New Discoveries of Platinum and Palladium in the Central Urals of Russia

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Despite historic production exceeding 450 tonnes between 1824 and 1970, the Urals Fold belt remains one of the least systematically explored regions of the world for platinum. No significant state and private sector funding has been directed at the application of modern technologies for exploration and processing of platinum group metals during the last 30 years.

Urals production peaked during the early years of the 20th century, at which time the region contributed 95% of the world's platinum supply (Wagner, 1929). The vast majority of production was from high grade placers, initially by hand mining and washing, followed by a major dredging phase from 1900 to 1950.

Eurasia has been exploring for PGM's in the Urals for three years. It has assembled a comprehensive data base derived from academic and expedition reports, has obtained the exploration rights for five properties covering 700 square kilometers and has several additional licence applications in process.

Exploration is conducted for alluvial platinum in a Joint Venture with Anglo American Platinum Corporation Ltd. Exploration is also taking place for hardrock PGM resources on a sole risk basis. The work has established exploration models and has demonstrated the existence of potentially economic platinum-chromite alluvial resources. Potentially economic discoveries of hardrock palladium-gold mineralisation have also been made.

Sources of disseminated platinum are recognised in the Urals Platinum Belt over a length of 900km (Gurskaya 1998). Forming the lower portion of an interpreted upended island arc sequence the belt comprises a series of 20-100km long Silurian igneous complexes (Sasanov, 2001and Sobolev et al, 1971). Zonation within the complexes normally comprises lower dunite sequences in the west grading through pyroxenites and gabbros into diorites and quartz diorites to the east (Ivanov, 1997). In some cases, particularly at Soloviev Hill in the Tagilsky complex and in the Kachkanarsky Complex, the lower units are isolated from the main gabbroic complexes forming small, concentrically zoned, dunite-clinopyroxenite bodies of Alaskan-type as defined by Taylor (1967).

Hardrock platinum occurrences associated with disseminated and massive chromite in dunite within these zoned Alaskan-type intrusives are the source of platinum for the major placer fields of the Urals. Three small, platiniferous chromitite pipes at Soloviev Hill, the deepest mined to 180 metres, which produced several tonnes of platinum, represent the only previous hardrock platinum mining in the Urals (Vysozky 1925). In-situ rock grades in dunite elsewhere at Soloviev Hill reflect the variable density of small, irregular and discontinuous chromitite 'schlieren'.

Several areas, up to 4ha, indicate grades of 0.3 – 0.5 g/tonne to depths of 30 metres. Individual drill intersections, obtained by Eurasia, range up to 1m at 28.4 g/t. Platinum occurs mainly as xenomorphic isoferroplatinum grains (30% less than 400μ) in chromitite schlieren and as idiomorphic grains (83% less than 400μ) in silicates within the host dunite (Volchenko 1999). Individual chromitite schlieren, in general, have a thickness of 1-7cm over lengths of 0.3-1.0m. The chrome spinel in the schlieren shows a compositional range of 48-51% Cr_2O_3 (Pushkareov, 2001).

The major central Urals alluvial platinum fields were formed by intensive erosion of the dunite- pyroxenite massifs during six post Jurassic phases of uplift (Schoub, 1994). Placer deposition usually occurred within 15 km of the dunite source and deposits are often developed radially from the massifs (Map 1).

The traditional method for alluvial platinum recovery, both by handwashing and dredging, was by sluicing. This has contributed to significant losses to tailings, particularly of –250μ platinum. In current Eurasia exploration sample processing, techniques have been established for enhanced fine-grained platinum recovery as well as for the segregation of a chromite concentrate. This is applied to both tailings and unmined or partially mined placer deposits. Initial work in the Vissim Field (Map 1), where resource definition traverse drilling of dredge launder tailings has now commenced, is very encouraging. Raw platinum results obtained, range from 115mg/m3 to

4555mg/m3 and chromite grades from 20 kg/m3 to 125 kg/m3 at approximately 50% Cr_2O_3. Sampling from the Martian River at Vissim indicates that up to 30% of the platinum recovered is less than 100µ. Exploration applying the same sample processing technology is also in progress for unmined placer deposits in the Sosva district east of the platiniferous dunite bearing Denezhkin Kamen intrusive complex (Map 1). Application has been made to explore several additional unmined placer and tailings targets.

Ore grade palladium-gold intersections from diamond drilling at Baronskoye define a new potentially commercial Platinum Group Metal-type of mineralisation in the Urals. Situated in the Volkovsky sub-complex at the North of the Tagilsky Complex (Map 1), the mineralisation occurs in Lower Silurian pyroxenites and gabbros, which are associated with Upper Silurian quartz diorites and syenodiorites.

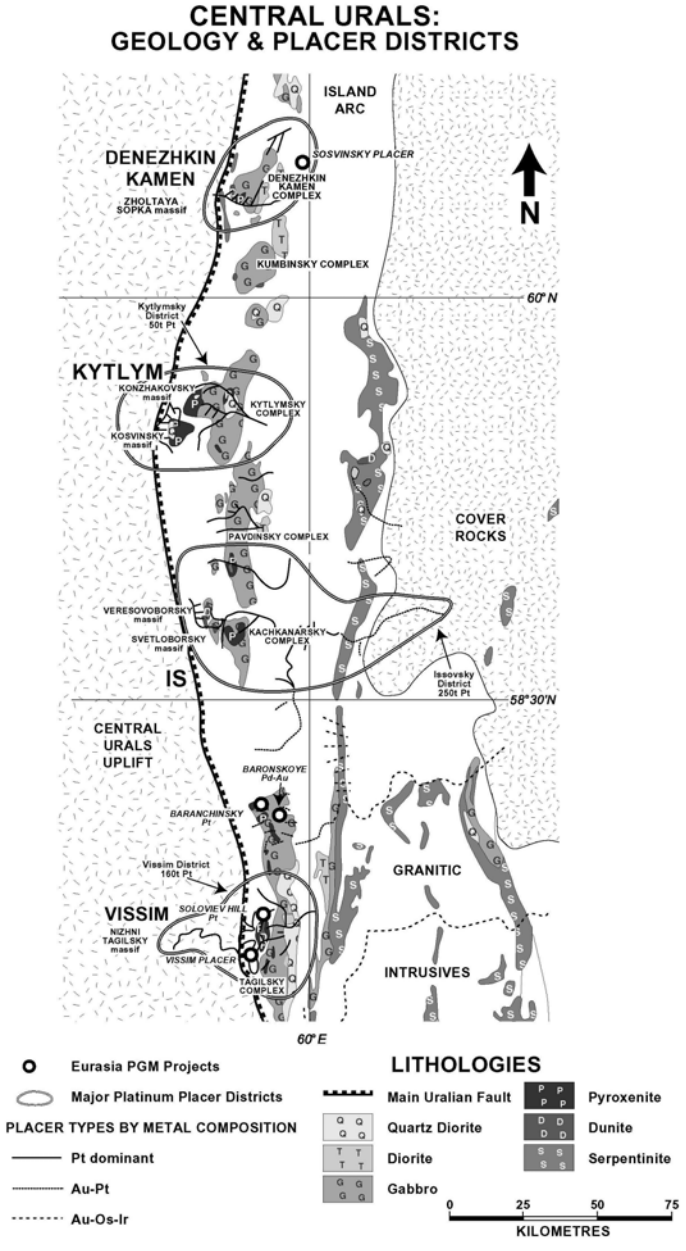

Figure 1.

Previous sampling indicated an isolated occurrence of high grade, palladium-gold mineralisation associated with serpentinised apatite-olivinite in the area (Volchenko 1998). Eurasia Mining commenced exploration at Baronskoye in 1998. Initial trench sampling gave an average of 15.7g/t Pd, 7g/t Au and 0.4g/t Pt. A small diamond drill programme confirmed continuation of the mineralisation over a short strike length to a depth of 50m, the best intersection was 4.1m grading 6.4g/t Pd, 0.5g/t Au and 0.2g/t Pt. The mineralisation was initially assumed to be directly associated with apatite-olivinite bands forming an integral part of the igneous stratigraphy. Drilling and subsequent trenching however also intersected strong mineralisation in saussuritized pyroxenite and confirmed its occurrence in low sulphide hydrothermal alteration within a shear zone cross-cutting the stratigraphy at an oblique angle (Potter 2002). Apatite-olivinite lenses occur as small tectonic slices within the zone.

B-horizon soil geochemistry has proven a reliable mechanism for tracing strike extensions of the Pd-Au mineralisation. At a threshold of 55 ppb palladium, soil sampling provided good definition of a linear anomaly, often as narrow as 10m, over a total strike length of 900m (Potter, 2002). Drilling under this narrow anomaly confirmed overall continuity of the shear zone with isolated ore grade intersections. Overall, however, consistency of widths and grades was insufficient to support mining.

Subsequent expansion of geochemical surveys on the licence area, particularly in proximity of gabbro/pyroxenite contact zones, defined much broader Pd-Au-Cu anomalous zones. The soil anomaly at Kluevsky, located 2.3km south of the discovery area, extended over 1.3 km at widths up to 100m. Initial drilling at the anomaly margins intersected broad, shallow zones of mineralisation including a section of
35.9 m at 1.01 g/t Pd+Au+Pt. Follow up drilling towards the centre of the anomaly included intersections up to 10 m assaying 3.65 g/t Pd+Au+Pt. The mineralisation occurs predominantly within pyroxenites which are often brecciated and highly sheared with strong chlorite-epidote-sericite alteration. Visible chalcopyrite-pyrite mineralisation from trace to 0.5 vol% is frequently observed within these zones. The Kluevsky pyroxenite body is surrounded by gabbro, except to the south where it is in contact with syenodiorite.

Eurasia's exploration in the Urals is still at an early stage but it has already established the basis for the redevelopment of historic mining districts based on both platinum and chromite (for which there is a large local market). The search for hardrock sources has revealed the presence of Lac des Isles type disseminated palladium-gold mineralisation and has recently been extended to include stratiform platinum deposit types. The technical skills, dedication and innovative ability of the local Russian teams and associated institutions should be emphasised together with the partnership created by their willingness to work with the small expatriate group who have been able to introduce alternative views on economic evaluation plus western exploration methods and deposit models.

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