

International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry

VIRTUAL EVENT

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Inventory of Brazilian NORM industries and radiometric monitoring integrated with a Geographic Information System

The Brazilian territory is constituted predominantly by sedimentary basins and crystalline massifs (magmatic and metamorphic rocks) and the natural radioactivity observed in the environment is not constant. The mineral extraction and physical and chemical processing of NORM can change the distribution of radioactive elements, resulting in materials with high radioactivity. The NORM associated with these industrial activities can exist in several forms such as in ore, in the raw material of the process, in the final product or in the waste. In Brazil, CNEN (Brazilian Nuclear Energy Commission) is responsible for controlling the effective dose limit for workers and the public. In this context, this work aimed to map the Brazilian NORM integrated with the use of the Geographic Information System - GIS. The mapping consists of 3 distinct phases. **(i) Inventory and georeferencing of NORM industries:** industry name, industry limit, raw material, product, waste, concentration of radioactive activity and classification according to CNEN Standard 4.01. The total industries mapped comprised of 23 mining companies and 34 metallurgical companies, located in 27 municipalities. The inventory carried out in this work identified and georeferenced 156 materials containing NORM and their concentrations of radionuclide activity, which ranged from 2 to 50,000 Bq/g; **(ii) environmental mapping:** geology, topography, hydrography and demography. A cartographic base was created using digital georeferenced maps from cartographic data from the Ministry of Mines and Energy, the National Water Agency and the Brazilian Institute of Geography and Statistics; **(iii) environmental radiological monitoring:** sampling campaigns of soil, water, sediment and survey of the external exposure rate ($\mu\text{Sv/h}$). So far, environmental monitoring has been carried out at 15 facilities. Activity concentrations of a radionuclide in amounts of water ranging from 0.02 to 5 Bq/l, in amounts of soil from 100 to 500 Bq/Kg and sediment from 200 to 4,000 Bq/kg were observed. The rate of external exposure in these 15 facilities ranges from 0.9 to 15 $\mu\text{Sv/h}$. The work allowed an overview of the Brazilian NORMs to be carried out, directing them as regulatory activities and proposing a data management model in the Geographic Information System. The work had financial support from CNEN and the National Council for Scientific and Technological Development - CNPq.

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