

# Comprehensive Radiation Monitoring Plan

Developed on 2 August, 2011  
Revised on 15 March, 2012  
Revised on 1 April, 2012  
Revised on 1 April, 2013  
Revised on 1 April, 2014  
Revised on 1 April, 2015  
Revised on 1 April, 2016  
Revised on 28 April, 2017

## Monitoring Coordination Meeting, Japan

The Meeting consists of the following organizations:  
Nuclear Regulation Authority: NRA (Headquarters);  
Ministry of the Environment: MOE; National Police Agency; Ministry of Education, Culture, Sports, Science and Technology: MEXT; Ministry of Health, Labor and Welfare: MHLW; Ministry of Agriculture, Forestry and Fisheries: MAFF; Fisheries Agency; Ministry of Land, Infrastructure, Transport and Tourism: MLIT; Japan Meteorological Agency; Japan Coast Guard; Ministry of Defense; Fukushima Prefectural Government; and Tokyo Electric Power Company Holdings Inc.

On 11 March 2011, a massive amount of radioactive material was released from Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi Nuclear Power Station (NPS). The Monitoring Coordination Meeting, which was set up under the Nuclear Emergency Response Headquarters, developed Comprehensive Radiation Monitoring Plan on 2 August 2011, and the relevant ministries, agencies and others have conducted radiation monitoring.

No significant increase of the concentrations for radionuclides has been found so far, while six years have passed since the accident at Fukushima Daiichi NPS. However, high air dose rates and high concentrations for radionuclides released by the accident at Fukushima Daiichi NPS have been still found in some areas around Fukushima Daiichi NPS. Thus, it is important to conduct radiation monitoring continuously.

The Monitoring Coordination Meeting then revised the Plan on 28 April 2017. Relevant ministries/agencies, local governments and nuclear operators should conduct radiation monitoring in a cooperative manner based on the revised Plan.

## 1. Aims

Aims of Comprehensive Radiation Monitoring Plan are as follows:

- (a) To figure out a distribution of radiation doses and radioactive materials on a mid- and long-term basis mainly in residential areas;
- (b) To estimate the current exposure doses (external and internal exposure doses) of people who have lived and are living near Fukushima Daiichi NPS and their potential exposure doses in the future;
- (c) To develop and evaluate procedures for reducing exposure doses (e.g., Decontamination

activities to be taken);

- (d) To review and decide designation of zones under evacuation orders by estimating future exposure;
- (e) To develop reference data for the health management of people who lived and are living near Fukushima Daiichi NPS, and to assess effects on their health;
- (f) To figure out a dispersion, deposition and migration of radioactive materials which were released to the environment;

Significance should be placed on developing an appropriate system for the purpose of integrating monitoring results over a long period of time, and utilizing them as basic data for the health management of residents who have lived and are living near Fukushima Daiichi NPS and people in other areas.

## 2. Roles and Tasks

### (a) Roles

- **Nuclear Regulation Authority (NRA)**

The NRA plays the role of Headquarters to make a necessary coordination with other organizations for conducting comprehensive radiation monitoring, and to assess monitoring results by the relevant organizations.

- **Nuclear Emergency Response Headquarters**

The Nuclear Emergency Response Headquarters conducts radiation monitoring around Fukushima Daiichi NPS in cooperation with other organizations, and assists Fukushima Prefectural Government with its monitoring.

- **Other central governmental organizations**

The other central governmental organizations conduct monitoring, and analyze monitoring results. Monitoring results are open to the public by the central governmental organizations promptly through their websites.

- **Local governments**

The local governments conduct their monitoring in their relevant areas, and disseminate monitoring data openly to the public in cooperation with the central governmental organizations, the nuclear operator and others.

- **Nuclear operator and others**

Under the authority of the central government, the nuclear operator and others conduct radiation monitoring in cooperation with the local governments, and disseminate monitoring results openly to the public.

**(b) Tasks**

The following table illustrates details of the tasks.

<b>Monitoring subjects or areas</b>	<b>Organizations that initialize monitoring activities and disseminate monitoring results to the public</b>	<b>Organizations that conduct monitoring in the fields</b>
Air dose, dust in air, soil, rivers, lakes, underground water, seawater, sediment	NRA MOE	<b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters  <b><u>Monitoring in the field except the above:</u></b> NRA, MOE, Ministry of Economy, Trade and Industry (METI), MLIT, Japan Coast Guard, local governments, the nuclear operator, MHLW, Ministry of Defense *1, Reconstruction Agency *2
School/ nursery yards	NRA MEXT	<b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters  <b><u>Monitoring in the field except the above:</u></b> NRA, local governments, Nuclear Emergency Response Headquarters, MEXT, MHLW

Ports, airports, parks and sewerage	NRA	<p><b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters</p> <p><b><u>Monitoring in the field except the above:</u></b> Local governments, MLIT*<sup>3</sup></p>
Wild fauna and flora, wastes	MOE	<p><b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters</p> <p><b><u>Monitoring in the field except the above:</u></b> MOE, local governments, the nuclear operator and others</p>
Cultivated soil, forests, pasture and irrigation reservoirs	MAFF	<p><b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters</p> <p><b><u>Monitoring in the field except the above:</u></b> MAFF, local governments</p>
Tap water	MHLW	<p><b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters</p> <p><b><u>Monitoring in the field except the above:</u></b> Local governments, water supply utilities and others</p>

Foodstuff (agricultural/ forestry/ livestock/ fishery products)	MHLW	<p><b><u>Monitoring around Fukushima Daiichi NPS:</u></b> Nuclear Emergency Response Headquarters</p> <p><b><u>Monitoring in the field except the above:</u></b> MAFF, local governments, National Tax Agency *4 and others</p>
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- \*1: Upon request, Ministry of Defense assists to use aircraft or ships as necessary in cooperation with other central governmental organizations.
- \*2: Reconstruction Agency coordinates with other central governmental organizations for the restoration of infrastructures in zones under evacuation orders and zones where evacuation orders have been lifted. Reconstruction Agency also supports residents for their return to zones under evacuation orders and zones where evacuation orders have been lifted.
- \*3: MLIT cooperates to conduct monitoring with local governments and airport management companies.
- \*4: National Tax Agency, which has jurisdiction related to the food safety for liquor, coordinates with other central governmental organizations for monitoring food stuff containing liquor.

### 3. Monitoring subjects, areas and methods

#### (1) Air dose, dust in air, soil, rivers, lakes, underground water, seawater, sediment

##### **Monitoring in land area around Fukushima Daiichi NPS**

###### **(a) Subject: Air dose rates and/or cumulative doses**

- The monitoring results obtained by the NRA and local governments using tele-type monitoring stations in Fukushima Prefecture and its neighboring prefectures (Miyagi, Yamagata, Ibaraki, Tochigi, Gunma and Niigata Prefectures) are open to the public on their own websites.
- The NRA, Nuclear Emergency Response Headquarters and Fukushima Prefectural Government conduct monitoring using portable monitoring equipment (e.g., dosimeters) to watch changes of air dose rates and cumulative doses throughout the whole land area of Fukushima Prefecture.
- Air Monitoring is conducted periodically by the NRA to figure out a change of air dose rate within an area of 80km radius from Fukushima Daiichi NPS and to make the air dose rate map.
- The air dose rate map is made by using monitoring vehicles.
- Fukushima Prefectural Government measures air dose rates in public facilities in Fukushima Prefecture with survey meters.

**(b) Subject: Dust in air**

Monitoring of dust in air is conducted mainly in residential areas by the NRA, Nuclear Emergency Response Headquarters and Fukushima Prefectural Government.

**(c) Subject: Fallout and tap water**

Fallout is monitored once a month, and tap water is monitored once a year. Their monitoring results are made open to the public.

**(d) Subject: Soil**

Distribution of air dose rates and migration of various radioactive materials on the ground surface are surveyed. And air dose rate and soil concentration maps are developed by the NRA, Fukushima Prefectural Government and Nuclear Emergency Response Headquarters.

**(e) Subject: Index-Plants**

Index-Plants (e.g., pine needle) that should be available throughout a whole year are specified, and their radioactivity is monitored by the NRA, Nuclear Emergency Response Headquarters and Fukushima Prefectural Government.

**(f) Area: Zones under Evacuation Orders and Zones where Evacuation Orders have been Lifted**

- Precise monitoring is conducted in zones under evacuation orders and zones where evacuation orders have been lifted. Nuclear Emergency Response Headquarters, Reconstruction Agency, other central governmental organizations, the nuclear operator and others conduct the following precise monitoring. Additional monitoring is conducted if necessary.
  - (i) Air dose rates are periodically measured by car-borne monitoring.
  - (ii) Contribution of monitoring results to recovery tasks of infrastructures in zones under evacuation orders and zones where evacuation orders have been lifted.
  
- For the purpose of assisting residents' return to and the recovery of zones under evacuation orders and zones where evacuation orders have been lifted, the following monitoring is conducted based on the needs of the local communities. Precise maps of air dose rate are developed, which will provide useful information to the evacuees who will make decisions whether they return to their homes or not. A monitoring system is formulated depending on the needs of local communities under the initiatives of Nuclear Emergency Response Headquarters and the NRA in cooperation with other central governmental organizations, Fukushima Prefectural Government, the nuclear operator and others.
  - (i) Monitoring of air dose rates at facilities (i.e., kindergartens, schools and hospitals).
  - (ii) Monitoring of air dose rates using vehicles or unmanned helicopters in the residential areas.
  - (iii) Monitoring that is requested by local governments.
  - (iv) Monitoring for evaluation of the progress of decontamination activities.

## **Monitoring in water resources**

### **(a) Area: Rivers, lakes and other water resources**

- MOE and Fukushima Prefectural Government monitor air dose rates and measure the concentrations of radioactive materials in water, sediment and other mediums, which are obtained at the points in rivers, lakes, other water resources and coastal areas in Fukushima Prefecture and its neighboring prefectures.
- In Fukushima Prefecture, measurement is conducted furthermore intensively for the concentrations of radioactive materials in water and bottom soil of rivers/lakes, other water supply and water at swimming resorts in coastal areas, as well as the air dose rates at the swimming resorts.

### **(b) Subject: Underground water and well water**

MOE and Fukushima Prefectural Government measure the concentrations of radioactive materials in underground water and well water in Fukushima Prefecture and its neighboring prefectures. In Fukushima Prefecture, the concentrations in well water for drinking are measured more intensively.

## **Monitoring in sea area**

Refer to the attachment "Implementation Guides on Sea Area Monitoring".

## **Monitoring in the whole land area of Japan**

### **(a) Prefectural area monitoring using monitoring stations**

- Air dose rates are measured by monitoring stations placed in the prefectures, and the monitoring results are available on the websites in real time. In addition, air dose rates are estimated at 1 meter high above the ground surface near the monitoring stations, and the estimated results are open to the public promptly.
- Air Monitoring is conducted by the NRA to figure out a composition of radioactive materials in Fukushima Prefecture and its neighboring prefecture, where relatively high level of radioactivity was observed.

### **(b) Subject: Fallout and tap water**

Prefectural governments conduct monitoring of fallout and tap water once a month and once a year respectively.

## **(2) School/ nursery yards**

### **(a) Subject: Schools and others**

Air dose rates outdoors at nurseries, kindergartens, elementary schools, junior

high schools, high schools and children welfare facilities in Fukushima Prefecture are monitored by the NRA using tele-type monitoring stations. Fukushima Prefectural Government measures air dose rates in their prefecture once a year outdoors at nurseries, kindergartens, elementary schools, junior high schools and high schools, and arbitrarily outdoors at children welfare facilities .

**(b) Subject: Outdoor swimming pools**

The radioactivity levels in the water of outdoor swimming pools in Fukushima Prefecture are measured by Fukushima Prefectural Government.

**(c) Subject: School meals**

An examination of school meals, which are supplied by schools and child welfare facilities, is conducted to measure the concentrations of radioactive materials in foodstuff by local governments.

**(3) Ports, airports, parks and sewerage**

**(a) Subject: Sewage sludge**

The concentrations of radioactive materials in sewage sludge are measured by local governments in cooperation with MLIT.

**(b) Subject: Seawater in ports**

- Refer to the attachment “Implementation Guides on Sea Area Monitoring”.
- Air dose rates outdoors at port facilities are measured by local governments in cooperation with MLIT.

**(c) Area: Airports**

Airport management companies measure air dose rates near major airports in cooperation with MLIT.

**(d) Area: Parks**

Air dose rates at parks in Fukushima Prefecture are measured by Fukushima Prefectural Government.

**(e) Area: Sightseeing area**

Air dose rates at sightseeing areas (e.g., tourist facilities, mountainous districts, natural scenic spots, roadside stations) in Fukushima Prefecture are measured by Fukushima Prefectural Government.

**(4) Wild fauna and flora , and wastes**

**Wild fauna and flora**

- The Reference Animals and Plants are selected, and then analysis of the concentrations of radioactive materials contained in those reference samples is conducted by MOE in cooperation with its related organizations.



- The concentrations of radioactive materials in hunting animals in Fukushima Prefecture and its neighboring prefectures are measured, because those are often supplied for food.

### **Wastes**

Based on the Act on Special Measures concerning the Handling of Radioactive Pollution, MOE, municipalities and others monitor wastes at water supply plants and others, emission dust and sewer water from waste incineration facilities, as well as underground water and water discharged at/from final disposal sites, and measure air dose rates at the site borders of incineration facilities and final disposal facilities.

### **(5) Cultivated soil, forests, pasture and irrigation reservoirs**

#### **(a) Subject: Cultivated soil**

Cultivated soil is monitored by MAFF.

#### **(b) Subject: Pasture**

The relevant prefectural governments, in cooperation with MAFF, measure the concentrations of radioactive materials in pasture in their own prefectures.

#### **(c) Area: Irrigation reservoirs**

MAFF measures the concentrations of radioactive materials in the water and sediments in irrigation reservoirs in Fukushima Prefecture arbitrarily.

#### **(d) Area: Forests**

Forestry Agency measures the concentrations of radioactive materials in forest soil, branches, leaves, tree bark and timber at the test site specified in forest areas in Fukushima Prefecture.

### **(6) Tap water**

- Regarding purified water at water treatment plants and raw water at intake areas, water samples are taken at the same points as those where water suppliers take water samples, and analyzed by the Nuclear Emergency Response Headquarters and the relevant prefectural governments including Fukushima Prefectural Government.
- Fukushima Prefectural Government measures the concentrations of radioactive materials in water sources for drinking in Fukushima Prefecture.

### **(7) Foodstuff (agricultural/ forestry/ livestock/ fishery products)**

- The relevant local governments conduct radiation monitoring in foodstuff in cooperation with the MHLW. The Nuclear Emergency Response Headquarters

revises inspection methods for foodstuff as appropriate taking into account monitoring results.

- Fukushima Prefectural Government, the MHLW and its related organizations survey actual radiation exposure doses through food ingestion for people, who are living in major prefectures including Fukushima Prefecture.

#### **4. Remarks**

- (a) The NRA and relevant organizations publish monitoring results on their own websites. They interpret the monitoring results and present them to the public in an understandable way.
- (b) The NRA develops a database of monitoring results to realize efficient retrieval and effective mapping/presentation.
- (c) The relevant organizations consider sensitivities of measurements, frequency as well as scope of monitoring on the requests of local communities.
- (d) The relevant organizations need to normalize the measurement and sampling methods to make monitoring results compatible. The cross-checking among analytical institutions is necessary as appropriate for each monitoring.
- (e) Monitoring plans and activities should be updated, when any new scientific and technological knowledge is obtained
- (f) The relevant organizations encourage analytical institutes to cooperate in radiation monitoring.

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