Geophysical Research Abstracts
Vol. 13, EGU2011-3524-1, 2011
EGU General Assembly 2011

Presence of Pharmaceuticals, Personal Care Products, and priority substances (2008/105EU) in groundwater (Llobregat delta, Barcelona, Spain)

Yoar Cabeza, Lucila Candela, Gloria Teijón, and Karim Tamoh

Department of Geotechnical Engineering and Geoscience, Technical University of Catalonia- UPC, Barcelona, Spain (lucila.candela@upc.edu)

Presence of 166 pharmaceuticals, personal care products, priority substances according to the 2008/105EU Directive and four metals (Cd, Ni, Hg, Pb) were investigated at the Llobregat delta, (Barcelona, Spain). In the monitoring waters from a tertiary wastewater treatment plant with an additional treatment of ultrafiltration, reverse osmosis and UV disinfection (WWATP) and groundwater were sampled. Treated wastewater was injected in the aquifer through four wells for the development of a hydraulic barrier against seawater intrusion through four wells (P1 to P4). Over a time period of three years, first phase of the hydraulic barrier (2007-2010), occurrence and concentration of microcontaminants in the injected WWTAP water and aquifer has been investigated in order to obtain: representative results; to get an overall view of the specific compounds being detected in the aquifer media, and their concentration levels.

A total of 92 out of 170 target active compounds were identified at detectable concentration in sampled water at least once. It is important to notice that 34 chemicals, among them Codeine (analgesic), Ibuprofen (anti-inflammatory), Iopamidol and Iopromide (organic iodine applied as contrast agent) and Paraxanthine (metabolite of caffeine), were not detected in WWATP water currently being injected in the aquifer for the hydraulic barrier system. Chemicals present in groundwater maybe related to aquifer natural recharge probably receiving a mixture of river water and untreated wastewater.

The analytes present both in WWATP and monitoring wells distant less than 1 km from the barrier, were detected in the closest wells (2) to the injection barrier. Its presence was also favoured by the high transmissivity values of the aquifer at this location. The monitoring well located 4 m distant from injection well showed similar WWATP concentration values, and a lower concentration is observed in wells distant from the injection points. In the aquifer media pH and Eh values indicate that neutral and oxidic conditions prevail and only TOC reduction is observed in three of the monitoring wells. All compounds detected in groundwater samples exhibit a great variability of concentration, being greater than 0.1μg/L for Hydrochlorothiazine (diuretic), N-acetyl-4-amino-antipyrine metabolite of Metamizol) and BHT (antioxidant). However, concentrations were in the range of ng/L. To determine the mobility of detected compounds in ground water studies addressing its persistence and transport in the aquifer media are being carried out to assess fate and distribution in monitored wells.