

1-1 Changes in Ambient Dose-Equivalent Rates Dependent on Land Use

— Evaluation of Ecological Half-Lives for Decreasing Trends of Ambient Dose-Equivalent Rates —

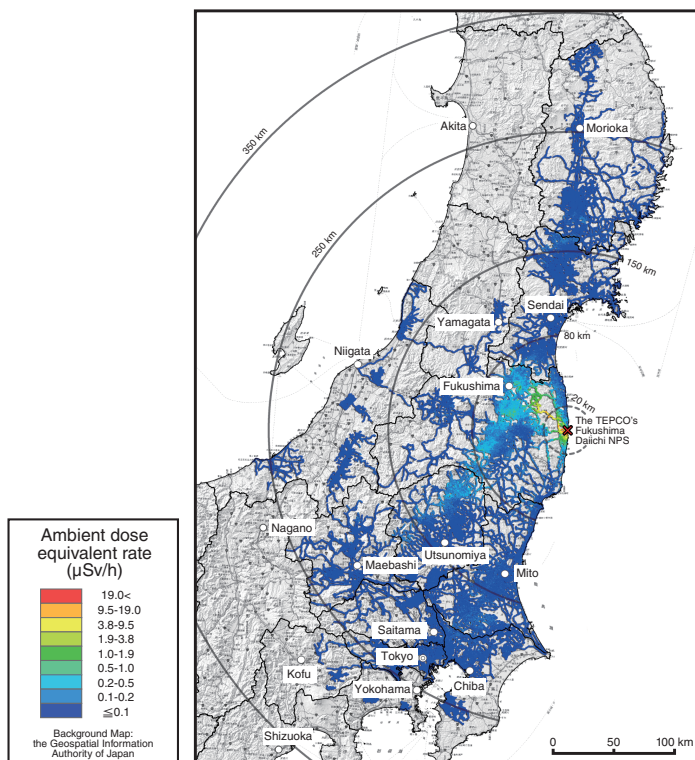


Fig.1-4 A map of ambient dose equivalent rates through vehicle-borne surveys
 (The eighth survey was conducted from June 23 to August 8, 2014)

To support a rehabilitation program after the accident at the TEPCO's Fukushima Daiichi NPS, prediction models have been developed to assess how ambient dose-equivalent rates obtained from the radioactive cesium (Cs) deposited on the ground might change in future. The prediction models were expressed using calculation formulae characterized by ecological half-lives for the fast/slow elimination components. The prediction models can provide information on the time-variation of the ambient dose-equivalent rates for land use. The ecological half-life is defined as the time for the ambient dose-equivalent rate to be halved due to natural removal phenomena and human activities.

In Western countries, ecological half-lives were evaluated after atmospheric nuclear tests and the accident at the Chernobyl Nuclear Power Plant. However, it is not clear yet whether these ecological half-lives are applicable in Japan. We evaluated ecological half-lives for the fast elimination component using ambient dose-equivalent rates through eight

Table 1-1 Ecological half-lives for the fast elimination component (median)

The median values of the ecological half-lives of the fast elimination component for each land use are listed in this table.

Land use	Ecological half-lives for the fast elimination component (year)
Water	0.56
Urban	0.60
Paddy	0.55
Crop	0.63
Grass	0.58
Deciduous forest	0.66
Evergreen forest	0.94
Bare surface	0.62

vehicle-borne surveys conducted from June 2011 to August 2014 (Fig.1-4). The ecological half-lives for land use were analyzed on the basis of a statistical method. The ecological half-life for the slow elimination component was assumed to be 45–135 year and is not easily evaluated using the data obtained within several years after the accident.

We found that the ecological half-lives for the fast elimination component in deciduous and evergreen forest areas are longer than those in other areas. In many areas other than deciduous and evergreen forests, the ecological half-lives were found to be approximately 0.55–0.63 year (Table 1-1). Our findings indicate that radioactive Cs in forest areas is unlikely to flow out into surrounding areas. Hence, a rehabilitation program in forest areas is an important issue as there are large forest areas in Fukushima Prefecture.

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References

- Kinase, S. et al., Development of Prediction Models for Radioactive Caesium Distribution within the 80-km Radius of the Fukushima Daiichi Nuclear Power Plant, *Radiation Protection Dosimetry*, vol.160, no.4, 2014, p.318–321.
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