別紙様式３（修士申請者用）

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学位論文題名（注：学位論文題名が英語の場合は和訳をつけること）

Changes in environmental radiation levels in Katsushika Ward, Tokyo after the Fukushima Daiichi Nuclear Power Plant accident
福島第一原子力発電所事故後における東京都葛飾区の環境放射線量の変化に関する研究

学位の種類：修士（放射線学）
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注：1 ページあたり 1,000 字程度（英語の場合 300 ワード程度）で、本様式 1～2 ページ（A4 版）程度とする。

Katsushika Ward, located in northeastern Tokyo, had the highest deposition in Tokyo of artificial radionuclides after the Fukushima Daiichi Nuclear Power Plant accident. A car-borne survey for measuring absorbed dose rate in air was carried out in the ward in each of the years 2015–2020. Car-borne surveys were carried out over the asphalt pavement (width: 4 - 10 m) using a 3-in × 3-in NaI(Tl) scintillation spectrometer. The measurements of the count rates inside the car were performed every 30 s along the route, and consecutive gamma-ray energies of 50 keV - 3.2 MeV were recorded. The shielding effect of the car body was estimated by measuring the count rates inside and outside the car because count rate was measured inside the car. There were 13 measurement locations. The shielding factor (SF) were calculated as regression coefficients from the correlation between count rates inside and outside the car. The count rates inside the car were then multiplied by SF. The measured gamma-ray pulse height distribution measured with the NaI(Tl) scintillation spectrometer was then unfolded using a 22 × 22 response matrix method and absorbed dose rates in air were calculated. The dose conversion factors (DCF: nGy h^{-1}/cps) were then estimated from a correlation between calculated dose rates and measured count rates.

The average dose rates (ranges) from radiocesium (n = 13) were 25 ± 11 nGy h^{-1} (15–51 nGy h^{-1}) for 2015, 20 ± 9 nGy h^{-1} (10–41 nGy h^{-1}) for 2016,16 ± 7 nGy h^{-1} (6–30 nGy h^{-1}) for 2017, 12 ± 7 nGy h^{-1}(1–28 nGy h^{-1}) for 2018, 12 ± 7 nGy h^{-1} (3–26 nGy h^{-1})for 2019 and 12 ± 8 nGy h^{-1} (4–31 nGy h^{-1}) for 2020. In car-borne survey measurements of 2014 obtained on the same route, higher dose rates exceeding 80 nGy h^{-1} were observed along national road 6 and other main roads. In urban areas with concentrated and high-rise housing, roads have become pathways for winds that significantly affect dispersion of artificial radionuclides; and radiocesium transported by dust

particles may have been dispersed along these roads. The average dose rates measured in 2015–2018 decreased every year, however, the percentage reductions were smaller after 2018 due to the decrease in ^{134}Cs amount; this radionuclide decays with a half-life of 2.065 years. The ecological half-life of absorbed dose rate in air measured above bare surfaces in Katsushika Ward was estimated to be 1.6 y and this value was clearly shorter than the value for only physical decay (3.2 y). The dose rate from the artificial radionuclides measured above asphalt surfaces had lower values due to stronger weathering effects compared to bare surfaces. This might be a change in dose rate specific to urban areas where asphalt or concrete coverage by roads, buildings, etc. is large.