4rth Int. Disposal Conf.,
Katrinaholm, Sweden, 2006.

SIMULTANEOUS DESORPTION OF EXPLOSIVES AND LEAD FROM CONTAMINATED SOIL: BENCH-SCALE SOIL WASHING AND BIOREMEDIATION

K. Elgh-Dalgren & P. van Hees
MTM Research Center, Örebro University, Örebro, Sweden.

ABSTRACT

Explosives, such as TNT, 2,4-DNT, RDX and HMX, and heavy metals, such as lead (Pb), are often found on old military sites. The simultaneous presence of both organic and inorganic pollutants, so called mixed contaminants, causes great problems for the remediation process since the different contaminants possess diverse chemical properties.

This survey aims to find new approaches to the remediation of mixed contaminants, whereby the desorption patterns of both organic and inorganic contaminants are studied simultaneously. Simulated soil washing and bench-scale bioremediation are the central constituents of the project. Soil washing is a technique where size separation, thereby minimizing the amount of soil needing further treatment, and mechanical washing, sometimes with the addition of specific washing solutions, are combined to fractionate and wash soil-particle surfaces. Bioremediation, utilizing microorganisms to degrade organic contaminants in the soil, is a technology which is both cost-efficient and easy to use.

Two different soils, containing high levels of explosives and lead, were collected at the open destruction area at Bofors Test Center (BTC). Following primary classification, the soils were washed in a simulated soil-washing process. To enhance the washing, pH-adjustment was used. Additionally, the effect of three different bioremediation technologies was evaluated in bench-scale surveys.

While both an increase and a decrease in pH had an effect on the explosives,. there was a larger effect from a pH-increase. During the pH 12 washing, OH^- ions were consumed, indicated through a decrease in solution pH, at the same time as the solution was colored red, which may imply the degradation of TNT.

Results from the bioremediation study indicate that this technique can be applicable on explosives-contaminated soil. The concentration of explosives decreased in all three studied applications of bioremediation. Further on, the microorganisms seemed to affect the binding of lead to the soils.