



## SOIL-FLUSHING WITH REUSED FLUIDS

Type of product	Treatment technology for contaminated soils, availability
Target group	Scientific community, European policy makers, companies
Availability	Timbre website, UFC website, scientific journals

**Background:** Soil-flushing is a high potential in-situ technology with minimal site disturbance, able to adapt easily to target contaminants by using additives that help for their removal. The spreading of chemicals within the soil and their optimal use (and reuse when feasible) are critical points to achieve effective remediation at low costs.

**Purpose:** Chemicals, vectors and separation tools are considered to both improve contaminant removal and reuse of flushing fluids as well as to provide added-value for the treatment of concentrated wastes.

**Approach:** Depending on soil porosity, nature and concentrations of contaminants, flushing uses foams or aqueous solutions. Highly effective, autonomous and stable separation technologies are applied in the field for both the removal of contaminants and the reuse of active agents from soil leachates.

**Findings and implications:** Nano and ultra-filtration are stable, highly mobile and cost-effective membrane technologies fitting the on-site management and reuse of soil-flushing wastewater of hydrocarbon-contaminated soils. They warrant high recovery of active substances (oxidant, surfactant) and high removal of contaminants. The technology is compatible with in-situ re-injection, encouraging for the reuse of treatment fluids.

For hydrocarbon-contaminated porous soils, the use of surfactant foams injected at low pressure allows a simultaneous and efficient extraction of VOC and SVOC contaminants, acting as a combination of venting and flushing. This allows a substantial reduction of wastewater amounts to manage. Chelating agents for metal extraction were found to be highly and easily recovered, and they can be reused several times with high yields using iron-based beds through redox or precipitation reactions.

**Practical and social applications:** The method allows intensive remediation at reduced costs while saving water and reagents and avoiding the transportation of high volumes of waste.



Soil before and after their treatment

Membranes treatments

UF & surfactant  
recovery

NF & oxidant  
recovery

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