Status and potential of exploration for PGE in India

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PGE Potential in India

Discovery of new platinum group of elements (PGE) deposits/mineralized zone is of great economic importance for any countryIn India, till date only the i) Baula-Nuasahi layered Complex in Orissa, ii) mafic-ultramafic

Hanmalapura Complex in Karnataka, and iii) the layered Sittampundi Anorthosite Complex in Tamil Nadu, are the three known promising PGE occurrences. Recent studies show that there is a tremendous potential for PGE-mineralisation in mafic-ultramafic complexes, ophiolite complexes and the fine grained sediments such as sulfide bearing black shales, occurring in different parts of our country.

Exploration Strategies

Determination of PGE at extremely low concentrations with the accuracy and precision and at high throughputs required for exploration studies needs optimization of critical steps such as selection of a representative sample and application of sensitive analytical techniques, etc. For identifying economically viable deposits and their mining, detailed geological, petrological and geochemical studies are essential on massive potential areas.

Geochemistry and mineralogy of Serov Ni lateritic deposit, N Urals

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Serov lateritic Ni deposit occurs within Kolsky massif in the northern part of the Serov-Magnitogorsk zone of the ultrabasites. The following zones are distinguished within the weathering profile (from the bottom to the top): serpentinites (1), leached serpentinites (2), saprolites (3) and laterites (4). The profile is covered by Early Jurassic to Late Tertiary sediments.

Ni mineralization is being studied by XRD, SEM and Microprobe in the laboratories of VSEGEI and NHM. In parent rock, Ni is distributed among the serpentine group minerals, olivine and pyroxene. For the leached serpentine zone, an increase of Ni content is typical in serpentines and appearance of "garnierite" veins, sometimes forming stockwork together with magnesite. The saprolite zone is characterized by broad variations of Ni content in serpentines – from low-common for lizardite and antigorite, to high, allowing them to be referred to as nepouite and pecoraite. Laterite is composed of goethite and haematite (< 1 % Ni), often with smectite admixture. Besides minerals listed, Ni was found in chamosite, talc, millerite and asbolane. XRD also recorded teophrastite $Ni(OH)_2$, honessit $Ni_6Fe_2(SO_4)(OH)_{16}*4H_2O$, willemseite $(NiMg)_3Si_4O_{10}(OH)_2$, nickeline – NiAs и maucherite $Ni_{11}As_8$.

Such mineral assemblage proves a long history of profile development: primary oxidized profile was partly reduced due to downward block movements evidently after covering the profile with lignites. The reduced parts of the cross section go down along the most permeable zones that connect with tectonic faults.

Later on the profile was oxidized again after recent uplifting. Such consequence of events has led to the redistribution of Ni and to the crystallization of sulphides, arsenides and chlorite.