CONTAMINATION OF THE GUADIAMAR RIVER AQUIFER AFTER THE AZNALCÓLLAR MINE ACCIDENT, SW SPAIN

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The fault of a mine tailing dam in Aznalcóllar (Sevilla, SW Spain) in April 1998 flooded some 4,000 ha of the Guadiamar river flat and farmland with sulphide slurry. The metallic mud settled along a 35 km long and narrow strip of river valley, invading a significant number of open farm wells. To the end of the river valley some 2 ? 106 m3 of highly metal polluted water with colloid size particles was retained during two months at the border of the Doñana National Park marshes. After the settling of the particles this water was in situ treated and evacuated to the sea (Atlantic Ocean) afterwards. Groundwater sampling and analyses started inmediatly after the accident to determine the alluvial aquifer pollution extent. However, only the overflooded wells along the Guadiamar valley showed up contamination mainly with Zn, Mn, Fe, Co, Ni, Cd, As,Tl, and SO4=. None of the non-flooded wells showed contamination. Groundwater monitoring has been periodically carried out up to the present, including several boreholes drilled after the accident both by the Water Authority and by the mine owner, Boliden-Apirsa. One and a half year after the accident, the wells initially contaminated have been cleaned and maintain a good quality, while none of the other wells show a groundwater deterioration. However, by January 1999 the new boreholes showed that the alluvial aquifer is contaminated by the set of metals characteristic of the mine in a narrow and elongated sector of some 3 km downflow the dam. Up to now it is not clear if the plume is a consequence of the 1999 accident or if it existed before. Environmental isotopes doesn’t help to discriminate, because the aquifer is thin (25 m) and has been traditionally used as an one-season reservoir for irrigation during spring. Work going on includes the construction of an experimental geochemical barrier just downflow to the contamination plume.