

Paper Number: 1953

**Main types of Platinum-Group Element Mineralization in the Fedorovatundra layered intrusion, Kola Peninsula, Russia**

Groshev, N.Yu., Subbotin., V.V., Korchagin, A.U.

Geological Institute KSC RAS, Apatity, Russia, email: nikolaygroshev@gmail.com

---

The 2526 to 2485 Ma Fedorovatundra layered mafic intrusion in the central part of the Kola Peninsula, Russia, is the western massif of the Fedorova-Pana Complex (2526-2446 Ma), which is situated along the northern contact of the Early Proterozoic Imandra-Varzuga rift and Archean granite gneiss. The Fedorovatundra intrusion is approximately 4 km thick and has two major parts: (1) located at the bottom of the intrusion, the Taxitic series (10 to 900 m); and (2) composing the main volume of the massif, the Layered series (4000 m). The Taxitic series is distinctive, due to its predominant variable-textured often quartz-saturated norites and gabbro-norites (with minor leucogabbro, melanorite and olivine-gabbro-norite) and abundant pyroxenite (with occasional harzburgite xenoliths). Medium to coarse-grained mottled or massive leucocratic gabbro-norite and leucogabbro prevails in the Layered series with mesocratic gabbro-norite, pyroxenite and troctolite as subordinate rocks.

Depending on its localization, geochemical features, mineral composition and economic value, platinum-group element (PGE) mineralization of the Fedorovatundra intrusion is divided into 'marginal' (basal, contact) and 'reef' types. 'Marginal' type of mineralization is presented by irregular disseminated interstitial sulfides (1-2 vol. %) of pentlandite-pyrrhotite-chalcopyrite association (Cu/Ni = 1.8) in the Taxitic series. Less sulfides occur as uniformly disseminated aggregates, thin massive lenses and nests. PGE and base metals are concentrated in several ore horizons of in a 3.5 km long complicated structure. Thickness of ore horizons varies generally within 10–150 m, but it can rise up to 280 m in overthickened lenses. In the most common ore-bearing rock (taxitic gabbro-norite) the average Pt + Pd content is 1.6 ppm (Pd/Pt 4.5). The pyroxenite xenoliths occurring within the Taxitic series are practically barren of sulfide and can dilute higher PGE and base metal grades in the gabbro-norite matrix. This 'Marginal' mineralization the forms the largest Fennoscandian PGE deposit with several hundred tons of contained precious metals.

PGE mineralization of a 'reef' type was found in rhythmically layered olivine-bearing horizons in the lower and middle parts of the Layered series. The 'reef' PGE mineralization is closely associated with finely disseminated (up 0.5 vol. %) pentlandite, pyrrhotite and chalcopyrite (Cu/Ni 2.4). Thickness of mineralized horizon varies from 1 to 3 m and is continuous for over 500 m (with estimations up to 3 km). In the lower mineralized horizon the average Pt + Pd content is 1.4 ppm (Pd/Pt 1.5), and that in the middle part is 0.4 ppm (Pd/Pt 0.8).

The most common PGE-bearing minerals of 'marginal' mineralization are merenskyite, moncheite, kotulskite, sobolevskite, and michenerite; less common are sperrylite, stillwaterite and vysotskite-braggite. 'Reef' type mineralization includes the same minerals, but it is substantially more enriched in PGE arsenides and sulfides.

A two-stage process is postulated for the genesis of the PGE mineralization of the Fedorovatundra massif. This involves the intrusion of sulfur-saturated PGE-enriched gabbro-norite magma of the Taxitic

series (2493-2485 Ma, 'marginal' PGE mineralization) into already solidified mafic and ultramafic rocks of the Layered series (2526-2507 Ma, PGE reef as a marker) [1, 2].

The work was supported by RFBR (16-05-00367, 15-35-20501).

*References:*

[1] Groshev N et al. (2009) Dokl Earth Sci 427(2): 1012-1016

[2] Schissel D et al. (2002) Econ Geol 97: 1657-1677

