EUROPEAN METROLOGY RESEARCH PROJECT IND 57 (METRONORM): METROLOGY FOR PROCESSING MATERIALS WITH HIGH NATURAL RADIOACTIVITY

Simon Jerome, National Physical Laboratory, UK
simon.jerome@npl.co.uk

Marie-Martine Bé, CEA, Saclay, France; Pierino de Felice, ENEA, Casaccia, Italy; Mikael Hult, JRC-IRMM, Geel, Belgium; Franz-Josef Maringer, BEV/PTP, Vienna, Austria; Monika Mazánová, ČMI, Prague, Czech Republic and Branko Vodenik, IJS, Ljubliana, Slovenia

Naturally occurring radionuclides are present in many natural resources. Industrial activities that exploit these resources may lead to enhanced potential for exposure to Naturally Occurring Radioactive Materials (NORM) in products, by-products, residues and wastes, which may be produced in large quantities in these NORM industries. Such waste materials, generated from current and past activities, are an economic and ecological burden if they are not properly disposed of or recycled in support of cleaner technologies.

The radioactivity content of mineral feedstocks and process residues creates a need to control exposure to workers and members of the public in accordance with the IAEA Safety Standards: '*In commercially exploited rare earths deposits, the level of thorium and uranium, depending on the type of mineral and its region of occurrence, generally exceed the worldwide median values for soil by up to 200 times of thorium and up to 30 times in the case of uranium*' (IAEA Safety Reports Series 68, 2011, p. 10).

When such minerals are being handled or processed, it is clearly necessary to determine the nuclides present and their activity concentrations as accurately as possible; this, in turn implies the need for reference materials to validate radioanalytical procedures measurement strategies and data processing. Thus, traceable, accurate, and standardised measurement methods and systems, in particular for *in situ* applications, are needed to decide on the recycling of waste materials without increasing costs, contamination of the environment or exposure of the public. Ionising radiation measurement in the recycling industry often focuses solely on artificial radionuclides and so a reliable measurement of natural radionuclides is required to minimise radiation exposure and environmental pollution. Furthermore, NORM industry facilities need to be effective, safe and not endanger the health of workers or the general population.

Within this project, work package 1 is concerned with the generation of reference materials and sources for instrument calibration and method validation. In work package 2, *in situ* measurement systems and sampling methods to improve the determination of radioactive content of raw material, waste materials and by products with truly portable instruments operating under ambient conditions. Standardisation and development of measurement procedures used in the EU is carried out in work package 3, including *in situ* α-spectrometry of smooth surfaces, radon measurements in the water industry and radioactivity distributed inhomogeniously in building materials and waste drums. Improvements of NORM related decay data will be carried out in work package 4, specifically concerned with α-, γ- and X-ray emission intensities in the 4n, 4n+2 and 4n+3 decay series, as well as ^{138}La. Finally, work package 5 is concerned with on-site and *in situ* testing of the measurement procedures and devices developed in the other work packages, using agreed verification criteria.

This this presentation will report on progress in all five work packages since the project was started in September 2013, and will detail work for the coming year.