

## **Geochronology and genesis of the Wolfram camp W-Mo-Bi deposit, Queensland, Australia**

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The Wolfram Camp W-Mo deposit is located within the Carboniferous James Creek granite intrusion emplaced into rocks of the Hodgkinson Formation. The formation locally consists of multiply deformed Devonian flysch and is overlain by little disturbed Carboniferous to Triassic cover sequences including the Carboniferous Feathered Volcanics.

Ore bodies occur as pipe-like bodies and discontinuous pockets of quartz  $\pm$  minor calcite and trace fluorite, located in the roof zone and upper margins of plutons, grading outwards to quartz-rich greisen (>90 vol% quartz), then mica-rich greisen (10 vol% muscovite), and finally to muscovite-altered granite. The major tungsten mineral is wolframite, with minor scheelite replacing wolframite. There is also trace later cassiterite. Molybdenite is the major Mo-bearing mineral, locally intergrown with wolframite and thus assumed to have formed contemporaneously with the wolframite. Native bismuth and bismuthinite are minor but ubiquitous, slightly later than wolframite. Sulfides, including pyrrhotite, arsenopyrite, pyrite, and minor chalcopyrite, typically cut the tungsten minerals.

The Wolfram Camp deposit is unusual in that all the mineralization and alteration, mainly greisenization, is confined inside the granitic intrusion, specifically in the roof zone of the James Creek Granite. The zircon U-Pb dating shows that the James Creek Granite formed at ~333 Ma. This age is much older than the molybdenite in the orebody ( $306 \pm 3$  and  $306 \pm 2$  Ma, Re-Os) and the muscovite in the greisen (~305 Ma, Ar-Ar). These data indicate that the James Creek Granite was not the causative intrusion, and there is another pluton ~30 million years younger beneath the James Creek Granite that released the hydrothermal fluid. The fluid travelled upward until it reached the roof zone of the James Creek Granite and was stopped by the massive hornfels formed along the contact with the Hodgkinson Formation sandstone. Thus the mineralisation and alteration mainly occurred in the roof zone of the James Creek Granite.