Health impact of recycling NORM residues in building materials

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Abstract

In this work, from the activity concentration data of NORM residues in the EU countries, the authors assess the radiological impact of using them as building materials or building materials additives. The results obtained by the ISS room model application [1], in particular on phosphogypsum data-set, will be also presented. This computational tool can give an accurate and specific estimate of the contribution of building materials to the indoor dose. Building materials are within the scope of the new Euratom Basic Safety Standards Draft. Therefore, another goal of this work is to introduce a new screening tool, I_{new}, more accurate than index I of Radiation Protection 112 guidelines. It accounts for other important parameters affecting the indoor exposure like density, thickness and Rn emanation power of building materials. By the application of I_{new}, the radiological impact of recycling fly ashes and furnace slags will be also evaluated. The results presented indicate that a responsible management of byproducts reuse for a sustainable resource exploitation might be possible, but unjustified radiological exposures might rise from an unware and/or uncontrolled use.

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[1] Nuccetelli C, Risica S, D'Alessandro M, Trevisi R. Natural radioactivity in building material in the European Union: robustness of the activity concentration index I and comparison with a room model. J Radiol Prot. 2012 Sep;32(3):349-58.