Application of Infra-Red Spectral and Multi-Element Analyses in the Gold Exploration in North Mara Mines, Tanzania

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Abstract

A combination of Short Wavelength Infra red (SWIR) spectral and multielement analyses was used to characterize certain hydrothermal alteration, pathfinder elements and their distribution within gold deposits in the Archean Musoma- Mara greenstone belt in Tanzania. The aim was to fingerprint hydrothermal systems responsible for the formation of major gold deposits in the belt. The SWIR spectra of white mica and chlorite from the samples revealed compositional zoning which reflects pH changes associated with hydrothermal fluid- rock interaction during mineralization. White mica crystallinity is variable in the deposits reflecting thermal gradient during hydrothermal alteration. On the other hand, gold pathfinder elements distribution showed extension of pathfinder element signature beyond a distance of 600 m width from the ore zone with either As and Sb association or Ag and Bi association. This suggests that different redox conditions have affected the deposits. This study confirms that a combination of SWIR spectral and multielement data is a cost-effective method in generating mineralization targets and can be applicable in areas with similar styles of mineralization.