

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

---

## **Bringing 20 Years of Research and 500 Reef Intersections Together on Ivanhoe's Tier 1 Platreef Deposit: A Synthesis from the Northern Limb of the Bushveld Igneous Complex**

Tim Dunnett

Ivanhoe Mines, Johannesburg, South Africa

Ivanhoe Mines' exploration commenced on the Northern Limb of the Bushveld Igneous Complex in 1998. Work attempted to unpack the enigmatically thick polymetallic Platreef developed on the Northern Limb. Initially exploration focussed on the near surface expression defining a resource amenable to open pit exploitation, before switching to a deeper target in 2010. A flattening of the Main Zone – Critical Zone contact, ultimately resulting in the "Flatreef" resource of 346Mt of 3PGE+Au at 3.77g/t as well as 0.16% Cu and 0.32% Ni using a 2g/t cutoff, defined using 482 drillholes.

In the past 20 years a large body of scientific work has been completed. A total of 12 drillholes from the open pit and 36 from the Flatreef area have been studied, in a total of 4 PhD, 10 MSc, and 4 Honours studies, producing 17 academic papers. The drillholes studied can be separated into three groups based on the part of the resource drilled; the open pit; the Flatreef and the deep reef. The footwall to the open pit and Flatreef is a zone of sediment-magma assimilation, divided into areas assimilated with shales and dolomites, whereas in the footwall to the deep reef horizon, cyclical norite (NC2) stratigraphy is developed. This insight into less contaminated lithologies that has been used to define stratigraphy and compare the Flatreef with the Merensky Reef of the Eastern and Western Limbs. All three drillhole groups have been combined to understand the Flatreef formation. The highest grade and thickest mineralised intervals are associated with the areas of sediment assimilation and not in areas with NC2 developed, underscoring the importance of sediment-magma interaction in the development of the Platreef.

The detailed, focussed scientific information and the holistic knowledge from core and underground exposures is synthesized in this review paper.