



# Sources of contaminants in the environment near the oil sands

## Context

Open-pit mining in the tar sands region of the lower Athabasca Valley in Alberta continues to raise questions about sources of contaminants and their potential effects on air and water quality, and the possible cumulative effects on water and land ecosystems.

Recent studies led by the Environmental Geoscience Program have shown that new isotopic approaches could potentially be very effective in drawing clear distinctions between natural emissions and anthropogenic emissions in air and water. This project contributes to developing attribution methodologies for the characterization of atmospheric (nitrogen oxide [NO<sub>x</sub>], polycyclic aromatic hydrocarbons [PAH]) and aqueous contaminants (naphthenic acids [NA], potentially toxic metals) by using sophisticated isotopic indicators. The indicators contribute to improved differentiation between sources of contamination in groundwater and rivers and to a better understanding of atmospheric contaminants in lacustrine and terrestrial environments.

## Expected outcome

- A better understanding of risks posed by continuous NO<sub>x</sub> emissions to the health of forests.
- New knowledge (process and data) of atmospheric loadings of nitrogen compounds caused by anthropogenic activities and by natural processes. This knowledge will help our main partners (Environment and Climate Change Canada and the Province of Alberta) to make projections about these loadings on air and water quality and on specific ecosystems (forests, rivers, estuaries).
- New supported series of indicators for identifying sources of PAHs in lakes and plants, NAs, and other potentially toxic metals in groundwater and surface water.
- A range of metal and organic isotopic characterizations that will help in tracing and better understanding diverse biological, geological and hydrochemical processes. The characterizations will also help determine the cumulative effects of industrial and natural contaminants in the targeted oil sands region.



## Partners

### Airborne - The nitrogen and nutrients cycle

Environment and Climate Change Canada – Air Quality Research Division (air, soils, trees)

Natural Resources Canada – Canadian Forest Service

Université du Québec à Montréal, Institut national de la recherche scientifique

### Sources of PAHs – Surface water and groundwater

Environment and Climate Change Canada – Water Quality Research Division

Carleton University

## Contact

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