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# Geology, Mineralogy and Geochemistry of the Mount Deans Pegmatite Field, Eastern Yilgarn Craton/Australia

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Lithium-Cesium-Tantal (LCT) pegmatites are an important source for the rare metals Li, Cs and Ta, commodities that are now consumed in a rapidly increasing amount in high technology applications. Despite that LCT pegmatites are characteristic features for the Archaean geology of Western Australia, only the Greenbushes, Cattlin Creek and Wodgina deposits are currently exploited for Li and Ta. Therefore, Western Australia still possesses a great potential for the identification of additional resources for Li, Ta and possibly also Cs.
The present study presents an overview of the geology, mineralogy and geochemistry of the Mount Deans pegmatite field, located c. 13 km S of Norseman, in the Eastern Goldfields Terrane of the Yilgarn Craton.
The Mount Deans pegmatite field is Meso- to Neo-Archaean in age and hosted in the N-S trending Dundas Hill greenstone belt.
The pegmatite field covers an area of 6 km in N-S and 4 km in E-W extension and comprises several dozens of individual pegmatite sheets and lenses. Structurally the pegmatite bodies are subdivided into two distinct types. Type I occurs predominantly in the southern part, is gently dipping (5-10°) to various directions and has variable thicknesses (3-25 m). Type II occurs in the northern part of the pegmatite field, dips steeply (50-90°) with a general N-S striking and has only a limited thickness (10 cm to 5 m). A clear distinction can also be made through their internal structure and mineralogy. Type I pegmatites exhibit a distinct structural and mineralogical zoning, whereas type II pegmatites are unzoned. Also albite, zinnwaldite, lepidolite and quartz form the bulk of the pegmatite; lepidolite is considerably more common in type II. Based on its peraluminous and strongly calc-alkaline character, as well as its enrichment in rare elements (i.e. Li, Rb, Cs, Ta, Nb, F), the pegmatites at Mount Deans are interpreted as LCT-pegmatites. However, despite the occurrence of rare element minerals like cassiterite, Nb-Ta minerals, lepidolite, petalite and spodumene, the high K/Rb ratios (>200) and low Zn (<140 ppm) and Th (<20 ppm) contents, indicate that the pegmatites in the Mount Deans area belong to the muscovite–rare element class of the LCT family. Therefore the Mount Deans pegmatite field only posses a limited potential to host significant amounts of rare elements. However, the observation of type I pegmatites that are crosscut by type II pegmatites, the high amount of lepidolite in type II and the observation of lepidolite replacement structures in type I are evidences for a two stage development during pegmatite formation. Also poorly understood at present, the process that leads to the formation of type II pegmatites is considered to be associated with a major element mobilization that could lead to a local enrichment of elements to an economic level and therefore should be the focus of future studies.