Micro-infrared spectroscopic analysis of emerald from Hiddenite, North Carolina

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Emeralds from the Rist tract, Hiddenite, North Carolina, occur within thin, steeply dipping quartz veins that cross cut high-grade metasedimentary rocks of the Inner Piedmont metamorphic belt. Gem-quality crystals are found in open, Alpine-type, fissures that are lined mainly with euhedral quartz and carbonate minerals. New micro Fourier transform infrared spectroscopic investigations have identified different types of emeralds based on the IR profiles of the valence modes of deuterated water molecules within the structural channels. Emeralds display up to five different absorption bands in the

Atlantic Geology, 2004, Volume 40, Number 1

range of OD stretching vibrations between 2500 and 2900 cm^{-1}. The presence or absence of these bands can be broadly correlated to different emerald provenances. The micro-infrared spectroscopic analyses of Hiddenite emeralds in the OD stretching vibration range display broad similarities with emeralds from Carnaiba-Socoto, Brazil, Habachtal, Austria, and the Urals, Russia. Although previous work on North Carolina emeralds suggest a genetic relationship to granitic pegmatites, no evolved pegmatites were found to be temporally and spatially associated with the emerald-bearing quartz veins at the Rist property.