

Oral 1.1

NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM) USED IN FRENCH INDUSTRIAL FACILITIES URANIUM AND THORIUM SERIES ACTIVITIES CONCENTRATIONS AND ASSOCIATED OCCUPATIONAL EXPOSURES

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According to the council Directive 96/29 Euratom, handling or storage NORM or TENORM has to be considered from the radiological protection point of view. This directive has been implemented in French regulations by, in particular, the Ministerial order of May 25, 2005 related to activities operating NORM not used because of their radioactive properties. It imposes radiological characterization of any materials and assessments of the effective dose received by workers to be done. Since the publication of this text, ASN and IRSN have already received ninety studies which provide information about activities of materials and occupational exposure of nine different types of industrial facilities. These data show that activity concentrations strongly vary according to the type of material and industrial activity. Waste generally contain the highest activity concentration of natural radionuclides. Activities in raw materials and products sometimes exceed the exemption level recommended by IAEA for the use of NORM. Activity of ²²⁶Ra and its daughters in waste or activity of ²¹⁰Pb and its daughters in ashes and dust related to heating processes are sometimes greater than the activities of the other radionuclides of ²³⁸U series. Concerning occupational exposure, doses reported by operators range from less than 1 $\mu\text{Sv}\cdot\text{yr}^{-1}$ to 82 $\text{mSv}\cdot\text{yr}^{-1}$. Based on the French feedback, the following conclusions can be drawn. Assessments are still expected for some industries. About 15% of calculated doses are greater than the effective dose limit of 1 $\text{mSv}\cdot\text{yr}^{-1}$ for the public and need further examination. The highest doses correspond to the production of compounds with thorium. External and internal exposure are often of the same order of magnitude. Some types of industrial facilities currently not concerned by the French ministerial order, e.g. paper mills, are concerned by NORM and TENORM issue.