The Mine Arnaud open deposit is located in Sept-Iles in the province of Quebec, Canada. The project, which is currently under development, consists of igneous apatite ore grading around 5% $P_2O_5$. The target metallurgical performances are set to a concentrate of $P_2O_5$ grade of at least 39% with an overall $P_2O_5$ recovery above 90%. The beneficiation of the ore is achieved by grinding to the liberation size, magnetic separation to remove the titaniferous magnetite and phosphate flotation. Most of Mine Arnaud’s apatite beneficiation flowsheet development testwork was realized by COREM. The most recent work performed, at laboratory and pilot scale, has demonstrated that the target metallurgical performances could be attained using a flotation column only flowsheet composed of one rougher, one scavenger and one cleaner stages (Figure 1). The pilot scale testing was carried out at natural pH, and results show that the collector consumption could be reduced by approximately 50% when temperature was maintained above 20°C throughout the flotation circuit. Additional laboratory flotation tests also showed the potential of further reducing the collector consumption with an optimized frother addition. The presentation will focus on the flowsheet development and the pilot plant modifications in order to reach the client targeted concentrate while maintaining a low collector dosage.

**Figure 1. Mine Arnaud ore beneficiation flowsheet**