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Assessment of ecological impact of blast oxygen furnace slag used as a fill material on the surrounding environments

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Steel slag generated from basic oxygen furnace (BOF) can be successfully used as construction aggregates especially for a fill material. BOF slag contains, to some extents, heavy metals originating from iron-bearing mother rocks and fluoride from calcium fluoride (CaF_2). The inorganics can be present as either environmentally resistant or readily desorbing forms and such easily released heavy metals and fluoride can pose adverse impacts on the surrounding ecosystems (i.e., soil and surface water). In this study, leaching potential of inorganics from BOF slag and ferro-nickel slag were tested. Batch type leaching tests including USEAP methods (TCLP and SPLP) and an EU method (EN 12457) were conducted to determine the intrinsic leaching potential. Continuous column test was also performed to predict the long-term leaching behavior of heavy metals and fluoride. Leaching rates of heavy metals and fluoride depending on liquid-to-solid ratios were derived from the BOF-packed column and percolation-controlled scenario was employed to predict the release behaviors for 100 years. For ecological impact analysis, Hazardous Concentration (HC) 5 values for each element were obtained by establishing species sensitivity distribution curves which was considered as Predicted-No-Effective-Concentrations (PNECs). The predicted concentrations obtained from this study were used as Predicted-Effective-Concentrations (PECs) and the ratio of PEC to PNEC was used for the determining index of potential ecological risk. In addition, the impact of BOF slag leachate on soil environment was assessed by analyzing the structure of microbial community, plant germination test and earthworm toxicity test.

Biography

Kyoungphile Nam has completed his PhD from Cornell University in 1998. Currently, he is Professor at Department of Civil and Environmental Engineering, Seoul National University, Korea and he also serves as the Director of Remediation Technology and Risk Assessment Center. His major research fields are soil and groundwater remediation and risk assessment. He has published more than 60 papers in peer-reviewed journals and has been serving as an Editor for Clean-Soil Air Water since 2006.

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