

Graduate Student Positions in trace element cycling, uptake and toxicity (2 PhD; 1 MSc)

The SWAMP lab facility is seeking highly motivated students with excellent communication skills to undertake research related to trace element concentration and speciation in the dissolved (< 450 nm) and particulate fractions (> 450 nm) of surface waters, and in soils and soil solutions. Two PhD positions are available, in the following research areas: 1) Assessing the uptake of trace elements by aquatic and riparian plants, and associated relationships with concentration, size, and speciation, and; 2) Assessing the uptake of trace elements by invertebrates and fish, associated toxicity, and relationships with trace element concentrations, size and speciation. The MSc position will focus on the assessment of soil properties, including trace element concentrations and speciation, and the impacts of these soils on surface runoff. Soil solutions will also be collected and characterized using purpose-built lysimeters. This research will occur in the context of an experimental engineered landscape in the Athabasca Oil Sands Region that is designed to treat waste streams for return to natural waters.

The ideal candidates will have undergraduate training and graduate-level research experience in environmental geochemistry and ecotoxicology, with a strong background in analytical chemistry and an interest in colloidal systems. Experience with fieldwork, AF4, sequential extraction, micro-scale particle size characterization and ICP-MS are also assets.

The SWAMP (Soil, Water, Air, Manure, and Plants) lab facility is a world class, metal-free analytical facility in the Department of Renewable Resources at the University of Alberta, which is purpose-built to routinely conduct measurements at trace end ultra-trace concentration (<https://swamp.ualberta.ca/>). The SWAMP also performs the routine size-based separation of dissolved trace elements into distinct colloidal species using asymmetrical flow field-flow fractionation (AF4), with online multi-element characterization using an iCAP-Qc quadrupole ICP-MS. Absorbance and fluorescence detectors are coupled to the AF4 system for the characterization of dissolved organic matter. A G-SPLITT fractionation system is also available to isolate and characterize the size distribution of particles > 2 μm . Access to SEM and TEM imaging with EDS/X to characterize elemental composition at the micro/nanoscale is also available. Other key laboratory equipment includes a high-pressure microwave for digesting solid samples, and a sub-boiling acid still. Benefits of undertaking PhD research in the SWAMP include supervision and training by experts in the areas of ultraclean sampling and analysis methods, geochemistry, micro- and nanoscale size characterization, and AF4-ICPMS.

To apply for one or more of these positions, please send a letter of application, CV, and the names of two references to Ms. Tracy Gartner (tgartner@ualberta.ca) or Dr. Chad W. Cuss (cuss@ualberta.ca).

Renewable Resources