



Recent advancement in enhanced soil flushing for remediation of petroleum hydrocarbon-contaminated soil: a state-of-the-art review

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Received: 4 March 2023 / Accepted: 8 May 2023 / Published online: 29 May 2023
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Abstract Remediation of persistent organic pollutants in soil especially total petroleum hydrocarbon (TPH) is of global concern due to its toxicity and health implications. Soil flushing has been considered a promising technique among in-situ technologies for treating non-volatile TPH-contaminated soils because it weakens the interaction between hydrocarbons and soil particles to enhance pollutant mobilization efficiency. It is still challenging to optimize the soil flushing treatment because the overall efficacy significantly depends on the environmental characteristics of the subsurface. Advanced soil flushing strategies (e.g., integrating with oxidation, air sparging, and nanoparticles) and novel flushing

solutions are discussed to overcome the limitations of the existing process during the remediation of soil systems contaminated with recalcitrant TPH. The flushed-out toxic chemicals comprise a large amount of waste solution, creating another pollutant. The present review summarizes the enhanced soil flushing techniques, and critically discusses their advantages and disadvantages, and addresses follow-up remediation of the generated wash solution containing toxic substances for its safe discharge. Fundamental information on soil flushing is discussed to overcome the challenges encountered during field application such as poor efficiency, high operating cost, and a large amount of generated secondary wastewater.

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