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Title: Characterization and Membrane Bioreactor Treatment of Oily Water Pollution

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Category: Environment

Water pollution is the discharge of contaminants into water at concentrations that can have adverse effects on human health, aquatic organisms and the environment. Oil pollution is one of the most common point and non-point source of water pollution, which mainly is present as an oil-water emulsion. Petroleum oil is a complex mixture of aliphatic and aromatic hydrocarbons, for example, n-alkanes, biomarkers and polycyclic aromatic hydrocarbons (PAHs). Chemical analysis of alkanes and biomarkers generates information of great importance to environmental forensic investigations. PAHs are among the most common petrogenic hydrocarbon pollutants. Many of these compounds have been confirmed or suspected to be carcinogenic, mutagenic and teratogenic in nature. High levels of exposure can be detrimental to human and animal health, which necessitates an environmentally friendly treatment method for these pollutants.

This research is divided into two phases. In Phase 1, oil-contaminated water, collected from the coastal Nova Scotia, will be characterized. Biomarkers, n-alkanes and PAHs will be extracted by solid phase extraction and analyzed by GC/MS. Fish and sediment samples will also be analyzed for these targets. In Phase 2, petrogenic hydrocarbons in water will be treated using membrane bioreactor technology to produce simpler, less toxic molecules. Hydrocarbons will be introduced to simulated wastewater and monitored using GC/MS analysis. Effluent water quality will be determined by spectrophotometric testing including chemical oxygen demand. Dissolved oxygen and pH will be optimized for the bacterial consortium. Our aim is to develop a method to decontaminate oil-laden water for safe discharge.