Distinguishing Natural vs Petroleum F3 Hydrocarbons in Oil Spill Impacted Muskeg Material

George Dixon, University of Waterloo
GL905251

Canada is rich in petroleum resources as demonstrated by the thousands of kilometers of pipelines in existence today. New technologies and routine monitoring can detect oil spills within days or weeks of the occurrence. In the case of older pipelines, historic spills may not be detected until pipeline retirement and removal procedures have begun. In each case, the impacted soils must be remediated in accordance with environmental regulations. The reduction of Total Petroleum Hydrocarbon (TPH) concentrations is a key component of oil spill remediation plans.

Current CCME Total Petroleum Hydrocarbon Analytical Protocols assume that all detectable hydrocarbons originate from petroleum sources (see Figure 1). In reality however, hydrocarbons can originate from ancient petroleum deposits as well as from newly biosynthesized plant and animal materials (Ref 1, 2, 4). Petrogenic (petroleum) hydrocarbons (PHCs) are

produced over millions of years and are found in a variety of sources such as crude oil, gasoline, diesel, etc. In contrast, biogenic hydrocarbons (BHCs) are naturally biosynthesized during the life cycles of living organisms such as plants, insects, fish, birds and animals. Biogenic hydrocarbons naturally exist in a wide variety of mediums such as plant waxes, animal wastes, sewage sludge, etc.

Contaminated organically rich soils such as those found in muskegs, could routinely recover BHCs as well as PHCs. The natural background BHCs would falsely elevate the TPH concentrations under the current CCME TPH analytical protocols. This could create false exceedences of regulatory criteria, resulting in unnecessary and costly soil remediation/disposal requirements, in addition to unnecessary environmental disturbances.

2007 UofWaterloo_Natural vs F3 in Oil Spill Impacted Muskeg Project Scope
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