Geophysical Research Abstracts
Vol. 16, EGU2014-9385, 2014
EGU General Assembly 2014

Mineral Adsorbents for Removal of Metals in Urban Runoff

Karin Bjorklund (1) and Loretta Li (2)

(1) Department of Civil Engineering, University of British Columbia, Vancouver, Canada; Department of Civil and Environmental Engineering, Chalmers University of Technology, Gothenburg, Sweden (karin@civil.ubc.ca), (2) Department of Civil Engineering, University of British Columbia, Vancouver, Canada (lli@civil.ubc.ca)

The aim of this research was to determine the capacity of four different soil minerals to adsorb metals frequently detected in urban runoff. These are low-cost, natural and commercially available soil minerals.

Contaminated surface runoff from urban areas is a major cause of concern for water quality and aquatic ecosystems worldwide. Pollution in urban areas is generated by a wide array of non-point sources, including vehicular transportation and building materials. Some of the most frequently detected pollutants in urban runoff are metals. Exhaust gases, tire wear and brake linings are major sources of such metals as Pb, Zn and Cu, while impregnated wood, plastics and galvanized surfaces may release As, Cd, Cr and Zn. Many metals have toxic effects on aquatic plants and animals, depending on metal speciation and bioavailability. The removal efficiency of pollutants in stormwater depends on treatment practices and on the properties the pollutant. The distribution of metals in urban runoff has shown, for example, that Pb is predominantly particle-associated, whereas Zn and Cd are present mainly in dissolved form. Many metals are also attached to colloids, which may act as carriers for contaminants, thereby facilitating their transport through conventional water treatment processes. Filtration of stormwater is one of the most promising techniques for removal of particulates, colloidal and truly dissolved pollutants, provided that effective filtration and adsorption media are used. Filtration and infiltration are used in a wide array of stormwater treatment methods e.g. porous paving, infiltration drains and rain gardens.

Several soil minerals were investigated for their potential as stormwater filter materials. Laboratory batch tests were conducted to determine the adsorption capacity of these minerals. A synthetic stormwater was tested, with spiked concentrations corresponding to levels reported in urban runoff, ranging from 50–1,500 μg/L for Zn; 5–250 μg/L for Cu, 2–20 μg/L for Cd and 10–150 μg/L for Ni and Pb. Humic acids were used to imitate natural stormwater contaminated with natural organic matter. The adsorption kinetics was also investigated through a sequence (10–120 min) of batch tests. By studying the capacity of a range of sorbents in batch tests under identical conditions, the most promising sorbent can be identified. The research is ongoing. Preliminary results will be presented.