

ABSTRACT

An important feature of the Merensky Cyclic Unit in the Bushveld Complex is the association of platinum group metals with narrow chromitite layers. The appearance and removal of chromitite layers in this unit has been used to define facies types. This study explores the hypothesis that individual chromitite layers within the Merensky Cyclic Unit at Marikana have distinguishing major element concentrations or ratios which could assist in tracing the continuity of the chromitite layers between facies types which is characterized by single or multiple layers. The examination of field relationships of the chromitite layers at the transition between facies types will be useful to improve understanding of lithological continuity. This study has two approaches; the first being the examination of underground exposures and petrographic analysis, and secondly by chemical analysis of chromite grains within the chromitite layers.

No chromite mineral compositional trends or similarities were observed for grains in chromitite layers hosted by the same silicate mineral. The mineral chemistry evidence suggests that post cumulus processes are considered to have changed the primary chromite compositions and that reequilibration has occurred due to reaction with trapped intercumulus liquid. Little to no reaction with the host silicates of plagioclase and pyroxene is envisaged. The slow cooling of the Bushveld Complex has allowed intercumulus liquid a greater opportunity to equilibrate with the early minerals, destroying the early magmatic history by reaction and recrystallization. The cumulate deposition model envisaged to have formed the Merensky Cyclic unit at Marikana is by the emplacement of several pulses of superheated magma, supported by the occurrence of several chromitite layers within the sequence.