

## Recent investigations at the East Kemptville Sn deposit: identifying lithologies, understanding hydrothermal alteration, constraining controls on mineralization, and estimating bulk densities using lithogeochemical data

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Recent diamond drilling at the East Kemptville Sn deposit, Yarmouth County, Nova Scotia, by Avalon Rare Metals Inc. has provided lithogeochemical data that reveal new information about the host lithologies (three recognizably different granite phases), hydrothermal alteration (two topaz-precipitation reactions), and mineral zoning (sphalerite and chalcopyrite mineralization is largely restricted to topaz-altered host rocks) within the deposit. Lithogeochemical data have also been used to constrain/ confirm the bulk feldspar ( $Or_{20}$ ), muscovite (Fe-phengite<sub>50</sub>), and topaz (F-topaz<sub>25</sub>) compositions, and balance three reactions responsible for muscovite and topaz alteration. 'Change of basis' calculations that convert element concentrations into mineral concentrations (equivalently describing rock compositions) provide new mineralogical variables that more directly describe zoning within the deposit. These mineralogical concentrations can also be used to estimate physical and chemical parameters describing the rocks. For example, mineral modes have been regressed against conventionally measured rock densities in training data subsets to produce linear functions that estimate rock densities. These regression models have also been used to estimate densities in other validation data subsets. Results demonstrate that the regression models provide adequate (accurate, precise, and representative) density estimates of the rocks. Because such lithogeochemically derived density estimates compare favorably with measured density estimates, if lithogeochemical data are collected during mineral exploration, adequate density measurements can be calculated post facto from these element concentrations, precluding the need to measure rock densities in feasibility studies and saving substantial costs.