Mineral Diversity in Epithermal Au-Ag Deposits of the Hauraki Goldfield, New Zealand

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The Hauraki goldfield (Coromandel Peninsula and Great Barrier Island) contains more than 50 low sulfidation epithermal quartz vein Au-Ag deposits with a recorded production of more than 11 Moz of Au and 50 Moz of Ag from 1862 to the present. The vein mineralogy varies between deposits and between different veins within the same deposit and many of the minerals have limited geographical distribution. Electrum and acanthite are the main economic minerals, although pyrargyrite is found in minor amounts in many deposits and native gold occurs at Tui. The veins have low to moderate (2–10%) metallic sulfide contents, mainly pyrite, with lesser sphalerite, galena, and chalcopyrite. A notable exception is Tui, where the average base metal ore grade was 7.0% Pb, 16.7% Zn, and 0.62% Cu. The main geographic differences are an abundance of calcite and presence of adularia in many of the veins in the southern part of the goldfield and occurrence of arsenopyrite in many of the veins in the northern part of the Coromandel Peninsula, particularly in the deposits near Coromandel town, where native arsenic was reported from some historic mines.

Pyrrhotite is very rare, being noted in trace amounts only from Te Ahumata, Kuaotunu, and Martha. Rare molybdenite occurs at Neavesville and Martha. Bismuthinite occurs rarely at Tui, Thames, and some deposits in the Thames-Waiomu area.

Veins in the Thames area are notable for containing a wide variety of minerals particularly sulfosalts, including tetrahedrite, tennantite, famatinite, enargite, polybasite, miargyrite, kobellite, and robinsonite, and tellurides including altaite, hessite, sylvanite, petzite, stutzite, tellurobismutite, tetradymite, and coloradoite. Tetrahedrite has also been reported from Te Ahumata, Martha, Tui, and Waiorongomai. Hessite is also present at Neavesville, Maratoto, Favona, Karangahake, and Waiorongomai. Rare tetradymite has been reported from Tui, and rare altaite has been noted from Wairongomai.

Gold-silver selenide minerals, particularly naumannite and aguilarite, have been reported from Te Ahumata, Ohui, Broken Hills, and Maratoto, but not Thames. Naummanite has also been reported from Martha and Favona. Selenium is present as a significant component of acanthite at Broken Hills, Maratoto and Martha (as much as 10 wt % Se). Stibnite occurs late in the vein paragenesis at Te Ahumata, Opitonui, and Thames, and cinnabar is a late stage mineral in Thames and Tui. Cinnabar also occurs separately as cinnabar deposits on the periphery of the Karangahake and Thames fields, and these were mined for small quantities of mercury in the Ascot mine and at Mangakirikiri in the Kauaeranga valley, respectively.

Some of the variation in vein mineralogy (e.g., arsenopyrite, calcite, adularia) corresponds to different host-rock types and ages suggesting a possible source control; however, other differences are difficult to explain and could relate to local mineral deposition processes.