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Natural radionuclides in acid mining drainage waters after a not controlled discharge from a pit lake in the south of Spain

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The Iberian Pyrite Belt (South of Spain) is plenty of acid pit lakes as a result of former mining. These pit lakes are leaching some limited amounts of acid water into their close environment: acid mining drainages (AMD). But in 2017, an accident occurred in an abandoned mine called "La Zarza" and from the associated pit lake approximately 250,000 m³ of acid water were discharged into a small tributary of the Odiel River. Policy makers decided the immediate application of countermeasures to decrease the impact of the release, being the main one to increase the pH of water affected by AMD. With this end, the water discharged from the pit lake was halted and amounts of calcareous rocks were fallen into the AMD in some zones.

In this work, Uranium and Thorium concentration were determined in waters collected immediately after the accident in the small tributary affected by the discharge and in the Odiel River, and the obtained results are presented and discussed. In the case of the Odiel River, the results corresponding to the samples collected after the accident are compared to previous levels observed under normal conditions.

Although the Uranium and Thorium concentrations are clearly elevated in the AMD, an irregular distribution, related to the presence of calcareous rocks in some zones (discharged as main countermeasure against the low pH of water) were observed in the small tributary. On the other hand, no differences of levels in the Odiel River, comparing previous levels and levels at the moment of accident are observed. Consequently, a positive effect of countermeasures (stopping the discharges and the use of calcareous rocks) can be inferred.

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