Chemostratigraphic assessment of drill core S916 from the Heath Steele E Zone, Bathurst Mining Camp, New Brunswick, Canada

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The Heath Steele E Zone, located in the Bathurst Mining Camp of northeastern New Brunswick, is an economically important part of the complex Middle Ordovician volcano-sedimentary sequence dominated by (meta) quartz-feldspar crystal tuff and intercalated (meta) sedimentary rocks of the Nepisiguit Falls Formation (Tetagouche Group). Based on previous lithogeochemical work conducted on drill core S196, the volcaniclastic and associated sedimentary rocks mostly fall within a very narrow compositional range of calc-alkalic to transitional A-type rhyodacite to rhyolite that is variably affected by hydrothermal alteration and multiphase deformation.

Modern portable X-ray fluorescence (pXRF) spectrometry can measure the abundances of many key elements in concentrations of 10 ppm or less and are sufficient to identify minor changes in geochemistry. Consequently, pXRF is a useful tool to acquire quality in situ data analysis of over 30 elements, thereby providing at least 30 potential variables for use in chemostratigraphic characterization and correlation. The advantages of pXRF-based chemostratigraphy are that it can be applied to any lithotype, deposited in any environment, and may be applied to core, cuttings, and outcrops with equal effectiveness. Perhaps the greatest benefit of pXRF-based chemostratigraphy is that it offers a reasonably high-quality result in real time and a level of resolution that surpasses most other techniques.

The objective of this study is the application of chemostratigraphy in order to resolve rock units in the hydrothermally altered sequence intersected in drill core S916. To achieve this, 152 core samples were selected and analysed at approximately 2 m intervals. Thus far, 11 chemostratigraphic units have been defined in terms of an average or range of elemental values (e.g., Th, Cr, Nb, Zr, and Ta), or a combination of elements or ratios. These results will be used to identify and correlate units intersected elsewhere in the deposit area. It is hoped that the results will be useful in resolving the complex lithostratigraphic relationships that are a key component of mineral exploration in the Bathurst Mining Camp.

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