Temporal and Structural Evolution of the Waterberg Project, Limpopo Province, South Africa

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In 2011 Platinum Group Metals Ltd. (PTM), aided by consultants and academics, discovered a previously unknown body of mafic to ultramafic intrusive rocks north of the known extent of the Bushveld Complex by drilling through the unconformably overlying Waterberg sediments. This newly discovered mafic body was a blind discovery and includes the mineralized T- and F-reefs (287 Mt @ 3.15 g/t PGE + Au along 9 km strike; Platinum Group Metals Ltd., 2014) in what is currently interpreted to be an extension of the Northern Limb. This find is not only an industry-changing discovery due to its grade-thickness, shallow depth, and Au content but potentially represents an entirely new section of the Bushveld Complex. The intersected mafic lithologies comprise a so-called Upper and Main Zone with a granofels footwall. While correlations with the Northern Limb of the Bushveld Complex are attractive based on its proximity, there are noteworthy differences in chemistry and mineralogy. The contact between the mafics and the overlying Waterberg sediment is strongly sheared and altered with hematite and dumortierite. Whereas the eastern and western limbs of the Bushveld Complex are located on the Kaapvaal Craton, the northern limb is located on the Pietersburg Block and the Waterberg project is located in the Southern Marginal Zone of the Limpopo Mobile Belt. Individual zones are separated by craton-scale shear zones. The Limpopo Belt represents the collision zone between the Kaapvaal and Zimbabwe Craton and it is suspected that its long-lasting tectonic history between c. 2.7 and c. 2.04 Ga had a significant impact on PTM's tenement area.

The Paleoproterozoic evolution of the Limpopo Mobile Belt and the onset of sedimentation in the Waterberg basin has been a contentious issue in the past and initial work centers around constraining the timing of emplacement, erosion and faulting of the area both in relative and absolute terms. Field relations in PTM's area and ongoing studies indicate that a thin, strongly oxidized and sheared zone between Waterberg sediments and Bushveld-type rocks represents a paleosoil. The necessary uplift (accompanied by faulting of the deposit?) and erosion of the currently unknown roof rocks before the onset of Waterberg deposition is poorly understood. Ongoing age dating will confirm whether this new discovery is of Bushveld age.

We present a 3D model of the deposit displaying interpreted faults along with newly acquired age data for crosscutting dolerites, Bushveld-type rocks and the overlying sediments. Initial work utilizing traditional core logging, downhole and airborne geophysical methods, and implicit 3D modeling with the Leapfrog 3D software package indicates steeply dipping faults with a fault slip of over 400 m. Several structural blocks were identified when the faults were taken into consideration and different levels of erosion of the paleosurface have been recognized.