Application of portable X-ray fluorescence analyses to discriminate felsic units in the Mount Pleasant Fire Tower Zone W-Mo-Bi and North Zone Sn-Cu-Zn-In deposits, southwestern New Brunswick, Canada

WEI ZHANG, BRITTANY E. CHARNLEY, AND DAVID R. LENTZ

Department of Earth Sciences, University of New Brunswick, Fredericton, New Brunswick, E3B 5A3, Canada

<wei.z@unb.ca>

The Mount Pleasant polymetallic deposit is located along the southwestern margin of the Late Devonian Mount Pleasant Caldera Complex in southwestern New Brunswick. This caldera is bounded to the west and east by Silurian to Late Devonian metasedimentary rocks and to the south by the Late Silurian to Late Devonian Saint George Batholith. The northern section of the caldera is disconformably overlain by the Carboniferous Maritimes Basin. Mineralization zones at Mount Pleasant include the North Zone (NZ, Sn-Cu-Zn-In) and the Fire Tower Zone (FTZ, W-Mo-Bi). This study focuses on the surface exposures at both strongly altered mineralization zones, where rock units are difficult to be classified with confidence. Thus, the Olympus X-5000 portable X-ray fluorescence (pXRF) spectrometer was used to rapidly obtain the geochemical compositions of these rock units.

Ninety samples were cut in order to obtain a flat surface to facilitate pXRF analysis. Each sample was measured six times at different positions on the 8 mm window with each spot taking 280 seconds (integration time). A quartz blank and several standards were analyzed between each sample, in order to monitor the instrumental drift and obtain the correction factors for each element, respectively. The elements Ti, Zr, Nb, Y, and Th were selected to discriminate rock types, since these elements are relatively immobile during hydrothermal alteration. The relative standard deviation (RSD %) is 3% for Ti, and <7% for other elements. Consistency of the immobile element data obtained by pXRF and that by conventional lab methods shows the pXRF data is very reliable.

The Little Mount Pleasant Formation (LMPF) found in both zones is enriched in Ti (up to 7710 ppm), and has the lowest Zr/Ti, Nb/Ti, and Th/Ti ratios. The similar element ratios were also found in the LMPF fragments in breccia. The McDougall Brook Granitic Suite occurs in NZ has Th/Ti ratios of 0.01 to 0.1, which are higher than those of the LMPF (<0.01), and are lower than those of the Mount Pleasant Granites (MPG, >0.1). Although the similarity in composition of the MPG (I, II, and III) caused some difficulties in discriminating one rock unit from another, detailed field observations combined with the pXRF technology still could offer quick and precise information to discriminate these highly altered and brecciated rocks in both zones. Furthermore, with respect to mineralization, W, Sn, Bi, and Mo correlate strongest to the alteration indices like the Fe/K ratio.

Atlantic Geology, 2016, Volume 52
Atlantic Geoscience Society Abstracts 42nd Annual Colloquium & General Meeting 2016
doi: 10.4138/atlgeol.2016.004