Characterization of Felsic Rocks with Immobile Elements and Alteration Assemblages Associated with Mineralization (W-Mo-Bi-Sn-Cu) in the North Zone, Mount Pleasant, New Brunswick: Application of pXRF data

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Mount Pleasant, located in south-western NB, is part of a late Devonian sub-volcanic eruptive complex. The granitic intrusions associated with Mount Pleasant are the McDougall Brook and Mount Pleasant granitic suites. Mount Pleasant deposits are divided into two zones, the North Zone and Fire Tower Zone, associated with three phases (GI, GII, GIII). These granite phases along with brecciated zones associated with these intrusions are host to numerous Sn-Cu-Zn-In (North Zone) and several W-Mo-Bi (Fire Tower Zone & North Zone) deposits. Characterization of the rocks sampled (35) on the North Zone has been done with the X-5000 pXRF. Using immobile high field strength elements, Nb, Zr, Y, Th, and Ti and their ratios, in particular Th/Ti, three distinct groupings were found, ranging from 0.00225-0.00760, 0.00833-0.04142, and 0.08467-0.198337. These elements and their ratios are comparable to C. Invernos' research, and help identify the McDougall Brook Granitic suite (21), the Little Mount Pleasant Formation (11) and possibly GI-GII (2). Further work using mobile elements, such as K, Fe, Ca, and S was used to help distinguish the alteration and associated mineralization with respect to these three units. The rocks in the North Zone have been altered with variable degrees of chloritization and sulfidation and at lower degrees of sericitization and fluorite alteration. Fe stabilized chlorite, because of the high acidic conditions and high activity of Fe and is also associated with sericitic alteration. The destruction of feldspars is the first phase in sericitic alteration of the host rocks. Slight chloritization overprints these earlier alteration types. Chloritization in the rocks is locally seen with quartz and (or) fluorite. The dominant minerals associated with chloritization are Fe–rich sphalerite and arsenopyrite yielding high amounts of Fe and Mn in the rocks. Because chloritization and sulfidation dominates at higher degrees of alteration, Fe increases and K decreases; therefore Fe/K increases from weakly to intensely altered and mineralized rocks. Using Fe/K shows the Granite I-II may be less affected by sericitization than LMP and MBG. Using the Fe/K vs. Ca indicates fluorite alteration in greisen and chlorite zones. Fe/K vs. S shows a correlation (r'=0.42) related to sulfidation associated with chlorite. For a data set of 35 samples, the 95% significant correlation coefficient is 0.33 and found was that Sn correlates with Fe/K (r'=0.49), W correlates with Fe/K (r'=0.48), Bi correlates with Fe/K (r'=0.37), Mo correlates with Fe/K (r'=0.35), and Cu correlates with Fe/K (r'= 0.30).