ASSESSMENT OF IMPACT OF OIL SHALE WASTES IN TERRESTRIAL ENVIRONMENT: CURRENT CONCEPTS, PROBLEMS AND PERSPECTIVES

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Proper management of large volumes of oil shale solid wastes (OSW) deposited in environment requires reliable chemical data as well as toxicity tests for hazard identification. Usually the environmental impact of any pollutant is related to their availability for transport and bio-uptake, rather then their total concentrations in the soil or waste material. Thus, it is important to know which compounds could be released to the environment and understand the processes involved. This study focused on the leaching behavior of OSW in laboratory as well as in field conditions with special emphases to the reliability of system to the toxicity testing and existing legislation.

OSW contain a number of critical substances which concentrations in leachate should be considered. In present laboratory setting EU compliance one-step batch-leaching test was applied for OSW samples by using two-step mode at the materials own pH-value. Results demonstrated the considerable difference in the properties and composition of first and second elutes. Thus, this compliance test seems to be not representative enough for hazard identification of organic as well as mineral pollutants in an OSW technogenic matrix. By monitoring of OSW in the field, the new type of lysimeters, which do not disturb the surface, were used. It was revealed that laboratory tests might underestimate leaching in situ conditions. The reason is that the fundamental chemical reactions greatly affect trace elements and organic pollutants availability in terrestrial system. Hence, the trace element interaction with soil components is highly pH dependent process. Due to the high content of CaO in any OSW, the corresponding leachates are always very alkaline. The toxicity of trace metals in solute is depending on their speciation, which in turn is pH dependent.

Consequently, the various kinds of leaching tests have to be approved to the material before the use due to certain limitations as prediction tools and medias for toxicity tests. Material-specific environmental standards should be introduced. Only based on this information is possible to characterize the hazard of waste/contaminated soil in site-specific conditions, transport and long-term changes in the utilization/disposal conditions. Creation of an environmental legislation to promote recycling of OSW is also needed, but it is a long way to go.