



Contribution ID: 281

Type: POSTER

## In-situ Characterization Technology Development for Clearance Verification of Radioactive Waste from Nuclear Decommissioning

During decommissioning of nuclear power plants, a large amount of metallic radioactive waste is generated. If it can be confirmed that the residual activity of radioactive waste is below the clearance level, it can be managed as general or industrial waste. For accurate and conservative evaluation of radioactive metal waste, in-situ characterization technology was developed. A value below the clearance level was found to be accurately measured through minimum detectable activity measurement. To evaluate the error according to the shape, spot, and nuclide of the sample, MCNP simulation was performed. A comparison of the measured value and the MCNP value showed an error range of 0.1–7.7%. Even if the radioactivity measurement value of metal waste shows contamination at the same level of radioactivity, the resulting value is different depending on the material and spot, making correction necessary. In order to evaluate this variation, the density correction factor according to the sample material and spot was evaluated. A conservative methodology was developed by calculating the simulation error and the density correction factor. For accurate evaluation, a 3D camera, plastic scintillation detector, NaI(Tl) scintillation detector, and MCNP simulation were applied to present a technique that can confirm a below clearance level.

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**Track Classification:** Track 5 - Practical experiences in integrating safety and sustainable development