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Research Note

A Study on Measurement Errors in Measurement of Radioactive Cesium Concentration in Rice Straw

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Summary

To properly treat agricultural and forestry wastes contaminated with radioactive cesium by means of incineration, it is necessary to measure the contamination level in advance. As agricultural and forestry wastes that contain plant matter have low bulk density and nonuniformity as sample characteristics, measurement error in the radioactive cesium concentration occurs during radioactivity analysis of them. In this study, using a kind of rice straw as a representative sample, we discussed causes of the measurement error through several investigations such as surface observation, heterogeneity and density of sample in measurement container, etc. As results of this study, it is highly likely that the contamination source of the rice straw is the adherent soil with a higher content of radioactive cesium. In addition, accumulation of the soil separated from rice straws on the bottom of the measurement container brings localization of radioactive cesium in the container, leading to the measured radioactivity being an over-estimation. The influence of the heterogeneous sample was suppressed by cutting or milling the sample. As the packing density decreased, however, the more the measured radioactivity tended to be over-estimated. From the present results, in addition to other previous research findings, we pointed out the over-estimation in radioactivity measurement of waste may affect material balance analysis of radioactive cesium during the waste incineration. Furthermore, based on the findings, we proposed an improvement of the conventional manuals for measuring radioactivity in sample to obtain more accurate radioactivity in heterogeneous sample.

Key Words: Radioactive cesium, Measurement error, Rice straw, Sample characteristics