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ECOTOXICITY OF FOAMING AGENT CONDITIONED SOILS TESTED ON TWO TERRESTRIAL ORGANISMS

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Abstract

Huge amounts of soil debris are produced during the underground excavation with Earth Pressure Balance-Tunnel Boring Machines (EPB-TBM). Soil debris may contain residual concentrations of the anionic surfactant sodium lauryl ether sulphate (SLES), the main component in some foaming agents used as excavation additives. The reuse of this debris or its discharge as waste is a critical environmental question in construction engineering. There are only few studies on ecotoxicological effects on soil debris coming from a real excavation site.

The aim of this study was to evaluate the ecotoxicity of two deep soils, with different lithological compositions, conditioned with three foaming agents. In some cases, lime was added to the soil. The soils were placed in mesocosms (1 m³) to simulate the temporary storage of the soil debris at a construction site. At fixed times, soil sub-samples were collected and ecotoxicological tests on terrestrial organisms (*Lepidium sativum*, *Eisenia foetida*) and an assessment of SLES concentration were performed with soils and aqueous elutriates produced from them. Results showed that at day 28, a SLES reduction was observed in both the soil and aqueous elutriates, with various rates of decrease. The differences were due to different soil lithological compositions and foaming agent products composition. In general, the two soils were not suitable for both plant growth and earthworm reproduction, but in Soil 1 the earthworm mortality was very low, except when lime was added. Tests with soil elutriates showed that 7 days after conditioning no toxic effect was found for the organisms tested.

Key words: anionic surfactants, cress, earthworms, mechanized tunnelling

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