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Strategies for Cost-effective Remediation of Oil-contaminated Soils in the Oil Lake Areas of Kuwait, an Environmental Legacy of the Gulf War

The 1991 Gulf War resulted in widespread oil spill in Kuwait. Large areas of low-lying desert lands were covered by a layer of spilled oil to form oil lakes. Part of the standing oil migrated downwards to contaminate the underlying soil layer to a varying depth, depending on soil permeability. The level of soil contamination varies both horizontally and vertically. This requires multiple management and remediation strategies to be developed and implemented in an integrated way in order to achieve acceptable contaminated land clean-up goals. For the contamination hotspots that still contain hydrocarbon species of high toxicity, active treatment methods need to be adopted to eliminate the source of high environmental risk. The cost-effectiveness of bioremediation may be limited due to generally harsh desert climate conditions (dry, high temperature and salinity), which disfavour the growth of hydrocarbon-degrading microbes. It seems that advanced oxidation treatment is among the most appropriate methods for remediation of the oil-contaminated soils in the area of concern. For the majority of contaminated soils that contain predominantly long-chain hydrocarbons that are of low mobility and water solubility, it is most unlikely that contamination of groundwater by the soil-borne petroleum hydrocarbons will take place under the current climatic conditions. However, human exposure to potentially toxic hydrocarbons through ingestion and inhalation is still likely. To minimize human exposure risk, any activities causing large-scale soil disturbance should be avoided. A simple, low-cost capping method should be sufficient for satisfactorily preventing human exposure to potentially toxic hydrocarbons from occurring. This could also allow long-term carbon storage in the capped contaminated soils, contributing to climate change mitigation.

Biography

Chuxia Lin is the chair and Professor of School of Environment and Life Science, University of Salford, United Kingdom. He obtained his PhD in Environmental Science from The University of New South Wales in 1995 (thesis was submitted for examination in 1994). Before joining University of Salford. He held senior academic positions at University of Southern Queensland and South China Agricultural University. Earlier academic appointments were with Southern Cross University, The University of New South Wales and South China Normal University. He also worked as a professional environmental consultant with a global consulting company (Brisbane Office, Golder Associates) during the period from 2005 to 2009.

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