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PGE Deposit Types and the PGE Potential of the Canadian Cordillera

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Magmatic concentrations of PGE occur in:

1) Intracratonic layered mafic-ultramafic intrusions;

2) Intracratonic differentiated mafic-ultramafic sills;

3) Synorogenic differentiated sills and layered intrusions of both tholeiitic and komatiitic affinity;

4) Synorogenic Alaskan-type zoned intrusions;

5) Tectonically emplaced Alpine-type peridotites;

6) Synorogenic Gabbro-pyroxenite complexes.

Type 1 occurrences, as exemplified by the reefs of the Bushveldt Complex, consist of thin but laterally persistent disseminated sulphide layers (Po, Pen, Cpy) occurring within polycyclic cumulate sequences and locally associated with chromite horizons. Type 2 and 3 occurrences are found in heavy sulphide zones near the base of the intrusions. Type 1, 2, and 3 occurrences are characterized by elevated Pd contents and complex PGE mineralogy. Type 4 and 5 occurrences are restricted to chromitiferous portions of dunites, are enriched in Pt (type 4) or Os-Ir (type 5), and depleted in Pd. Type 6 occurrences contain palladium associated with late magmatic copper sulphide-magnetite mineralization. PGE production comes largely from type 1 (Bushveld Complex) and type 2 (Noril'sk-Talnakh district) lodes and from placers derived from Alaskan-type intrusions. By-product Pd-Pt is recovered from type 3 Ni-Cu operations. Non-magmatic PGE concentrations occur in a variety of geologic environments and host rocks such as metasomatic Fe-rich dunite pipes, vein and shear zones, skarns, and black shale basins.

Known PGE occurrences of the Canadian Cordillera include low-grade disseminations in chromites of the Alaskan-type Tulameen Complex, Pt-rich placers derived from zoned intrusions (e.g. Tulameen district), Os-Ir placers derived from Alpine-type peridotites, and Pd-Pt bearing Ni-Cu massive sulphides in differentiated mafic-ultramafic sills (e.g. Kluane district). Platinum values are also reported from a variety of polymetallic veins and skarns. Potential exploration targets in the Cordillera include sulphide horizons in layered intrusions and synorogenic sills, pipes or hydrothermal breccia zones in Alaskan-type intrusions, and mineralized shear and contact metasomatic zones in regions underlain by abundant mafic-ultramafic intrusives.

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To: A.F. Reave
From: L. Riccio
Re: Further comments re R-1 (Pitqueh) Property –

(1) Some of the pictures clearly show good "compositional banding". The nature of this banding (i.e. "cumulate vs flow banding") should be established since it may have a bearing on potential PGE mineralization – Also I would like ~~the~~ to establish the composition of individual layers (e.g. are the leucocratic bands "anorthositic"?) –

(2) The sampling by J. Fraser only investigated the "MAIN ZONE" (Loc 4) and its westerly extension (Loc 1, 2, 3). None of the sulphide zones further to the west and to the north of the Main Zone were sampled.

(3) It appears that most sulphides may have been introduced as hydrothermal systems postdating the deposition of the layered intrusions (maybe pumped into the system by the various dykes and sills which cut across the layered rocks) – However one only needs ONE primary PGE-bearing sulphide

horizons to make a mine!

(4) [redacted] In summary I recommend that, unless Northair is already in the process of optioning this ground, a one to two days helicopter-supported investigation of this "layered complex?" should be carried out - The scope of this examination would be to
a) establish the presence of sulphide zones [redacted] with the kind of mineral assemblages (po - cpy) generally associated with PGE.
b) look for sulphide-bearing pegmatitic horizons (pegmatitic horizons or other unusual textures are usually found in PGE-bearing zones).
c) Try to get values [redacted] in the order of >1000 ppb Pd and >100 ppb Pt.

Luce Roy