



## Radioactive influence of some phosphogypsum piles located at the SW Spain in their surrounding soils and salt-marshes

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In the SW of Spain, just in the confluence of the mouths of the Tinto and Odiel River and in the vicinity of Huelva town, there is a big industrial complex which includes between others an industry devoted during more than 40 years to the production of phosphoric acid, by treating sedimentary phosphate rock by the so-called "wet acid method". As a by-product of the mentioned process it have been produced historically huge amounts of a compound called phosphogypsum, which composition is mostly di-hydrate calcium sulphate containing some of the impurities of heavy metals and natural radionuclides originally present in the raw material.

Due to the lack of market for this by-product, it has been mostly piled over some salt-marshes located in the vicinity of the industry, on the bank of the Tinto River. About 100 million tons of phosphogypsum have been piled in an area covering more than 1000 hectares, constituting a clear environmental and radiological anomaly in the zone.

The phosphogypsum piles set do not conform obviously a close system. They are interacting with the nearby environment mostly by leaching waters releases from the waters accumulated in them either for its previous use in transporting in suspension the PG from the factory or by rainfall. These waters leaks contain in solution enhanced amounts of heavy metals and radionuclides that can provoke the chemical and radioactive contamination in surroundings soil and salt-marshes areas.

In this communication the radioactive influence by the phosphogypsum piles in the surrounding terrestrial environment is evaluated. This contamination is mostly due to radionuclides belonging to the uranium series, which are present originally in the raw material treated in the industry, and afterwards in the generated phosphogypsum, in enhanced amounts in relation to typical soils. In addition, the different dynamics and behavior of different radionuclides will be discussed and analyzed. The gained information in this study can be considered as an essential step for the proper design of a regeneration and restoration program of the area, now under development.