

I The Current State of Air Dose Rates in Fukushima Prefecture

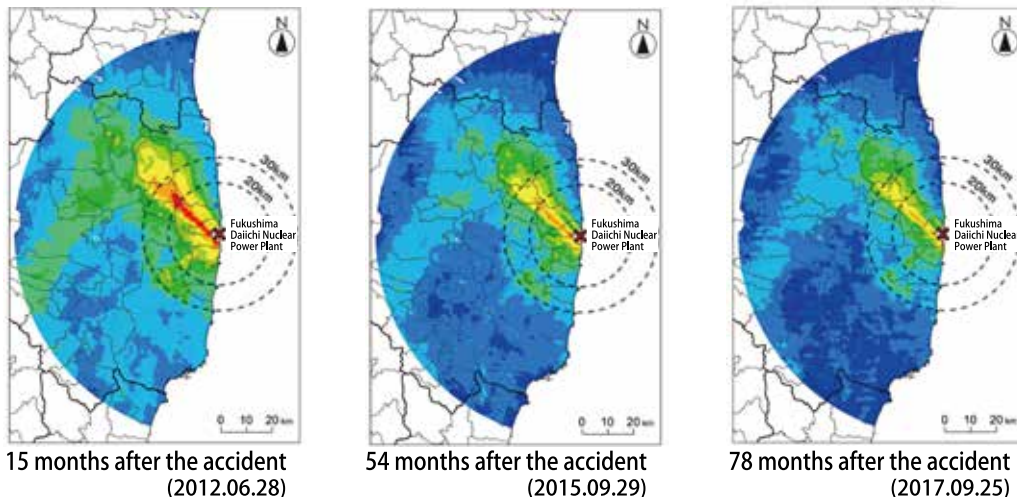
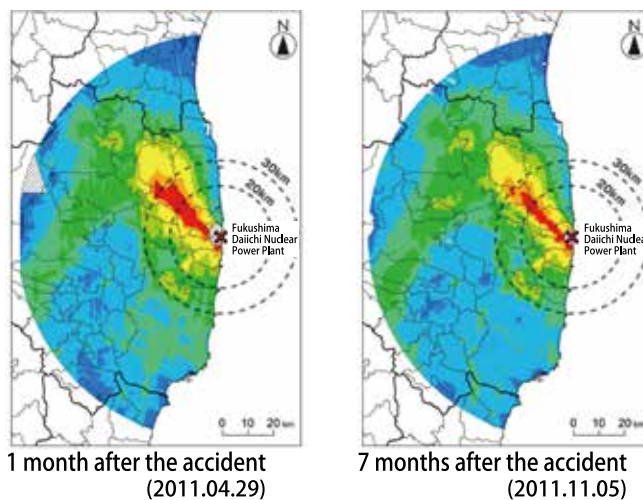
The state of radiation within Fukushima Prefecture and in nearby areas continues to change year by year. This report examines the course of events from immediately after the accident at the Fukushima Daiichi Nuclear Power Plant to the present, and the outlook for the future, presenting the current situation together with actual measurement data produced by detailed monitoring.

Changes Over Time of Air Dose Rate Observed by Airborne Monitoring

The Nuclear Regulatory Commission has been using aircraft to perform continuous monitoring, both within and outside a zone of 80km around the Tokyo Electric Power Company, Incorporated (TEPCO) Fukushima Daiichi Nuclear Power Plant, in order to check changes of air dose rate in areas affected by radioactive substances from the accident.

The results of airborne monitoring of air dose rates within the 80km zone between September and November 2017 found that air dose rates had declined by approximately 74%*, compared to November 2011, immediately after the accident.

Levels have been confirmed to be falling over time, both in areas of high dosage (a region extending northwest from TEPCO Fukushima Daiichi Nuclear Power Plant) and of low dosage (see Figures).



Key
 Air dose rate at a height of 1m above ground surface (μSv/h)
 Area in which measurement has not been conducted

190 <
95 - 190
38 - 95
19 - 38
1.0 - 1.9
0.5 - 1.0
0.2 - 0.5
0.1 - 0.2
≤ 0.1
Not measured

* This map includes air dose rates due to naturally-occurring nuclides.

* These values were obtained by dividing the target region with a 250m mesh and calculating from the ratio of measurement results at the center point of each mesh square. It is possible that reduction rates could differ if other comparative methods were used.

[Figure] Movements in the Distribution Map of Air Dose Rates within the 80km Zone

Reference : Nuclear Regulatory Commission "Measurement Results of Monitoring by Aircraft in Fukushima Prefecture and Nearby Prefectures" February 20, 2018, Ministry of the Environment "Unified Basic Reference on the Health Impacts of Radiation" (2017 Edition)

Estimated Future Air Dose Rates Distribution

According to data from a measurement monitoring survey which has been conducted continuously at 362 points in forests in Fukushima Prefecture since August 2011, air dose rates from the time of the accident to the present have fallen in almost the same manner as the physical decay of radioactive cesium. The average value of air dose rate now, in March 2018, is $0.23 \mu\text{Sv/h}$ (see Figure).

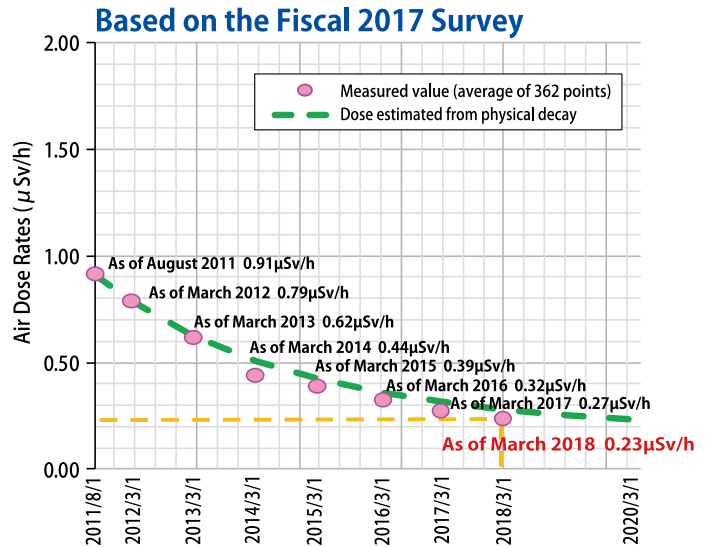
Therefore, air dose rates in future are expected to continue to fall in the same manner as the physical decay of radioactive cesium. By 2041, 30 years after the reactor accident, air dose rates are expected to fall to $0.1 \mu\text{Sv/h}$ or less, with the exception of some areas near the areas under evacuation orders.

Based on the Fiscal 2017 Survey

※Estimates based on continued surveys at 362 points since August 2011 (Unit: $\mu\text{Sv/h}$)

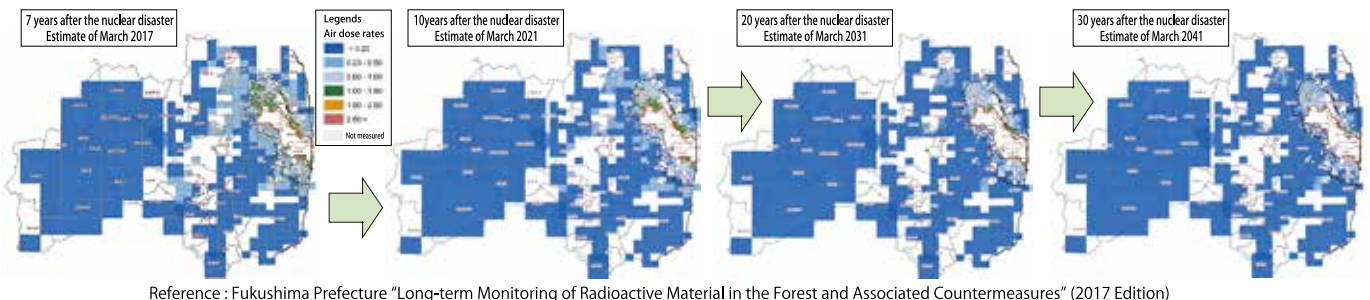
As of March 2018 (see above)	10 years after the nuclear disaster Estimate of March 2021	20 years after the nuclear disaster Estimate of March 2031	30 years after the nuclear disaster Estimate of March 2041
0.23	0.18	0.13	0.10

30 years after the nuclear disaster:
Air Dose Rates will decrease to $0.1 \mu\text{Sv/h}$ or lower, except some parts of the areas under evacuation orders.



[Figure] Physical Decay Curve of Radioactive Cesium and Its Relationship with the Measured Monitoring Values (average of the values at 362 points)

Reference : Fukushima Prefecture "Long-term Monitoring of Radioactive Material in the Forest and Associated Countermeasures" (2017 Edition)



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Comparison of Air Dose Rates between Fukushima Prefecture and the World

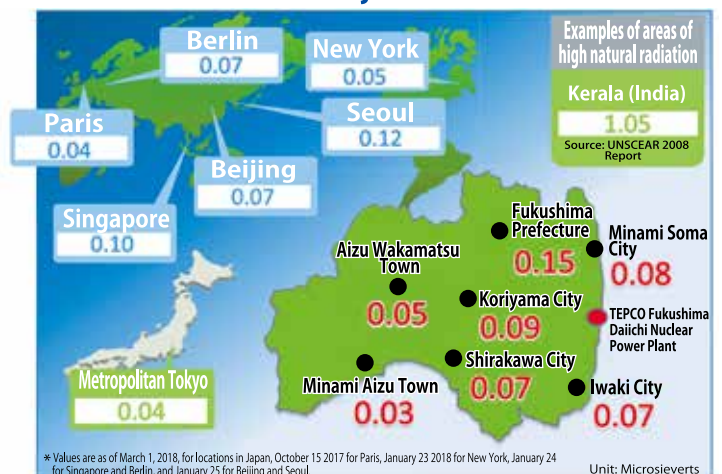
Compared to April 2011, air dose rates in Fukushima Prefecture have greatly declined, and are at close to the same levels as major cities overseas (Figure).

There are places around the world, such as Yangjiang in China, Kerala in India, and Ramsar in Iran, which have levels of natural radiation between two and 10 times higher than in Japan. The high levels of natural radiation in such areas are said to be caused by high content of radioactive substances such as radium, thorium, and uranium in soil.

Epidemiological studies etc. in China and India have not reported markedly increased levels of cancer incidence and mortality in these areas. Analysis of cancer risks in Ramsar is currently under way.

Furthermore, the impact of radiation on the human body is caused by damage to DNA, so the impacts of natural and artificial radiation are the same.

Air dose rates in Fukushima Prefecture are at close to the same levels as major cities overseas.



[Figure] Current Air Dose Rates in Fukushima Prefecture and the World

Reference : Reconstruction Agency "Eliminating Negative Reputation Impact 2018", Ministry of the Environment "Unified Basic Reference on the Health Impacts of Radiation" (2017 Edition)