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10. Resource recovery and reduction of oily hazardous wastes via biosurfactant washing and bioremediation

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Abstract. Physico-chemical washing of oil-contaminated soils with biosurfactant offers a novel pre-treatment method which could potentially enhance subsequent bioremediation. Although literature reviews and our pilot studies using artificially oil "spiked" soils under a similar washing regime had indicated that oil would be released during soil-washing, it was soon apparent that this was not the case for weathered, oil-contaminated waste soils where virtually no oil released into solution occurred. Furthermore, we frequently detected an apparent increase in soil hydrocarbon contamination levels in analysis after washing. This was demonstrated to be partly an artefact of the smaller grain size fraction used for the standard analytical protocol (<2 mm), compared to that used in the standard washing protocol (<4 mm). The apparent increased contamination in the former resulted from the efficient transfer of oil contamination from the coarser particles (i.e. 2-4 mm) to the clay component during soil-washing. We concluded that the envisaged combination of biosurfactant and low intensity soil-washing was unlikely to remove oil from soils or other oily hazardous wastes due to the potent transfer of contaminants to the fine-grain fraction which is inherent in most conventional soil-washing processes. Biosurfactants however can potentially offer technically and economically competitive alternatives to chemical surfactants derived from fossil fuels.

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