

# Environmental Dose Rate Monitoring System for the Field of Dispersed Cesium-137

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[Abstract] Environmental dose rate measurement was performed using a mobile measurement system consisting of a vehicle carrying time series data measurement equipment with a GPS. The response characteristics accompanying movement were measured using a GM-type survey meter, which performed energy calibration by Cs-137, and comparison with an environmental measurement point was performed. Dose rate was measured while moving toward Fukushima, and the data were compared with the dose rate released by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). There were no marked changes in the fundamental measurement associated with distance from the radionuclide source, and the response characteristic of the survey meter did not alter with changes in speed. The measurement results in Fukushima Prefecture were in agreement with the dose rate map (MEXT). There were significant differences between Kanazawa and Fukushima in dose rates inside and outside of tunnels. As the background was high, especially within Fukushima Prefecture, the differences between the inside and outside of the tunnels were large. The measured value of the released distribution and the GM survey meter showed relatively good agreement. Moreover, the results confirmed that the GM survey meter could be used for dose rate measurement even in an emergency. Although soil withdrawal and decontamination work are currently in progress, it is necessary to carry out monitoring continuously.

[Key Words] Cesium-137, GM survey meter, Dose rate

[Introduction] Although there are two cases where the integrated value and dose rate can be determined for environmental measurement, integrated measurement is not suitable in an emergency. A scintillation survey meter is instantaneously effective and is often used as the measurement instrument, and KURAMA, which is a vehicle-borne survey system developed by Kyoto University, has also been used. The dose rate measurement with GPS function is adopted, and is performing radiation dosimetry.

[Object] It is investigating the usefulness that the response characteristics accompanying movement are measured using a GM-type survey meter, which performed energy calibration by Cs-137.

[Methods] The dose rates of the every place point around Kanazawa University and tunnels in Kanazawa (about 380 km from Fukushima) were measured, because there have been many reports that the dose rates in the tunnel were higher than within the city. The dose rates of the every place point and tunnels were also measured in Fukushima. In addition, the dose rates of the tunnels in Fukushima and on the highway from Kanazawa to Fukushima were measured.

[Results] Based on the measurements obtained at the every place point around Kanazawa University and in the tunnels in Kanazawa City, there were no significant differences in dose rates between the city and the tunnels (Fig.1). These observations were in agreement with the official values for Fukushima City released by MEXT(Fig.2). Hot spots were observed on the

expressway, and dose rates in the tunnels increased from Adataro Service Area(Fig.3). Dose rates in the tunnels were lower than those on the road in Fukushima City. Thus, dose rate appeared to be markedly influenced by exposure to the rain.

**[Discussion]** The dose rates were lower inside compared to those outside of the tunnels between Kanazawa and Fukushima. As the background was especially high around Fukushima, the differences between the inside and outside of the tunnels were large. In an emergency, therefore, tunnels may be appropriate refuges. As the measurement results obtained with the GM survey meter and the official dose rate map were in agreement, this meter appears to be sufficient for obtaining a rough measure of the dose rate in an emergency. An increase in dose rate by rain was observed. The changes in dose rate around Fukushima nuclear power plant were large, and were particularly high in cultivated fields. This must be taken into consideration in radiation dosimetry.

**[Conclusions]** The officially released distribution and the values determined with the GM survey meter showed relatively good agreement. Therefore, in an emergency, dose rate measurement is possible using the GM survey meter. During the process of soil withdrawal and decontamination work, it is necessary to carry out continuous monitoring of contamination levels.

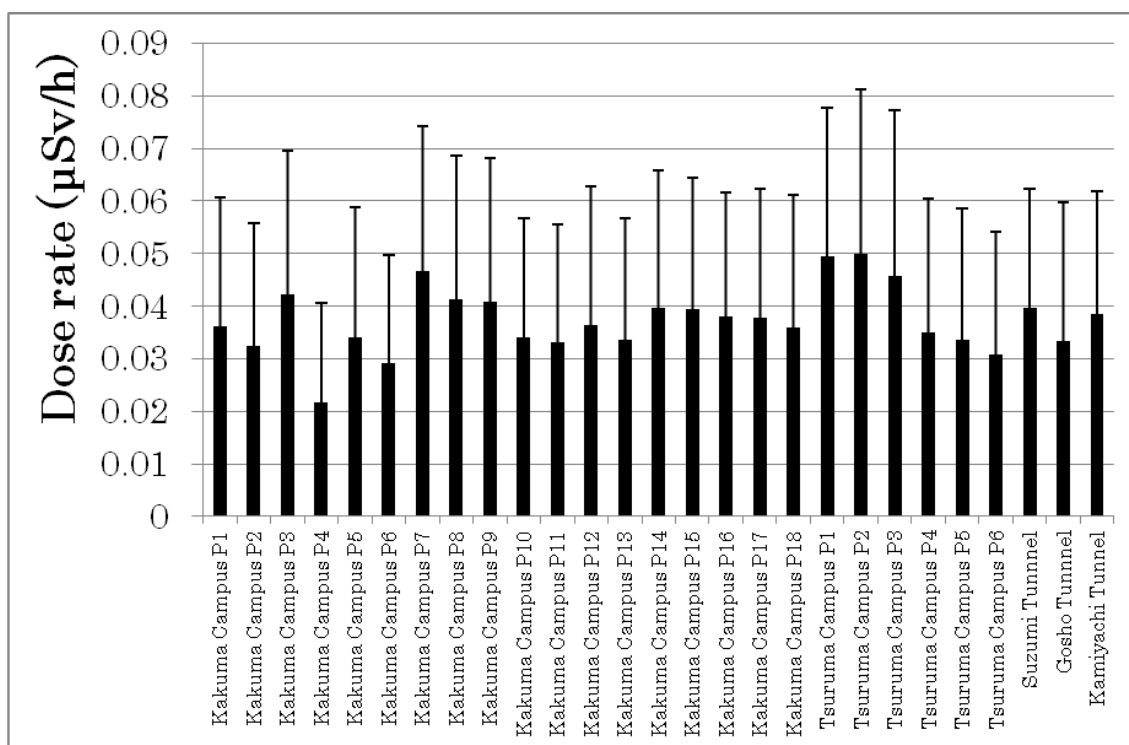


Fig.1 Dose rate of the points in the campus and the tunnels in Kanazawa City

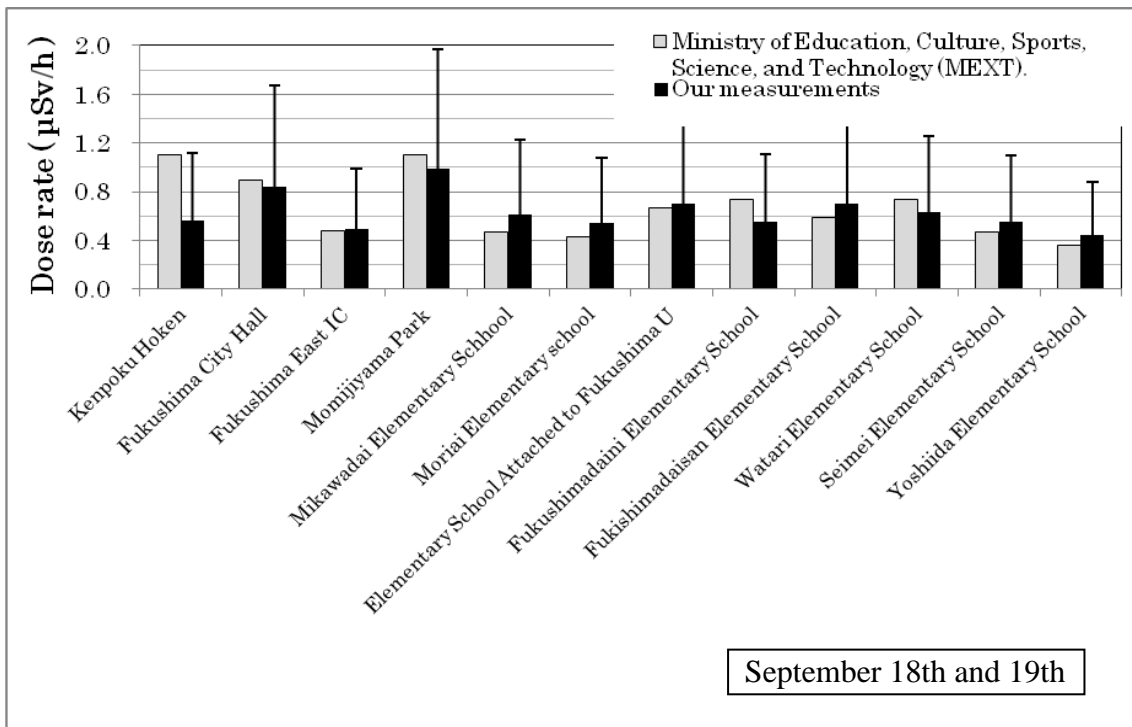


Fig.2 Dose rate comparison between MEXT and our measurements in Fukushima City

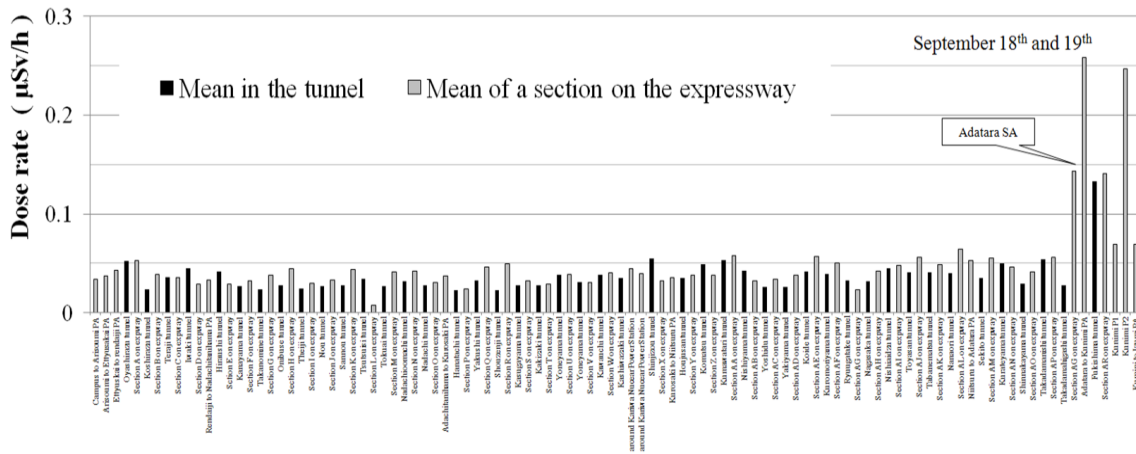


Fig.3 Dose rate of each section on the expressway and the tunnels