Method Development for Predicting Radionuclide Concentration in Dry Active Waste of KAERI LILWs

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Abstract**:** *To satisfy the delivery regulation for radioactive waste drums of KAERI to permanent disposal sites, the radionuclide concentration is essentially required by the Nuclear Safety and Security Commission (NSSC) Notice which indicates to identify more than 95% radionuclide present in the radioactive waste drums. Particularly the concentration of beta emitting radionuclides indicated in the notice is not easy to be identified by non-destructive methods. Permanent disposal cost of each LILW drums is expensive. Thus it is suggested to the development of indirect method by which the concentrations of DTM nuclide is decided using the correlation between Key nuclide and DTM nuclide with detected concentrations of Key nuclide. Scaling factor (SF) method which is mainly used as indirect prediction about DTM radionuclides in other advanced countries can predict only Fe-55 of ALL data and Ni-63 of PI data. So for this supplement point about SF method that was applied KAERI radioactive waste data, it is needed to attempt to apply other indirect prediction methods for resolution of these questions. In this study, the method using existing SF for DTM nuclides are compared with that using MLR and ANN. Multiple Linear Regression (MLR) method can predict concentrations of all DTM nuclides except C-14, Ni-63, and I-129. Artificial Neural Network (ANN) method can predict concentrations of all DTM nuclides except C-14 and I-129. Herein, we present the better improved estimation result by the comparison of MLR, ANN, and SF method. For almost the whole DTM nuclides, the predicted values using ANN and MLR are well matched with the original values compared with that using SF. So, MLR and ANN method can compensate the weakness of narrow prediction range of SF method.*

Keywords: *Radioactive waste, scaling factor, data mining.*