INVESTIGATION OF HANGINGWALL NORITES OF THE MERENSKY REEF UNIT AT TWO RIVERS PLATINUM MINE, EASTERN BUSHVELD

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This research study focuses on the enigmatic occurrence of noritic lenses (termed "brown sugar norite" by mine geologists), within the feldspathic pyroxenite of the Merensky Reef as well as the hangingwall at Two Rivers Platinum Mine which is situated on the southern sector of the eastern limb of the Bushveld Complex. The primary purpose of this study is to determine the origin of the noritic lenses (later on referred to as BSN) and their influence on PGE distribution of the Merensky Reef as well as to characterise the cumulate rocks associated with the Merensky Reef unit by the use of geochemistry and mineralogy from the different genetic facies types.

Underground samples were taken of different Merensky Reef profiles and studied petrographically. These samples are compared to hangingwall leuconorites and mesonorites of Merensky Reef units found north of the Steelpoort fault. The BSN are fine-grained and appear to only occur where the upper chromite stringer is present.

From petrography it is observed that orthopyroxene is the dominant cumulate phase in both the BSN and feldspathic pyroxenite followed by interstitial plagioclase. Both rock types contain a relatively high concentration of biotite, pyroxene exsolution lamellae and poikilitic textured clinopyroxene. Clinopyroxene may also occur as intermittent rims around orthopyroxene which could be attributed to a decrease in temperature and compositional change of the melt. Clinopyroxene inclusions are found in some of the well-rounded chromite grains present in the pyroxenite indicating possible magma erosion. Preliminary geochemical results of the BSN postulate that they are different from the melanorites which constitutes the HW of Merensky reef of the farms north of the Steelpoort Fault. Geochemical and petrographic evidence show that the BSN are in fact felspathic pyroxenites. EMPA results show cryptic vertical variation of incompatible and compatible elements in orthopyroxenes which indicates fractionation and replenishment of magma. A general negative trend of the Mg# with stratigraphic height in the Merensky reef profile where the BSN occurs which is caused by fractionation of the magma. The difference in texture as well as composition suggests a different or late-stage magmatic origin of the BSN. The fine grained texture of the BSN may suggest that a change in temperature of the magma occurred most likely due to an injection of a new cooler magma resulting in rapid cooling of the resident magma and thus a finer grained pyroxenite.