

NEWS AND NOTES

PGE Mineralisation in Ultramafic-mafic Complexes of Tamil Nadu: A Preliminary Note – N.P. Nathan, GSI, Chennai; (Email: npnathan55@yahoo.co.in)

The ultramafic-mafic complexes are considered to be the potential host for PGE, nickel, chromium and copper mineralisation. The PGE mineralisation is generally concentrated in the Base Metal Sulphides (BMS) and in the chromites occurring within pyroxenite-gabbro suite of rocks with chromitite layers (e.g. Bushveld, Stillwater, Great dyke, Munni Munni Complex, etc).

In the granulite-gneiss terrain of Tamil Nadu, several ultramafic-mafic-anorthosite complexes occur in Sittampundi, Mettupalaiyam, Torappadi, Manmalai, Tenmudiyanur, Kadavur and Oddanchatram areas. Among these, the major Sittampundi and Mettupalaiyam complexes represent layered and/or differentiated sequences of dunite, meta-pyroxenite, metagabbro, chromitite and meta-anorthosite. These complexes, dated to be ca.2900 Ma (Bhaskar Rao et al. 1996) are emplaced within the amphibolite facies gneisses and the associated supracrustals within the E-W trending Cauvery Shear Zone.

The Sittampundi Anorthosite Complex (SAC) comprises meta-anorthosite with bands and lenses of chromitite/ chromiferous meta-pyroxenite, garnet-pyroxene granulite (eclogite?), meta-gabbro and amphibolite. It occurs as a broad arcuate belt with width ranging from 125 to 990 m and extending over a strike length of about 17 km from Cholasiramani in the west up to east of Karungalpatti in the east. PGE mineralisation in Sittampundi Complex was brought to light during the preliminary investigation carried out by GSI during 1984 and 1996. This belt has been divided into three blocks, viz. Karungalpatti, Chettiyampalaiyam and Tasampalaiyam, from east to west for the purpose of investigation.

Detailed investigation carried out by GSI in the last four years has brought to

light that PGE mineralisation is mainly confined to the chromitite and chromiferous meta-pyroxenite bands and layers occurring within the meta-anorthosite both in Karungalpatti and Chettiyampalaiyam blocks.

Based on the assay data, two significant zones of PGE mineralisation – one in the chromitite band no.III with an average grade of 1.56 ppm of Pt + Pd over 3 m width and the other in the chromiferous meta-pyroxenite band no.IV with 2.45 ppm of Pt + Pd over 1.60 m width have been delineated. These chromitite bands are traceable for a strike length of about 500 m.

In the adjoining Chettiyampalaiyam block, a prominent zone of PGE mineralisation with Pt + Pd values ranging from 1 to 18 ppm has been delineated for a strike length of about 1.1 km. The depth persistence of this zone has been tested up to 30 m below ground level by scout drilling at 100 to 200 m strike interval.

The on-going investigation in Tasampalaiyam block has shown high PGE values up to 12 ppm in trench samples. The depth persistence of these zones is being tested by drilling.

The PGE mineralised chromitite contains chrome-spinel (Cr_2O_3 35.35 to 41.90%, Al_2O_3 20.97 to 27.54%), magnesio-hornblende and rutile. Pyrite, pyrrhotite, chalcopyrite, millerite and pentlandite represent the sulphide phases occurring as inclusions within the chrome spinel and in amphiboles.

The SEM-EDX studies have led to characterisation of different PGM phases present in the PGE mineralised zones of Sittampundi Complex. The PGM phases identified include native Platinum (Pt), Sperrylite (Pt As_2), Braggite ($\text{Pt, Pd} \text{S}$), Cooperite (Pt S), Malanite ($(\text{Cu Pt})_2\text{S}_4$), alloy of Pt-Rh-Ir, Stibiopalladinite ($(\text{Pd, Cu})_5\text{Sb}_2$), Kotulskite (Pd, Te), Cupror-

hodsite ($(\text{Cu Rh})_2\text{S}_4$), Laurite (Ru S_2), Erlichmanite (Os S_2), Rutheniridosmine (Ir, Os, Ru) and Irarsite (Ir As S). They occur as minute inclusions (6 to 10 microns) within the chrome-spinel in the Karungalpatti and Chettiyampalaiyam blocks. In Tasampalaiyam block, PGM phases of PPGE group are found in BMS while that of IPGE occur within the chrome-spinel. The PGM phases are distinctly fresh and they do not show any alteration due to subsequent tectonothermal events.

In Mettupalaiyam Ultramafic Complex (MUC) emplaced within the Bhavani Shear Zone, PGE mineralisation is associated with the meta-pyroxenites and chromitites. In Solavanur block, a zone of PGE mineralisation with Pt + Pd values ranging from 1 to 4 ppm has been delineated over 700m strike length within the meta-pyroxenite. In Karappadi block, PGE values range from 0.1 to 1.8 ppm in chromitite and 0.1 to 2.4 ppm in meta-pyroxenites. The mineralised zone in this block is traceable for a strike length of about 450 m. Investigation is going on in the intervening Mallanayakkan-palaiyam block where high values up to 2.5 ppm of Pt + Pd are obtained in trench samples. An array of PGM phases ranging from native platinum to sulphides, tellurides and antimonides of Pt, Pd, Ru and Os have been identified within the BMS, chromite and pyroxene/amphibole grains.

The on-going sub-surface exploration by GSI is indicative of significant PGE resources in both Sittampundi and Mettupalaiyam ultramafic complex. In the light of these findings, it is necessary to carry out a massive project for the identification of economically important PGE resources and of all the major ultramafic bodies occurring within the entire MUC from Bhavani (Tamil Nadu) in the east up to Attappadi (Kerala) in the west.