The On-site Airborne Contaminants from NORM Industries in Korea are Well-represented by the ICRP References with Limited Deviations

Ji-Yong Shin, Wanook Ji and Eun-Hee Kim*

Department of Nuclear Engineering, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 151-744, Republic of Korea

*Corresponding author: eunhee@snu.ac.kr

Abstract

Workers handling Naturally Occurring Radioactive Material (NORM) can be exposed to ionizing radiation through inhaling airborne radionuclides. Thus, the internal dose estimation is an essential process for the safety of workers. Although individual monitoring combined with bioassay measurement is recommended for intake estimation, workplace monitoring is often a practical choice. When workplace monitoring data are used for internal dose estimation, however, lack of specific information on aerosol's properties could lead to under or overestimation.

This study has evaluated the representativeness of the ICRP reference values in internal dose estimation for the workers of NORM industries in Korea. Among the key parameters of airborne contaminants, we focused on the physical properties of aerosol: activity median aerodynamic diameter (AMAD) and density. When no specific information is available, ICRP publication 66 (Human Respiratory Tract Model) recommends using 5 μm and 3 g/cm3 as reference values for AMAD and density, respectively.

The on-site measurement data of aerosol in several Korean NORM industries, available in the reports by Korea Institute of Nuclear Safety (KINS), have been analyzed. Overall mean of AMAD and density of aerosols from Korean NORM industries are well represented by the ICRP reference values with limited deviations. IMBA Professional Plus (PHE, UK) was employed to calculate the effective doses. Dose coefficients for the aerosols in Korean NORM industries vary in the range of -36% to 43% of that for the ICRP reference aerosol. The current aerosol properties, specifically AMAD and density, in Korean NORM industries are well represented by the ICRP references in internal exposure estimation with a limited uncertainty.