

INCLUSION STUDIES OF THE DENCHAI GEM SAPPHIRES FROM NORTHERN THAILAND

1LIMTRAKUN, P., 1KHIN ZAW, 2MERNAGH, T.P., 1FALLOON, T.J. 1School of Earth Sciences, University of Tasmania, Hobart, Australia 2Australian Geological Survey Organisation, Canberra, ACT, Australia

Thailand is the major producer of gem sapphires in the world. Gem sapphires in Thailand are recovered from alluvial placer and/or residual soils associated with Late Cenozoic basaltic rocks. Rarely, sapphires are observed occurring as megacrysts in the host basalts. The Denchai sapphire deposits are located in Phrae Province, northern Thailand. They are associated with Tertiary alkaline basalts, which unconformably overlie Permo-Triassic sedimentary and volcanic rocks. Sapphires in this study vary from light blue to dark grey and are up to 0.9 cm across. Fluid inclusions in Denchai sapphires have a size range of 5 to 100 mm, with the majority of inclusions having either negative crystal or rounded shapes. Many of the inclusions that occur within coloured growth bands have been interpreted as primary inclusions, though those that occur along healed fractures are either secondary or pseudosecondary in origin. Based on optical studies, three types of inclusions can be distinguished: (1) vapour-rich fluid inclusions, (2) polyphase inclusions containing vapour + liquid + solid phases, and (3) probable melt inclusions. Recent Laser Raman Spectroscopic studies have revealed the presence of CO₂ in Type 1 vapour-rich inclusions. CO₂ occurrence in Denchai sapphires implies that the involvement of CO₂-bearing melt is an important constraint on the formation of the gem sapphires.