

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

VIRTUAL EVENT

International Conference on

**Management of Naturally Occurring Radioactive Material (NORM) in Industry**

19–30 October 2020

#NORM2020



Contribution ID: 194

Type: **Poster**

## MINIMIZING THE RISK TO THE BIOTA BY REUSING A NORM RESIDUE

Phosphogypsum (PG) is classified as a Naturally Occurring Radioactive Material (NORM) residue of the phosphate fertilizer industry; one possible application of this residue is in agriculture, as a soil conditioner. Several studies showed that the application of PG can result in an increase of agriculture productivity. However, PG presents in its composition radionuclides of the natural U and Th decay series. The main phosphate industries in Brazil are responsible for the annual production of 12 million tons of PG, which is stored in stacks, posing environmental risks.

The aim of this study is to apply the ERICA Tool to compare the risk to the terrestrial and aquatic biota arising from the storage of PG in stacks and from its use as soil amendment.

For this purpose, an experiment was performed in the laboratory, in which PG and typical Brazilian soils (sandy and clay soil) amended with PG were leached with distilled water.

The concentration of natural radionuclides ( $^{238}\text{U}$ ,  $^{226}\text{Ra}$ ,  $^{210}\text{Pb}$ ,  $^{210}\text{Po}$ ,  $^{232}\text{Th}$  and  $^{228}\text{Ra}$ ) in PG, soil amended with PG and in the leachate were used to evaluate the risk to the terrestrial and aquatic biota, using the ERICA Tool.

The results for terrestrial biota exposed to soil amended with PG showed a risk reduction of about 90%, when compared with the exposure of PG from stacks. Considering the aquatic biota, the results showed a risk reduction of about 50% when comparing the radionuclides concentration in the leachates of PG and of the soils amended with PG.

Finally, it can be concluded that the addition of PG in soils reduces the risk coefficient arising from the exposure of terrestrial and aquatic biota, showing that this is a safe practice. Furthermore, this practice reduces the amount of PG disposed in stacks. The reuse of NORM residue has an important role for a sustainable development and is considered as one of the Sustainable Development Goals of United Nations.

**Primary authors:** Dr NISTI, Marcelo Bessa (Instituto de Pesquisas Energeticas e Nucleares); Dr CAVALCANTE, Fernanda (Instituto de Pesquisas Energeticas e Nucleares); Dr SAUEIA, Catia Rosignoli (Instituto de Pesquisas Energeticas e Nucleares); Dr MAZZILLI, Barbara Paci (Instituto de Pesquisas Energeticas e Nucleares)

**Presenter:** Dr MAZZILLI, Barbara Paci (Instituto de Pesquisas Energeticas e Nucleares)

**Session Classification:** Session VI - Solutions for Residue and Waste Management

**Track Classification:** NORM Residue and Waste Management