

USE OF PETROCHEMISTRY TO INFER TECTONIC ORIGIN OF GRANITOID ROCKS:  
A TEST CASE USING AECL'S CHEMICAL SAMPLES FROM THE  
ATIKOKAN AND WHITESHELL RESEARCH AREAS

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ABSTRACT

This report describes an attempt to use geochemical data; i.e., major, minor and rare earth elements (REE) from AECL's two granitic research areas to place the granitoid bodies into a tectonic environment using discrimination methods of Pearce et al. (1984). It first explored two methods: 1) using trace elements and REE in discrimination methods; and, 2) using major elements in discriminating granites by Agrawal's (1995) method. Secondly, it used chemical data sampled from the Atikokan and Whiteshell research areas to classify the granitic plutons into their tectonic environment using the two methods mentioned. Granitoids in the Atikokan and Whiteshell Research Areas, were found to overlap the boundaries of syn-collision granite, volcanic-arc granite and within-plate granite in the Pearce discrimination diagram system and to classify as syn-collision granite, post-collision uplift and late-orogenic granites in the de la Roche R1-R2 multicationic diagram system. Agrawal's method classified the granitoids as late- and post-orogenic. However when Agrawal's method was tested on rock samples already classified by another author, it only achieved 43% success. Given that our granite samples are from Archean terrain, it is possible that the overlaps are caused by contamination of the original rocks by processes such as partial melting, and fractionation of feldspars.