



A UNIQUE PARTNERSHIP, REAL, SUSTAINABLE SOLUTIONS

Postdoctoral fellow – Mining geotechnique in cold regions

Hydrogeotechnical behavior of filtered tailings storage facilities located in cold regions

Duration and location

2 years – Université du Québec en Abitibi-Témiscamingue (UQAT), Rouyn-Noranda, Québec

Project start

As soon as possible

Research fields

Mining geotechnique, geotechnical engineering in cold regions

Research supervision

Thomas Pabst (Polytechnique Montreal) and Vincent Boulanger-Martel (UQAT) assisted by a team of specialized professors and professionals.

General project description

An increasing number of mining projects are being developed in northern Canada, particularly in Québec, where the hydro-geotechnical challenges associated with the storage of mine tailings are numerous and different than in more temperate regions. In order to reduce the risks associated with the physical stability of tailings storage facilities, it is proposed to reduce their water content before their deposition through filtration. However, processes associated with the tailings' placement (e.g. method of compaction, freezing of tailings before compaction, excess of water or snow) and the nature of the geological foundations (i.e. permafrost) mean that filtered tailings storage facilities are heterogeneous structures in terms of density and distribution of water and ice. Several mechanisms, such as thaw settlement, thaw consolidation and creep can cause of significant deformation over time. Generally, the conditions of the infrastructure and permafrost (more specifically, the type and distribution of ice) govern the settlement potential and stability of the structure. However, the contribution of each of these mechanisms and the influence of key parameters with respect to filtered tailings storage facilities are not well known. This project seeks to improve the management and deposition of filtered mine tailings in northern conditions and adapt the design of reclamation approaches to field conditions by better understanding these processes.

Specific objectives

The main objective of this project is to evaluate the hydrogeotechnical behavior of the filtered tailings storage facility at Raglan mine using laboratory tests and field measurements.

Specifically, this project seeks to:

1. Characterize the physical, hydrogeological, thermal, and geomechanical properties of frozen and unfrozen filtered tailings in the laboratory. These characterizations will be used to determine the thermal conductivity, ice segregation potential, and shear strength in the frozen and unfrozen states, as well as to assess the creep behavior of the frozen tailings.
2. Adapt existing testing methods for characterizing the geomechanical properties of tailings at different temperatures and for frozen conditions.
3. Quantify the magnitude and evolution over time of deformation at the surface of the filtered tailings storage facility using digital elevation models (LiDAR and photogrammetric survey), satellite surveys (InSAR) and various auscultation instruments installed at selected representative and critical areas of the filtered tailings storage facility.

The candidate will also have to support the supervision of doctoral and master's students attached to the project.

Salary

\$60,000/year.

Candidate profile

Doctoral degree in mining, geological, or civil engineering, or any other relevant field.

Demonstrate autonomy and have good teamwork skills.

The candidate will periodically visit the Raglan Mine site, located in Nunavik, Nord-du-Québec to carry out field work.

Documents required

Curriculum vitae, motivation letter, university transcripts, and two references.

Only the candidates selected for an interview will be contacted.

For more information or to apply:

Thomas Pabst, Ph.D.
Professor, Polytechnique Montréal
Tel.: (514) 304-4711, ext. 4731
Email: t.pabst@polymtl.ca

Vincent Boulanger-Martel, Ph.D.
Professor, UQAT
Tel.: (819) 762-0971, ext. 2740
Email: vincent.boulanger-martel2@uqat.ca

<http://www.irme.ca>

<http://www.polymtl.ca>

<http://www.uqat.ca>