

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

Monitoring Coordination Meeting, Japan

The Meeting consists of the following organizations:
Nuclear Regulation Authority (Headquarters);
Fisheries Agency; Ministry of Land, Infrastructure,
Transport and Tourism; Japan Coast Guard; Japan
Meteorological Agency; Ministry of the Environment;
Fukushima Prefectural Government; and Tokyo Electric
Power Co. 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 three 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. It is important to conduct radiation monitoring continuously.

And then, the Monitoring Coordination Meeting revised the Plan on 1 April 2014. 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 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 evacuation areas 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 in a long period of time, and utilizing them as basic data for the health management of residents who 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 a 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 for its monitoring.

- **Other central governmental organizations**

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

- **Local governments**

The local governments conduct their monitoring in their administrative 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.

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

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

Foodstuff (agricultural/ forestry/ livestock/ fishery products)	MHLW	<p><u>Monitoring around Fukushima Daiichi NPS:</u> Nuclear Emergency Response Headquarters</p> <p><u>Monitoring in the field except the above:</u> MAFF, local governments, National Tax Agency *4 and others</p>
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- *1: 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 the evacuation areas and other areas. Reconstruction Agency also supports residents for their return from the evacuation areas.
- *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, 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 in 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 the area of 80km radius from Fukushima Daiichi NPS.
- The air dose rate map is to be made by using monitoring vehicles.
- Fukushima Prefectural Government measures air dose rates in public facilities in Fukushima Prefecture by survey meters. When relatively high air dose rates were found in any point, their causes need to be surveyed.

(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 for three months. Their monitoring results are made open to the public.

(d) Subject: Land sediment

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 in a whole year are specified, and their radioactivity is monitored by the NRA, Nuclear Emergency Response Headquarters and Fukushima Prefectural Government.

(f) Area: Evacuation areas

- Precise monitoring is conducted in the evacuation and the planned-evacuation areas. 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 the evacuation and the planned-evacuation areas.
- For the purpose of assisting residents' return to and the recovery of the areas for which an evacuation order was lifted and the areas for which an evacuation order is expected to be 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 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 where the above-described facilities have been located.
 - (iii) Monitoring that is requested by local governments for underground water/well water for drink and others.
 - (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 others (e.g., aquatic organisms), 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, water of other water resources and water at swimming resorts in coastal areas, as well as the air dose rates in 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 drink are measured furthermore 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 in the websites at 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 for three months 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. Furthermore, Fukushima Prefectural Government measures air dose rates outdoors at nurseries,

kindergartens, elementary schools, junior high schools and high schools in Fukushima Prefecture once every several months, as well as outdoors at children welfare facilities arbitrarily.

(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.

(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) Natural parks (spring water, wild fauna and flora), wastes and others

Natural parks (spring water, wild fauna and flora)

(a) Area: Natural parks

MOE measures the concentrations of radioactive materials in spring water for drink alongside trails, as well as mountain water and mountain stream water for drink in parking lots. Samples are taken at natural parks within the area of approximately 100km radius from Fukushima Daiichi NPS.

(b) Subject: Wild fauna and flora

- Annual gramineae weeds, pine trees and apodemus speciosus are selected within the area of 20km radius from Fukushima Daiichi NPS and its surrounding areas, on the basis of the Reference Animals and Plants of International Commission on Radiological Protection (ICRP). Analysis of the concentrations of radioactive materials containing in those 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 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 drink 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 NERH 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 ten 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. 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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