

Exploration of Syenite-Hosted Gold Deposits using Benchtop SEM at the Highway 144 Offset Target Area in the West Timmins Camp, Timmins, Ontario

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At the 144 Gap and Thunder Creek Deposits, there is an apparent association between gold mineralization and the presence of sulphate minerals. However, in hand sample and drill core, sulphates are extremely difficult to identify. Instruments such as field portable benchtop SEM with Energy Dispersive Spectroscopy (bSEM-EDS) are extremely useful for mineral identification, but have yet to find practice outside of the academic community. In this study bSEM-EDS is evaluated as a rapid technique for evaluating the presence of sulphates. Samples of halved NQ drill core were analyzed in three stages by bSEM-EDS and electron microprobe (EPMA). In the first stage, unpolished halved core without carbon coating was analyzed by bSEM-EDS to evaluate the quality of results with minimal sample preparation. The core sample was then carbon coated and analyzed by EPMA-EDS. For the second stage the sample is placed on a low-cost field portable vibrating polisher with a 240-grit silicon carbide powder for one hour. Once polished, the bSEM-EDS and EPMA analyses were repeated. In the third stage the sample was polished for 24 hours with 240- grit powder and then analyzed for a final time by bSEM-EDS and EPMA. The quality of the data from the first and second treatments are comparable. Pyrite, anhydrite, celestine-barite, gold and a variety of other minerals are easily identified from samples with limited sample preparation, but polishing does greatly improve sulphate and pyrite textures and other smaller mineral constituents such as gold and galena are much more clearly visible. Because the time and cost of preparing thin sections has been avoided, using benchtop bSEM is not only faster than standard petrographic analysis, but it is also much more accurate at identifying sulphates from other syenite minerals. Thus, bSEM-EDS analysis shows considerable promise for documenting the occurrence of sulphates and other primary mineralogical constituents in drill core. Cutting drill core is sufficient to identify sulfates, but some polishing is recommended to improve the detection of gold. However, this study has shown that bSEM-EDS is a useful exploration tool for indicators associated with syenite-hosted gold deposits.