

## **MINERAL DEPOSIT MODELS FOR PGE IN LAYERED INTRUSIONS - AN EXPLORATION PERSPECTIVE**

LEE, CHRIS. A.

Platinum, palladium and the associated metals rhodium, osmium, iridium, and ruthenium, which comprise the platinum-group elements (PGE), are widely distributed in nature. This distribution is especially evident with the advances in sensitive analytical techniques. However, there are few sites around the world where these elements have concentrated in sufficient quantity and suitable geological form to be classed as economic resources. These primary economic deposits are invariably located in layered mafic or ultramafic intrusions, with or without an affinity for Cu-Ni sulphides and/or chromite. In the primary deposits each economic sequence has mineralisation patterns and PGE ratios unique to the particular deposit. Most are Pd-dominant, whereas the Zimbabwe and Kaapvaal craton intrusions are Pt-dominant. In addition, a complex can be host to several economic PGE sequences, such as the Platreef, the UG2 chromitite, and the Merensky reef of the Bushveld Complex. Economic mineralised intrusions are not spatially clustered, but appear to be time clustered around 2500 to 2000Ma. Furthermore there are Ni-Cu sulphide-bearing mafic/ultramafic intrusions depleted in PGE. Metamorphism, tectonics, and weathering redistribute and concentrate PGE. This range of PGE associations and geochemical characteristics is a multivariate problem in ore genesis and mineral deposit modelling. Work in progress shows that the rocks surrounding the Merensky reef do not have any geochemical trends that would indicate or predict the stratigraphic position of the MR. The MR is a discrete geochemical entity, and this appears to preclude the application of archetypal modelling. Exploration models for PGE in layered intrusions are reviewed.