



**POLYTECHNIQUE  
MONTRÉAL**

WORLD-CLASS  
ENGINEERING



## Doctoral and Masters Project Offers / Valorization of waste rocks on mining sites

RIME – Research Institute on Mines and Environment  
Polytechnique Montréal

---

- You are concerned with the environment and mine wastes management?
- You are interested in geotechnical engineering, hydrogeology or geochemistry?
- You are attracted by research projects with practical industrial applications?
- You wish to further your knowledge with an applied research project?

RIME-Polytechnique is presently looking for **Ph.D.** and **Masters candidates** in mineral engineering to work on several projects in mining environment, and in particular the valorization of waste rocks on mining sites. Short-term **internships** (4-6 months) are also available.

### Duration

Ph.D. project duration: 3 years.

Masters' project duration: 2 years.

### Location

Polytechnique Montreal.

### Beginning of project

Summer 2017, Autumn 2017 and Winter 2018.

### Project description

With the multiplication of low-grade hard rock mines and the substantial increase in the production of mine wastes, the industry has started to consider new management and disposal approaches. Waste rocks, in particular, represent a challenge due to their complex geotechnical and hydrogeological properties, linked to their coarse and heterogeneous grain size distribution. Increasing the use of waste rocks in various structures on production sites could be a practical solution to these problems.

The objective of this project is to assess some forms of valorization, including the use of waste rocks in roads designed for heavy machinery traffic, in cover systems and in waste rock inclusions in tailings ponds. The aim of this research is to define hydrogeotechnical criteria in order to select and use waste rock adequately to meet targeted performance objectives. Field and laboratory tests, as well as numerical simulations will be carried out. In addition to the thorough characterization of the geotechnical, hydrogeological and mechanical properties of waste rocks, original physical models will be used to study specific aspects of waste rock valorization. Complex numerical simulations which take into account the numerous parameters that can influence waste rock properties will be carried out. Operational constraints will be integrated in the assessment in order to propose realistic solutions



<http://www.irme.ca/en/>  
<http://www.polymtl.ca/en/>

and optimize the design and implementation of these structures according to material properties, field (especially climatic) conditions, and the usual stability and durability standards.

The project will be completed at Polytechnique Montréal, in collaboration with the Université du Québec en Abitibi-Témiscamingue (UQAT), and three partner mining companies of the RIME (IAMGold, Canadian Malartic Mine and Agnico Eagle Mines).

### **Research fields**

Mine wastes management, mining geotechnics, hydrogeology, geochemistry, and environment.

### **Thesis advisors**

Thomas Pabst (Polytechnique Montreal), with the collaboration of Michel Aubertin (Polytechnique Montreal), Bruno Bussière (UQAT), Li Li (Polytechnique Montreal), Michael James (Polytechnique Montreal), Mamert Mbonimpa (UQAT).

### **Candidate profile**

Ph.D.: Candidate must have a master's degree (or equivalent) in civil, mining or geological engineering, or any other relevant field.

Masters': Candidate must have a bachelors' (or equivalent) in civil, mining or geological engineering, or any other relevant field.

### **Scholarship**

Ph.D.: Research scholarship of 20,000\$/year (22,000\$/year after the pre-doctoral examination).

Masters': Research scholarship of 17,500\$/year.

### **Required documents**

Resume (CV), student transcripts, motivation letter and references.

### **Note:**

Field work is planned at the mining sites of the industrial partners in Abitibi.

### **For more info**

Thomas Pabst, Ph.D., Asst Prof.

Polytechnique Montréal, Department of civil, geological and mining engineering

P.O. Box 6079, stn. Centre-Ville, Montréal (QC), H3C 3A7, Canada

Ph. : 514-340-4711, ext. 4731 - Email : [t.pabst@polymtl.ca](mailto:t.pabst@polymtl.ca)

---

The Research Institute on Mines and the Environment (RIME) UQAT-Polytechnique supports research that favors the development of original and practical environmental solutions for the entire mine cycle

The RIME UQAT-Polytechnique offers:

- A multidisciplinary and dynamic research environment.
- Partnership with the mining industry.
- Access to several mining sites.
- Laboratories equipped with cutting edge technologies.
- A team of professors and researchers with world class expertise.