Geology and PGE Mineralisation along the Northern Contact of the River Valley Intrusion, Sudbury Region, Ontario

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Pacific North West Capital Corp. (Vancouver, BC) and joint-venture partners Anglo American Platinum Corporation Ltd. (South Africa) are currently exploring the River Valley property, located about 60 km northeast of the City of Greater Sudbury, Ontario, Canada. The property, underlain by a large portion of the River Valley Intrusion, came to the attention of Pacific North West Capital Corp. in late 1998 and exploration began in mid-1999. To date, two initial deposits, Dana Lake and Lismer's Ridge, have been outlined, defining a minimum geological resource (measured, indicated and inferred) of ~13 million tonnes, grading ~1.5 g/t 4E (platinum + palladium + rhodium + gold) and containing +600,000 ounces 4E. Current diamond drilling continues to expand this initial resource with drilling thus far totalling more than 32,000 m in 180 holes, with an average discovery rate of ~25 ounces 3E (platinum + palladium + gold) per metre of exploration drilling. The economic target is a +20 million tonne open pit deposit at a grade of ~1.5 g/t 3E (0.7 g/t 3E cut-off).

The River Valley Intrusion (RVI) covers more than 100 km^2 and is one of several Paleoproterozoic (2.5 Ga) intrusions (East Bull Lake Intrusive Suite) that occur within the +600 km long Huronian Magmatic Belt of the Southern Geological Province, north-central Ontario, Canada. The RVI, located at the boundary between the Archean Superior Province and Paleoproterozoic Southern Province, was emplaced into Archean-age rocks at moderate to shallow crustal levels; its emplacement is associated with plume-induced rifting of the Superior Province at around 2.5 Ga. The intrusion has been variably affected by the Grenville Orogeny (~1.7 Ga) and mostly lies within the Grenville Front Tectonic Zone, an ~30 km wide zone of reworked Archean and Paleoproterozoic rocks in the Grenville Province. Silicate mineral assemblages in the RVI exhibit a range in metamorphism from middle to upper greenschist facies in the Dana Lake area (northwest part of the intrusion) to lower to upper amphibolite facies in the Lismer's Ridge area; granulite facies mineral assemblages are observed in areas of the intrusion southeast of the Lismer's Ridge area.

The RVI consists primarily of gabbronoritic to gabbroic rocks with subordinate pyroxenite and anorthosite; layering is crudely developed and is dominantly at the decametre to metre scale. Contact-style PGE-Cu-Ni mineralisation occurs at or adjacent to most of the northern margin of the RVI where its intrusive contact is preserved. Exploration to date has outlined two potentially economic areas, Dana Lake and Lismer's Ridge, that contain sulphide-associated PGE hosted by a marginal Inclusion-bearing/Breccia Zone which is in abrupt, intrusive contact to the east with Neoarchean-age Pardo gneiss, and to the west with a crudely layered to massive leucogabbro-gabbro-melagabbro sequence. Alkaline stocks (<1.24 Ga) occur along the intrusive contact where in a few places they displace the Inclusion-bearing/Breccia Zone. As well, 060Az, 090Az and 120Az fault/shear zones, related to Grenville-age deformation (<1.7 Ga), and 1.24 Ga Sudbury swarm olivine-magnetite gabbro dykes, cut and/or displace all rock types of the intrusion.

The stratigraphy of the mineralized environment or Marginal Series rocks, which averages about 100 metres wide in plan view, is based on diamond drilling and surface mapping completed to date. From the footwall Pardo gneiss, westward into the intrusion, the sequence and character of the distinguishable units are:

Footwall Breccia Unit: 5 to 15 metres wide, but may be absent; consists of partly rounded to angular, centimetre- to decimetre-size fragments of country rock (~75% Pardo gneiss, Archean gabbro, diabase, diorite, minor Huronian Supergroup sedimentary rocks) and RVI material (~25% chilled gabbro and medium-grained melagabbro) in a matrix of finer grained rock of similar composition and (or) aplitic/granitic matrix; a narrow zone (<5 m) of migmatite at and near the contact of the intrusion is probably due to contact metamorphism; granitic veins can be traced from this unit into the footwall; sulphides are dominantly

pyrite and pyrrhotite, locally trace to 1% chalcopyrite + pyrrhotite; PGE concentrations are normally <25 ppb 3E.

Boundary Unit: 5 to 20 metres wide, but may be absent; contains partly rounded to subangular, centimetre- and decimetre-size fragments of country rock (typically 10-25%), and cognate xenoliths of melagabbro, gabbro and less commonly leucogabbro to anorthosite in a matrix of gabbro to melagabbro ± aplite/granite, as in the Footwall Breccia; sulphides are mainly pyrite and pyrrhotite, locally up to 3% chalcopyrite + pyrrhotite; PGE are typically <75 ppb 3E with local concentrations >1500 ppb 3E.

Breccia Unit: 20 to >100 metres wide; contains up to 95% dominantly cognate xenoliths of gabbro to melagabbro and subordinate leucogabbro in a medium-grained matrix of similar composition; fragments are partly rounded to round probably due to partial assimilation, and centimetre to decimetre in size – those greater than a metre are mainly footwall compositions (including Huronian sedimentary rocks) and tend to be larger with increasing proximity to the intrusive contact; sulphides from 1-5% pyrrhotite + chalcopyrite, occur as bleb and disseminated types with subordinate net texture; PGE contents are highly varied, but most values range from 500-6000 ppb 3E with local concentrations >15,000 ppb 3E.

Inclusion-bearing Unit; 10 to 50 metres wide; contains >90% autoliths of leucogabbro, subordinate gabbro and less melagabbro in a matrix of either medium-grained leucogabbro or gabbro; leucogabbro xenoliths are subangular to partly rounded, dominantly decimetre to metre in scale, and appear to be stoped inclusions from the adjacent (overlying) Layered Units; sulphides are trace to 3% pyrrhotite + chalcopyrite; PGE contents range from 100-500 ppb 3E with local concentrations >2000 ppb 3E.

Notably, the Breccia Unit, which shows the highest and most persistent sulphide-associated PGE mineralisation, has the smallest proportion of footwall inclusions (<1%); perhaps an indication that chemical contamination from footwall lithologies is not a major controlling factor on mineralisation. Fine-grained gabbro and diabase dykes cut all of the above units as well as the Leucogabbronorite Zone in the main part of the intrusion. These dykes are distinct from younger dykes of the Sudbury swarm and may be linked to a feeder dyke system.

Diamond drilling and surface mapping suggests that the deposits, as defined at Dana Lake and Lismer's Ridge, are near vertical, dipping between 70-90° east and west. The attitude of metre-scale layering in the Layered Units adjacent to the mineralised Marginal Series rocks is poorly constrained but is estimated to be near-vertical (~70-90^{o} west and east) but possibly shallowing (i.e. <70^{o} west dip) westward into the intrusion.

S/Se ratios from mineralised and unmineralized samples range from 500-2120, well within the magmatic range indicted by the Merensky and J-M reefs, and Konttijarvi-Portimo contact-type mineralisation (i.e. <1000 S/Se). Footwall rocks have low Pt, Pd and Au concentrations, and Pd/Pt and Cu/Ni are <1, indicating that the Archean footwall rocks are not genetically related to the PGE mineralising event(s). Estimates of the metal values for unmineralised magma that forms large parts of the intrusion (Layered Units) and(or) which are feeders (diabase dykes) to the intrusion, have anomalous PGE concentrations averaging 32-35 ppb Pt+Pd, but the Pd/Pt and Cu/Ni are both <1, which is unlike mineralised samples, which are typically 3:1 Pd/Pt and 5:1 Cu/Ni. Chondrite-normalized 100% sulphide chalcophile metal abundances from mineralised (3-5% total sulphide) samples show patterns and absolute abundances that are similar to contact mineralisation at the Konttijarvi-Portimo and Stillwater reefs, both of which are accepted to be magmatic PGE localities; samples with trace mineralisation which show a wide variation in PGE abundance also show a pattern not unlike the mineralised samples, leading to similar conclusions. Overall, the PGE patterns are consistent with a principally magmatic model for the origin of the mineralisation and contrast sharply with expected hydrothermal patterns.