

***Training Programme on 'Recent advances on Chromitites, PGE and Ni-Cu Sulphide Deposits with special reference to the Nuggihalli Schist Belt (NSB), Karnataka, India, 5-6 June, 2010, Bangalore***

As a sequel to series of discussions between the Society and Government to identify new PGE resources with chromites and/or Ni-Cu sulphide in Karnataka, a two pronged approach was conceived by the Geological Society of India. The first one was to assemble all the available data base on geologically favourable terrains in Karnataka. The second was to formulate a training programme in two parts for selected geologists from State, Central Government agencies and Universities and research institutes within Karnataka so as to develop human resources in the domain of chromites, PGE and Ni-Cu resources. As outlined above it would be in two phases covering theoretical and general aspects followed by a field orientation and training. During the field stage of training, services of foreign experts well versed in the exploration of PGE from South Africa and Rhodesia (now Zimbabwe) have been envisaged.

The NSB had been invoked by late Dr. C.S. Pichamuthu as somewhat analogous to the great dyke of Rhodesia, which hosts PGE and Ni-Cu resources besides chromites. Mysore Minerals Limited operates several chromite mines in the NSB and is seeking new resource bases including PGE in this belt. Such a scenario, led the Geological Society of India and Mysore Minerals Limited, in collaboration with DMG, GSI, NGRI, IMMT, to formulate a two-phase training programme.

The first phase held at Chandra Residency, 44 Millers Road (Ambedkar Veedi), Bangalore during 5<sup>th</sup> and 6<sup>th</sup> June, 2010 was formally inaugurated by Ramaprasad, IAS, Secretary, Industries and Commerce, Government of Karnataka emphasized the need to search for high-value metals such as PGE, Au, Ni, Co and others in Karnataka in addition to the most easily accessible ores of iron, chromite, manganese besides limestone and granite. R.H. Sawkar, briefly outlined the genesis of the training programme as part of the Society's synergy plans between Academic Institutes, Universities and Industry for the benefit of identifying new resource bases in India. Sriraman, Managing Director,

MML, released the volume containing the 'Course Material and Lecture Notes' and stressed the need to develop expertise in the search of PGE and associated mineralization. Shivalingamurthy, Director, DMG, GOK, complimented the Society for taking up such programmes and invoked closer liaison between the different agencies so as to complement each other in their common goal of locating new mineral resources in Karnataka. P. Krishnamurthy welcomed and also thanked the numerous resource persons, trainees and the invitees and guests including those who had come for the Global Investors Meet (Rio Tinto, Deccan Minerals, Geo Mysore and others) held on 3<sup>rd</sup> and 4<sup>th</sup> 2010, Bangalore. The training programme was attended by 20 trainees (MML-5, DGM-6, DMG-4, GSI-3, NGRI-4, Bangalore University-4). Twelve (12) resource persons delivered a total of \_\_\_\_ lectures on a variety of topics covering various aspects as listed below:

Mukherjee in a key lecture reviewed the PGE deposit scenario of the world with special reference to the Baula-Naushahi complex in Orissa. He emphasized the genetic aspects especially the contamination of parent magma with sulphur-rich sediments (to increase the 'R' factor) and to look for '*reversal in differentiation trend, high heterogeneity in composition and texture of silicates existing with hydrous phases and pegmatitic texture*' within the mafic portions of the intrusive complex. The extreme diversity in PGE minerals (over 100, 5-40 microns in size) has been attributed to PGE's affinity to readily combine with Sb, As, Bi, S, Se and Te. Pt, Ir and Os also strongly siderophile and combine with Fe to form metal alloys. He also explained the different stages of exploration both at the reconnaissance and prospecting stages.

R. Srinivasan gave an overview of the genetic types of ultramafic-mafic complexes, their mineral deposits with special reference to the NSB, Dharwar craton.

D.V. Subba Rao gave a detailed account of the petrology, multielement chemistry and metallogeny of the Tagadur-Ranganpetta

section of the NSB. V. Balram outlined the analytical strategies for the determination of Au and PGE. The inhomogeneous distribution of PGE necessitates the use of large quantities (>20g) of samples for their determination to get reliable and reproducible data. The most popular decomposition methods for PGE being fire assay (PbS only for Au, Pd, Pt, NiS for all PGE).

G.V. Rao gave a comprehensive account of how recovery plants for PGE and chromite ores are designed and worked. Recovery plants are tailor-made to the type of ore. No two plants are similar even within a deposit since ore and gangue characters can vary with both depth and along strike. He called for a close liaison with geologists, mining engineers and ore petrographers to face the challenge.

T.S. Ramakrishna in two lectures detailed the numerous geophysical methods (gravity, magnetic, SP, IP, EM and others) used in mineral exploration with special reference to the layered complexes.

V.S. Sarma gave two lectures on the recent advances that have been made in electrical prospecting methods such as resistivity, SP, IP, SIP/CR and also on HERT (high resolution electrical resistivity tomography for 2D and 3D imaging).

M. Jayananda reviewed the geochemistry of komatiites from the Sargur schist belt in the western Dharwar craton with special reference to their Ni and PGE potential.

H.M. Ramchandra outlined the theoretical aspects of the genesis of ultramafic rocks found in diverse tectonic terrains with Indian and world examples.

Fareeduddin emphasized the classification and nomenclature of ultramafic rocks with beautiful microphotographs of different rock types, features which are essential in comparative studies of rock suites from different terrains.

Hanuma Prasad provided an overview of world class Ni-Cu-PGE deposits with potential areas from India especially for Ni.

T.C. Devaraju provided an overview of the exploration that has been carried out

on the PGE and base metal mineralization within the Holenarasipur greenstone belt with special reference to Hanumalpur and NSB.

M. Mukherjee elaborated on the genetic aspects of the world class PGE (e.g. Bhushveld), and PGE-Ni-Cu (e.g. Norilsk) deposits and the conceptual approaches that have used to understand their genesis so that

such principles can be adopted for new discoveries in India.

N. Nathan outlined the detailed exploration strategies adopted during the trenching, pitting and exploratory drilling to make the Sittampundi complex, especially the proximal areas of chromitite –anorthosite bands, as a potential PGE deposit with 1-2 gpt of PGE.

In the concluding session, Vasudev (GeoMysore Pvt., Ltd.), Veere Goud (MML), Prabhakar (Bangalore University), R. Nathan (GSI), R.Shankar, DMG and R.H. Sawkar participated and outlined to the trainees briefly, the *modes operandi* of the 2<sup>nd</sup> phase of training that would include batches of trainees complimenting each other from the five agencies.