

Toxicity of Weathered Petroleum Hydrocarbons Fraction 3 in Field Subarctic Soils to Soil Invertebrates

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A challenge often faced by contaminated site managers when remediating weathered heavy petroleum hydrocarbons (PHCs) in the fraction (F) 3 range (C₁₆ to C₃₄) is the inability to meet guidelines. Within Canada, the guidelines for the heavy molecular weight PHCs are typically limited by the ecological direct soil contact pathway, protective of soil dwelling organisms like plants and soil invertebrates. A common barrier encountered in remediating weathered soils to PHC F3 guidelines is attributed to guidelines that are overly conservative based on toxicity testing of unweathered soils spiked with contamination.

To evaluate weathered PHC F3 impacted field soils, a research program was established more than 10 years ago to assess the toxicity of residual PHC F3 contamination in field soils of the subarctic. These soils were selected as bioremediation processes

were stalling at residual PHC F3 concentrations exceeding the federal guidelines. Initial findings of this research program were that toxicity was not observed for five varying native plants species grown in field soils with residual PHC F3 at concentrations higher than guidelines. The next stage of the research program has involved evaluating the response of soil invertebrates to the same PHC F3 contaminated field soils. The results of these soil invertebrate toxicity tests will be presented. Additionally, a discussion of how the research program may influence federal PHC guidelines will be provided.

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