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Original

Study on Reuse of Soil Contaminated with Radio-Cesium Using Calcination Technology

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Summary

By using a calcination technology, the thermal volume reduction of contaminated soil by radio-cesium (r-Cs) and its recycle as cement of clearance level less than 100 Bq/kg has been investigated. For the experiments, actual contaminated soil removed for decontamination (removed soil) was used and the evaporation properties were investigated. The chemical composition of removed soil was adjusted as that of Portland cement and calcium chloride was added in order to evaporate r-Cs and calcined. When the calcination temperature was increased over 1300ºC, the concentration of r-Cs in calcined product was lowered than the clearance level and became non-detective and more than 99% was successfully removed. The remained amount of free lime that is an indicator of the formation of Portland cement components decreased with temperature increase and at over 1450ºC, it was reduced to an acceptable level less than 1%. The phase composition of calcined material was confirmed to be normal Portland cement clinker mineral by X-ray diffraction / Rietveld analysis. Furthermore, it was found that the r-Cs concentration in the clarified material can be volatilized to the clearance level even without the addition of calcium chloride and this suggests the possibility of reduction of the amount of fly ash by-products being concentrated by r-Cs. Based on this finding, 100 kg order of Portland cement clinker was produced from imitated soil by using a pilot scale kiln. As a result, the similar level of Cs removal ratio was obtained to the case of actual removed soil. From the calcined products, Portland cement was produced by adding gypsum and grinding. The performance of produced Portland cement was evaluated and satisfied every specification of relating JIS.

Key Words: Radio-cesium, Calcination technology, Reuse