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Analysis of Radiation Dose to Workers at major NORM Industries in Korea

In NORM industries, there is a potential for routine radiation exposure to workers. The Act on Protective Action Guidelines against Radiation in Natural Environment was enacted in Korea to protect workers against ionizing radiation from NORM in 2012. The radiological protection programme elements to workers should be consistent with the radiological hazards to approach to optimized protection. ICRP recommended a graded approach for the protection of NORM workers based on radiological hazard. Therefore, it needs to analyze the radiation dose to workers in NORM industries. Currently, the major NORM industries in Korea are identified through the pilot survey. In this study, we analyzed radiation dose to workers at major NORM industries in Korea. In Korea, the radiological assessment was performed for a total of 8 NORM Industries. The phosphate, potassium compound and zircon industries are the major NORM industries with the highest quantity of handling in Korea. Radiation dose to workers resulting from external exposure was assessed using the directly measured dose rates and hypothetical exposure scenarios. Radiation dose to workers due to inhalation of particulates was assessed based on ICRP-66 Human Respiratory Tract Model and actual measurement data of airborne particulates. In phosphate industry, the workers in the phosphate ore storage area had the highest radiation dose of 0.48 mSv/y. The major exposure pathway was internal exposure due to the large amount of dust generated. In potassium compound industry, the workers in the raw material mixture area under the potassium compound production process had the highest radiation dose to 0.43 mSv/y. External exposure was contributed to total effective dose over 99%. In zircon industry, the workers in the packaging area under the glaze production process had the highest radiation dose to 0.55 mSv/y. The major exposure pathway was external irradiation due to the large amount of zirconium silicate handled. The radiation dose to workers was assessed at a similar level to the dose to NORM workers as presented in ICRP 142 publication and IAEA Safety Report Series 49. In this study, we analyzed radiation dose to workers at major NORM industries in Korea. The graded approach for radiological protection based on radiological hazard can be implemented considering the radiation dose levels and the major exposure pathways. Based on this information, it will contribute to improve the regulatory system in accordance with the safety of NORM workers.

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