

Using microbes for the quick clean up of dirty oil

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Microbiologists from the University of Essex, UK have used microbes to break down and remove toxic compounds from crude oil and tar sands. These acidic compounds persist in the environment, taking up to 10 years to break down. Mr Richard Johnson, presenting his PhD research to the Society for General Microbiology's meeting at Heriot-Watt University, Edinburgh, described how, by using mixed consortia of bacteria, they have achieved complete degradation of specific compounds in only a few days.

Tar sand deposits contain the world's largest supply of oil. With dwindling supplies of high quality light [crude oil](#), oil producers are looking towards alternative oil supplies such as heavy crude oils and super heavy crudes like tar sands. However, the process of oil extraction and subsequent refining produces high concentrations of toxic by-products. The most toxic of these are a mixture of compounds known as naphthenic acids that are resistant to breakdown and persist as pollutants in the water used to extract the oils and tar. This water is contained in large settling or tailing ponds. The number and size of these settling ponds containing lethal amounts of naphthenic acids are growing daily - it is estimated that there is around one billion m³ of contaminated water in Athabasca, Canada, alone - and is still increasing. The safe exploitation of tar sand deposits depends on finding methods to clean up these pollutants.

"The chemical structures of the naphthenic acids we tested varied," said Mr Johnson, "Some had more side branches in their structure than

others. The microbes could completely break down the varieties with few branches very quickly; however, other more complex naphthenic acids did not break down completely, with the breakdown products still present. We are now piecing together the degradation pathways involved which will allow us to develop more effective bioremediation approaches for removing naphthenic acids from the environment."

Source: Society for General Microbiology

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