

**LONG-TERM TEMPORAL EVOLUTION OF THE RADIOACTIVE IMPACT
CAUSED BY A SPANISH PHOSPHATE INDUSTRY
IN THEIR NEIGHBOURING ENVIRONMENT**

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In the south-West of Spain, just in the estuary formed by the mouths of the Tinto and Odiel rivers, it has been in operation for more than 40 years (1968-2010) a factory with several plants devoted to the production of phosphoric acid. The phosphoric acid was produced in these plants by the so-called wet acid method using mainly Moroccan sedimentary phosphate rock as a raw material. This raw material contains high levels (around 1500 Bq/kg) of the radionuclides from the uranium series, in secular equilibrium.

Through the application of the wet-acid method, and together with the phosphoric acid, a by-product called phosphogypsum is generated, containing 90% of the ^{226}Ra and ^{210}Pb originally present in the raw material as well as lower amounts of U-isotopes and ^{230}Th . This by-product, due to the lack of market, has been managed historically in two different ways: a) During the first 30 years of operation, 20% of the production was released directly to the estuary, while the remaining 80 % was transported in suspension with sea water to a salt-marsh area close to the factory where was deposited by decantation in big piles while the transporting waters drained to the estuary , and b) Since 1968, 100% of the phosphogypsum has been transported to the same area in suspension with fresh water for its storage in a big pile, but following the waters a closed circuit that reduce drastically their interaction with the estuary.

The followed PG management policy caused during the first 30 years of operation a clear radioactive impact in the neighbouring environment, that decreased dramatically in the last decade due to the changes introduced in its management.. The temporal evolution of the radioactive contamination in the estuary has been historically evaluated by the research group presenting this communication by performing several sampling campaigns of waters, sediments, and biota in the estuary which started in the 1980's and were periodically done until the 2010's.

In this communication, a compilation of the results and conclusions derived from this long-term radioactive contamination will be presented and discussed.

***On behalf of the Applied Nuclear Physics Group, University of Sevilla**