Geophysical Research Abstracts
Vol. 16, EGU2014-11515, 2014
EGU General Assembly 2014

Microbial leaching of toxic metals and arsenic from a heap consisting of heavily polluted soil

Stoyan Groudev, Plamen Georgiev, Irena Spasova, and Marina Nicolova
Bulgaria (groudev@mgu.bg)

Soil heavily polluted with toxic heavy metals (mainly Cu, Zn, Cd) and arsenic was subjected to microbial cleanup in a heap specially constructed for this purpose. The heap was located on an impermeable geomembrane, had the shape of a truncated pyramid and contained about 240 tons of soil collected mainly from the horizon A. The soil was highly acidic (with an initial pH of about 3.2) and was preliminarily crushed to minus 2.5 cm particle size. The pollutants were present mainly as the relevant sulphide minerals and the soil was inhabited by different microorganisms, including some acidophilic chemolithotrophic bacteria able to oxidize sulphides and to solubilize the relevant toxic elements. The heap possessed systems for irrigation and aeration and was surrounded by ditches to collect the drainage heap effluents containing the dissolved pollutants. The treatment of the soil was carried out by means of interrupted irrigation with leach solutions containing diluted sulphuric acid (to maintain pH in the heap within the range of about 2.5 – 2.8) and ammonium and phosphate ions to maintain the microbial growth. The treatment was carried out for a period of about two years during different climatic seasons. After the end of leaching the soil was subjected to some conventional melioration procedures such as liming, grassing, moulching, addition of fertilizers and animal manure and periodic ploughing and irrigation to increase its quality to levels suitable for agricultural utilization.