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A Geometallurgical Assessment of the P1 and P2 units of the Platreef at Lonmin's Akanani Project, Northern Limb, Bushveld Complex

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The Akanani prospect is situated in the Central Sector of the Platreef on the northern limb of the Bushveld Complex. Mineralisation is primarily restricted to the P1 and P2 geological units of the Platreef at Akanani. Mineralisation in the P1 Unit is erratic, and occurs over a wide vertical interval. In contrast, the overlying P2 unit is more uniformly mineralised, with generally higher grades than P1 [1].

Previously published studies of the Platreef focused mainly on an understanding of its geology and mineralogy, with published insights into its processing behaviour being comparatively rare. The present study therefore aims to investigate the geometallurgical nature of the P1 and P2 units of the Platreef at Akanani, with a focus on the influence of various ore properties (mineralogy, sulphide grain size, sulphide liberation) on the recovery of the platinum group elements (PGE), as well as nickel (Ni), copper (Cu) and sulphur (S).

Various ore types were sampled. These include feldspathic pyroxenite, serpentinised pyroxenite and olivine bearing pyroxenite occurring in P1 and P2 units. Orthopyroxene, clinopyroxene and plagioclase are the dominant primary silicate minerals, with serpentine the dominant secondary silicate. Base metal sulphides comprise of dominant pyrrhotite, along with pentlandite and chalcopyrite. The size distribution of the sulphides are variable, with the finest encountered in the serpentinised pyroxenite, and the coarsest sulphides occurring in the feldspathic pyroxenite. Milling times required in order to reduce these ore types to 60% passing 75 micron, are variable, with feldspathic pyroxenite milling the fastest, and serpentinised pyroxenite the slowest. Levels of liberation upon milling is comparatively poor for the serpentinised pyroxenite, and significantly better in the case of the feldspathic pyroxenite. This is mirrored by the recovery of the PGE from the various ore types, with poor recoveries associated with the serpentinised pyroxenite and better recoveries associated with the feldspathic pyroxenite.

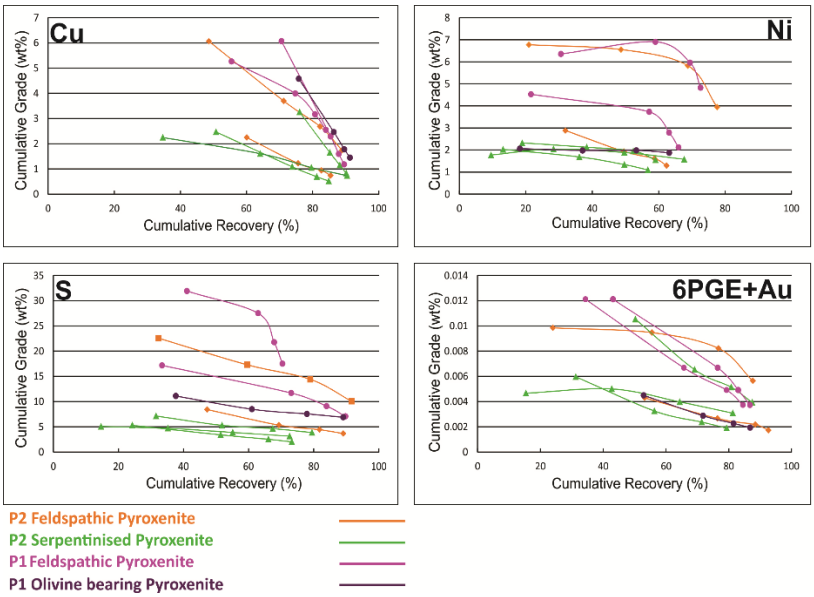

Figure 1: Cumulative concentrate grade as a function of cumulative recovery, for the samples collected from P1 and P2 at Akanani.

References:

Lonmin Mineral Resource and Mineral Reserve Statement (2014) pp21