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Archean Rare-Metal Pegmatites in Zimbabwe and Western Australia

Geology and Metallogeny of Pollucite
Mineralisations

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Preface

Lithium–cesium–tantalum (LCT) pegmatites are important resources for rare metals, whose demand increased markedly during the past decade. Especially, cesium and its compounds are used in drilling fluid in hydrocarbon exploration, as a catalyst in the chemical industry, and in advanced technology applications as atomic clocks, airbag detonators, high-resolution display screens or as a propellant agent in ion engines. The Cs metal market is actually in the frame of lower tens of thousand kilograms per annum. Data on resources and production are very limited. Cs resources can be categorised into one group of potassium salts, sedimentary rocks and seawater, all with no commercial interest due to low concentrations. The Cs resource group of commercial importance is LCT pegmatites that contain the rare zeolite group cesium mineral pollucite. At present, Cs and reserves of it are known in economic and mineable quantities only from the two LCT pegmatite deposits at Bikita in the Zimbabwe Craton and Tanco in the Superior Craton in Canada, where pollucite occurs in monomineralic mineralisation. Both pegmatite deposits have a comparable regional geological background, as they are hosted within greenstone belts and yielded Neo-Archean ages at ~ 2625 Ma. A closure of the Tanco Mine for safety reasons and an imminent depletion of the pollucite resources at Bikita stimulated the specialised search for pollucite mineralisation in the frame of the exploration boom for Li and rare metals in pegmatites. In Western Australia, the Meso- to Neo-Archean units in the Yilgarn and Pilbara cratons are known to host many LCT pegmatites, among them world-class economic deposits as Greenbushes (Li-Ta-Sn) and Wodgina (Li-Ta-Sn). Geological mapping programmes by the Geological Survey of Western Australia and the National Geological Survey of Australia, as well as countless prospecting and exploration attempts, could identify a large number of LCT pegmatites. Due to this potential, the Rockwood Lithium GmbH at Frankfurt/Main (Germany) initiates and funds the exploration on LCT pegmatites with a special focus on Cs. The first author participated as investigator in such campaigns between July 2011 and June 2016, where a total of 19 pegmatite districts were inspected and sampled. The second author acted as the principal supervisor of the project. As the search for massive Cs-pollucite mineralisation is influenced by genetic concepts on their formation, the

Bikita pegmatite was included in the study. This book presents the analytical results and their interpretations, generated during the intensive search to find one more deposit of a yet merely unique mineralisation type on the planet Earth.

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