Exploring indicator minerals of less than 63 micron fractions in till deposits related to PGE ore bodies*

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Canada has experienced many continental scale glaciations; it has undergone glaciations extending from the coastal mountains to the central interior regions. During these glaciations events, sediments and ore material from deposits are affected by the ongoing movement of the glaciers, creating dispersion trains that contain useful indicator minerals and platinum group elements (PGEs). As the sediments are pushed and scraped along the surface of the ground by the pressure of the overlying glacier, they are moved a considerable distance away from their place of origin and can be affected by several different glacial or fluvial events. As a result, the sediments decrease in size and form fragmented materials that are considerably difficult to separate. The focus of this study is on the characterization and processes behind recovering indicator minerals and PGEs from dispersion trains of less than 63 micron size fractions. This process will be tested on five different samples from three different localities, all of which have different geological features and commodity types. The rocks will first be separated by density with Wilfle-tabling techniques from which the grains of interest, indicator minerals, and PGEs, will be selected. The grains chosen will then be analyzed and characterized using scanning electron microscopy (SEM) and mineral liberation analysis (MLA). This will be performed in order to determine the purity of the grains and consider their true size. Additionally, this allows for the composition of each grain to be determined for recovery purposes with individual grains labeled. Through the use of a new technique, these size fractions can be accurately separated from that of the till and other heavy mineral fractions with which they are commonly associated. The Hydroseparator HS-11 is capable of recovering the grains of choice through the use of different oscillatory motions and water pressures, with settings determined for different minerals of interest. Through this process, one is able to produce a more efficient heavy mineral size fraction from the till samples. The accuracy and precision of this method is tested by staging experimentation and spiking blank till with a known number of grains for recovery. By accurately determining the number of recoverable grains at this size fraction, a better understanding of the dispersion train can be applied and modeled at further distances from the ore. This model can then be used in the determination of whether or not a deposit is feasible for mining purposes. It is necessary that the data displays a direct representation of the PGE composition in the till. This will allow for the determination of whether or not continued exploration will result in the identification of a potential mine site.