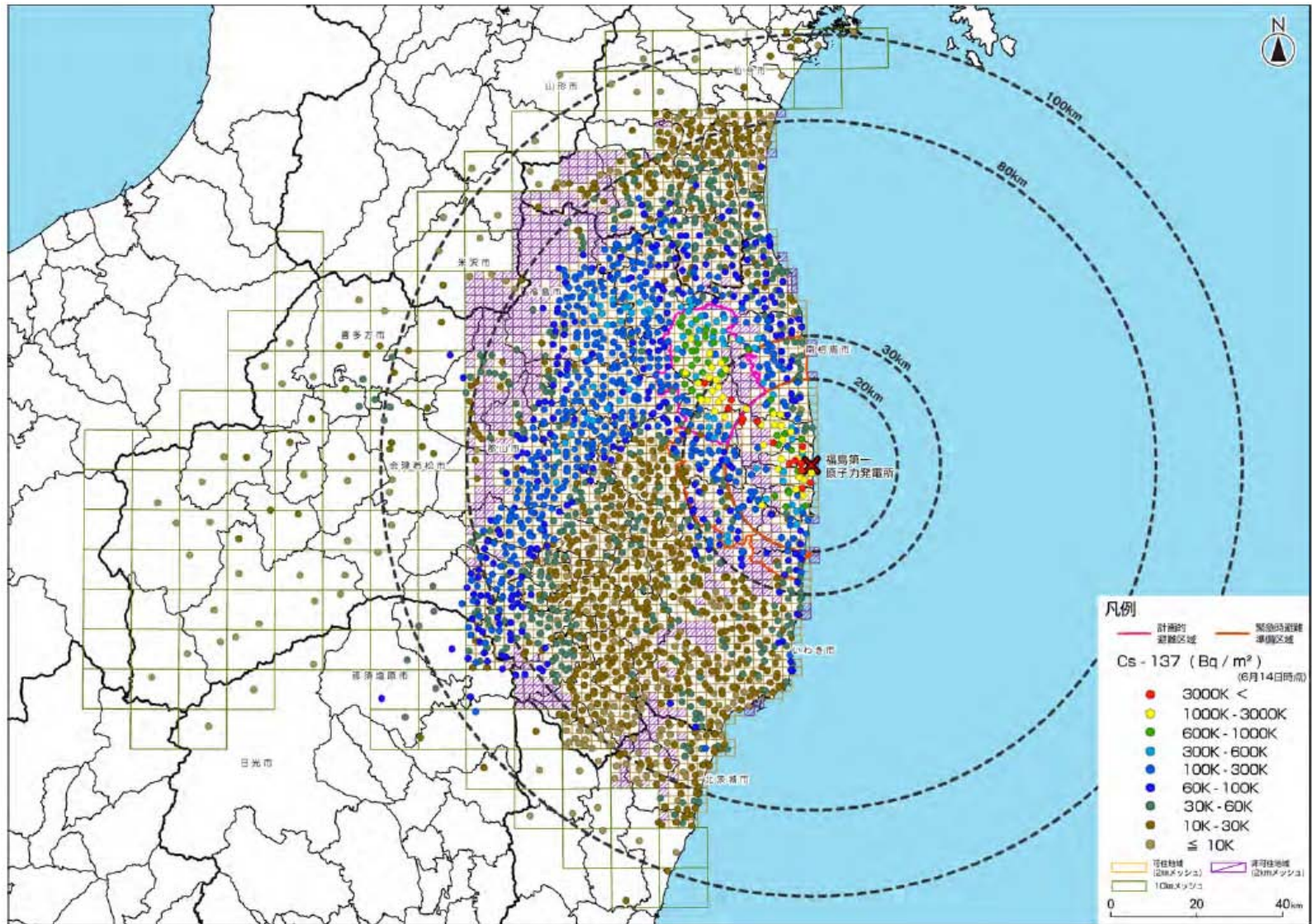
6) Monitoring of tap water

(1) Comprehensive monitoring plan

- MEXT collected soil at about 2,200 places within a roughly 100 km radius from TEPCO's Fukushima Dai-ichi NPS while also measuring the air dose rate and the amount of radioactive materials deposited into the soil at these locations.

Amount of radioactive materials deposited into the soil

Map indicating radioactive cesium-137 concentration in soil



(2) Efforts concerning decontamination

□ *Basic Policy for Emergency Response on Decontamination Work*

□ *Working principle (over the next two years)*

1. The GOJ promotes decontamination, with the goal of reducing the estimated annual exposure dose to below 20 mSv where the current estimated annual exposure dose exceeds 20 mSv.
2. Areas where the estimated annual exposure dose is below 20mSv, with a goal of bringing the estimated annual exposure dose to close to 1mSv.
3. High priority is placed on achieving thorough decontamination in children's living areas (e.g. schools, parks)

□ *Individual efforts concerning decontamination*

- Decontamination efforts at schools
- Monitoring and decontamination of agricultural soils
- Dose reduction of public facilities, school zones
- Decontamination of residents' living spaces
- Decontamination efforts by municipalities

(3) Responses to people affected by the accident

□ *Restricted Areas*

Evacuation areas to which access is prohibited, except in extremely limited circumstances (temporary access for residents, temporary access in the public interest)

□ *Deliberate Evacuation Areas*

Areas where the cumulative dose might reach 20mSv within a year; evacuation takes place in a planned, deliberate manner over roughly a month, rather than immediately

□ *Evacuation-Prepared Areas*

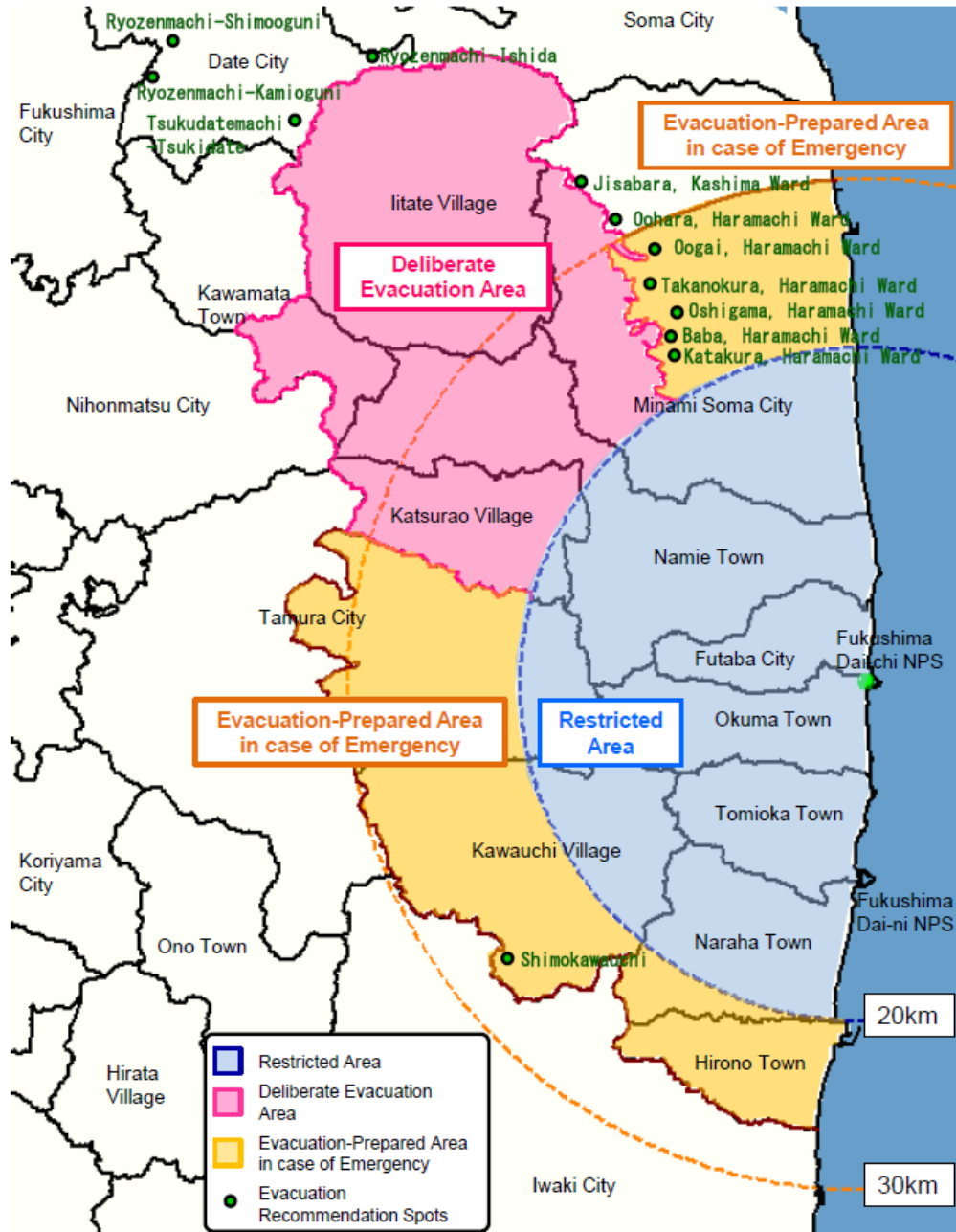
“Stay indoors” areas and/or areas where evacuation might become required should an emergency arise. (Efforts are underway to enable the lifting of this designation.)

□ *Specific Spots Recommended for Evacuation*

Identified residences where exposure might reach 20mSv in a year; total of 227 locations (245 households)

Restricted Areas, Deliberate Evacuation Areas, Evacuation-Prepared Areas in Case of Emergency and Specific Spots Recommended for Evacuation

(As of August 3, 2011)



(3) Responses to people affected by the accident

□ *“Concept of Review of Evacuation Areas, etc.”*

(decided August 9 by the Nuclear Emergency Response Headquarters)

1. maintain necessary distance as a result of safety evaluation
2. Result of radiation monitoring in the areas
3. Development of restoration plan

→ The GOJ intends to lift the designation of Evacuation-Prepared Area in Case of Emergency in blocks when all local municipalities have completed the development of a restoration plan, taking their residents' intentions into consideration.

(4) Measures to address agricultural products

- ❑ The GOJ promotes the inspection of agricultural products, restricting distribution as necessary when radiation levels exceed the provisional regulation values
- ❑ Products whose radiation levels exceed the provisional regulation values must be recalled and destroyed (restricting distribution as necessary)
- ❑ Efforts regarding food items
Tea leaves, beef, rice, etc.

3. Efforts to address lessons learned

(1) Reforms to safety-related regulatory and administrative systems

- (1) The “Nuclear Safety and Security Agency (NSSA; tentative name)” will be created as an affiliated organization (“*gaikyoku*”) of the Ministry of Environment in view of “the separation of nuclear regulation and promotion,” separating the nuclear safety regulation section of the Nuclear and Industry Safety Agency (NISA) from the Ministry of Economy, Trade and Industry (METI) and integrating the functions of the Nuclear Safety Commission (NSC).
- (2) Aiming to further strengthen its functions as a regulatory organization by unifying work related to nuclear safety regulation, the NSSA will also be in charge of safety regulations on the use of reactors and nuclear fuel materials and nuclear security, and lead functions in environmental monitoring (including the operation of SPEEDI).
- (3) Crisis management, including emergency responses, is one of the primary roles of the NSSA, and necessary arrangements will be made for this purpose.
- (4) In order to steadily implement operations of the new organization, the government will make every effort to secure competent human resources from both the public and the private sectors.
- (5) In parallel with the organizational review, the government will also conduct a review on the contents of nuclear regulations and their related systems, including the introduction of a new regulatory framework in view of the recent accident.
- (6) The Cabinet Secretariat will carry out preparation work, including drafting necessary bills, aiming to create the NSSA in April 2012.
- (7) When the relevant outcome from the Investigation Committee on the Accident at the TEPCO’s Fukushima Nuclear Power Stations is presented during the course of the review, the government will respond to it in a flexible manner.

(2) Countermeasures to reinforce safety at nuclear plants

□ *Emergency safety countermeasures*

Completed disposition of emergency response equipment; now working out manuals and drills.

Mid- to long-term efforts include countermeasures against flood damage.

□ *Urgent protective actions*

Completed ventilation of center operating room; now working out manuals for exhaust of hydrogen gas, and deployment of wheel carriers.

Mid- to long-term efforts include countermeasures against hydrogen leakage and the installation of hydrogen exhaust ports.

(2) Countermeasures to reinforce safety at nuclear plants

□ *Total safety countermeasures*

Implementation of a new safety evaluation scheme, referring to safety assessments which EU countries have introduced.

First assessment: To be conducted after completing a regularly-scheduled inspection

Second assessment: To be conducted at all plants

(3) Reviewing regulatory guides and standards

- Regulatory Guide for Reviewing Safety Design of Light Water Nuclear Power Reactor Facilities
- The Regulatory Guide for Reviewing Seismic Design of Nuclear Power Reactor Facilities
- Regulatory Guide for Emergency Preparedness of Nuclear Facilities

<http://www.iaea.org/newscenter/focus/fukushima/japan-report2/japanreport0911.pdf>

Thank you