

## ***On site* measurement strategies for the characterization of NORM**

**Wouter Schroeyers<sup>1</sup>, Gerti Xhixha<sup>2</sup>, Niels Vandevenne<sup>1</sup>, Fabio Mantovani<sup>2</sup>, Tom Croymans<sup>1</sup>, Mark Stals<sup>1</sup>, Sonja Schreurs<sup>1</sup>**

<sup>1</sup>*NuTeC, U Hasselt, Diepenbeek Belgium*

<sup>2</sup>*Legnaro National Laboratory (LNL), National institute of Nuclear Physics, Legnaro (Padova), Italy*

**E-mail: wouter.schroeyers@uhasselt.be**

This paper deals with the application and evaluation of industrially useful methodology/protocols for the determination of the activity concentrations of naturally occurring radionuclides from NORM (Naturally Occurring Radioactive Materials) and the activity concentration index (ACI) for NORM containing building materials.

The new Euratom Basic Safety Standards (EU-BSS) published in January 2014 contains a broad list of industries, processing NORM, which will become subject to more strict regulation. Notification is required from industries on the list mentioned in the EU-BSS if the activity concentration of the radionuclides of the <sup>238</sup>U and <sup>232</sup>Th or their decay product is larger than 1 Bq/g or if the activity concentration of <sup>40</sup>K is larger than 10 Bq/g. In addition the new EU-BSS proposal provides additional regulation for the incorporation of residues of NORM (fly ash, phosphogypsum, phosphorus/tin/copper slag, red mud, ...) in building materials and for building materials from natural origin. The reference level applying to indoor external exposure to gamma rays emitted by building materials, in addition to outdoor external exposure, is set in the new EU-BSS to be 1 mSv per year. For verification of this reference level a screening parameter the 'Activity Concentration Index' (ACI) is proposed. The EU-BSS implies the requirement of activity concentration determination for the different radionuclides present in NORM residues and the determination of the activity concentration index for building materials.

Specifically to further aid industry in the search for cost-efficient measurement solutions this paper will deal with newly developed *on-site* measurement methods for the determination of the activity concentration of naturally occurring radionuclides and the evaluation of these methods. An important aspect is the validation of the developed methods which is even more important in case of *in situ* measurements.

Acknowledgement: COST project NORM4Building Tu1301