



## Theme 1, Project 1.4

# Subsurface Flow Behavior of a Continuous Solute Release in a Sub-Arctic Bog

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## **Abstract**

Resource extraction and transportation activities in the Canadian Boreal zone can result in the unintentional release of contaminants in boreal peatlands. In the event of a release, a thorough understanding of flow within the variably saturated acrotelm is necessary to predict both the behaviour of the plume, and the potential impacts on the non-vascular moss species present. The implications of capillary action on the potential removal and release of solute in the unsaturated zone, and on the potential toxicity to surficial mosses, are currently unknown. The goal of this study is to better understand how bog peatland hydrology and peat structure control the nature and extent of solute transport in a variably saturated system. The objectives are to 1) determine the spatial and temporal evolution of a developing solute plume, and 2) to relate the physical structure of peat to the plume's dispersion throughout the peat profile. Relationships and results obtained from this experiment can be used to predict the subsurface flow behaviour of a real-world contaminant spill given information on the topography, vegetation community distribution and basic hydrology of the system.

**Keywords:** hydrology, contaminant transport, unsaturated flow, peatland

**Geographic Location:** De Beers Victor Diamond Mine, James Bay Lowlands, Ontario, Canada

## **How does your project link to Canadian aquatic ecosystem services?**

Peatlands, characteristic features of the Canadian Boreal zone, are important ecological systems which act as natural regulators of surface and groundwater flow quantity and quality. Understanding contaminant transport behaviour in peatlands is essential to mitigate the short term release of attenuated pollutants, as well as a long term decrease in surrounding water quality.