

NOTES

SEISMIC RISK MANAGEMENT AND MITIGATION FOR URBAN CONGLOMERATIONS

R.N. Iyengar and S. Ghosh of the Department of Civil Engineering, Indian Institute of Science, Bangalore presented a paper recently on the "Seismic Hazard Microzonation of Delhi City" in the National Seminar on Disaster Management and Mitigation held at the Structural Engineering Research Centre, Chennai (June 20-21, 2003), under the auspices of the Indian National Academy of Engineering.

The paper has attempted to map the Peak Ground Acceleration (PGA) values for Delhi City using the state of art probabilistic seismic hazard analysis (PSHA) methods. The authors opine that the seismic hazard at Delhi is controlled broadly by two different tectonic regimes with differing recurrence characteristics. The first regime has the source in the Indo-Gangetic plain nearer to Delhi city while the second regime is related to the distant events originating in the Himalayan plate boundary. They present a seismo-tectonic map of greater Delhi area with all the twenty identified faults plotted. A controlling region of 300 km radius around Delhi has been taken up for the study with analysis of data on regional recurrence patterns over the last 300 years.

Probabilistic seismic hazard analysis has helped in arriving at the mean annual probability of exceedance of PGA value at any site. Results of the study in the form of a

contour map covering Delhi city and environs on a grid of 1 km x 1 km has been presented for the use of engineers for hard rock sites in Delhi. Surface level PGA values for soft soil sites are being computed after necessary corrections.

The recent Gujarat Earthquake as well as the earlier Latur Earthquake have brought home the importance of suitably designed civil engineering structures/buildings based on an objective study of anticipated seismic risk factor on a finer scale, particularly in our fast-growing urban conglomerations. Both underestimation or overestimation of the seismic hazard will prove costly in the long run. Hence the city level information provided by the authors for greater Delhi area is to be welcomed as a starting point for other major urban conglomerations in the country to mitigate seismic hazard on a more realistic and scientific basis.

Interested readers may obtain the full text of the paper from the Proceedings of the 2003 National Seminar on Disaster Management and Mitigation brought out by M/s Phoenix Publishing House Pvt. Ltd. 21, Prakash Apartments, 5 Ansari Road, Daryaganj, New Delhi-110 002; **Email:** phoenix@ouseph.com.

Bangalore

Email: gsocind@bqivsnl.net.in

M.S. RAO

GEOLOGY, GEOCHEMISTRY AND GENESIS OF RARE METAL BEARING GRANITIC PEGMATITES FROM PARTS OF SOUTHERN KARNATAKA*

CHANCHAL SARBAJNA

Atomic Minerals Directorate for Exploration and Research, Begumpet, Hyderabad - 500 016

Email: chanchal_s@hotmail.com

EXTENDED ABSTRACT

Rare metal Li, Be, Nb and Ta bearing pegmatites of southern Karnataka, especially those found at Marlagalla, Allapatna, Byderhalli, Hassanpura, Mundur and Arehalli

have been recognized as an important source for Nb, Ta, Li and Be by AMD. An understanding of their geology and genesis, however, has been very limited. The present lecture

**Lecture delivered at the monthly meeting of the Geological Society of India at Bangalore on 25 June 2003.*

forms a part of the doctoral thesis of the author earned out to fill these gaps in our knowledge. The rare-metal bearing pegmatites of Southern Karnataka have been emplaced into the amphibolites of the Bababudan Group which form part of the lower intracratonic supracrustal sequence of the Dharwar Supergroup. Based on a study of over one hundred (100) pegmatites, ranging in size from 5-100 m in length and 5 to 10 m in width, in terms of their mineralogy, internal zoning and associated mineralization, the pegmatites in this area have been classified into three types, namely (1) barren pegmatites (Type-I), (2) beryl-columbite-tantalite bearing type (Type-II) and (3) complex-zoned-spodumene and columbite-tantalite bearing pegmatite (Type-III). All the three types have distinct characteristic mineralogy and paragenetic assemblage as well as bulk chemistry. The gravel-sized colluvial placers of Nb-Ta bearing minerals have been formed by the weathering of rare metal pegmatite around Mailagalla-Allapatna due to very conducive geomorphic evolution. They have been mined for over 10 years for the recovery of columbite-tantalite, with beryl and spodumene as co-products.

Mineralogical and geochemical characters of the pegmatites reflect the presence of minerals such as columbite-tantalite, spodumene and Na-Li-Cs bearing alkali beryls. Their geochemistry permits one to group the RM-bearing pegmatites of Mailagalla to the LCT (Li-Cs-Ta) type. However, the presence of significant quantities of discrete Cs minerals are lacking. Based on the abundances of alkali elements, the beryl has been classified as alkali beryl of Na-Li-Cs type. The substitution of Cs in beryl as well as in muscovite probably accounts for the near absence of independent Cs minerals in the pegmatites. A detailed chemical compositional study of pegmatitic minerals such as feldspars, muscovite, tourmaline, columbite-tantalite, beryl and spodumene have provided significant insights into

the genesis of the RM-bearing pegmatites.

Numerous stock-like bodies of granites are known to intrude the Peninsular Gneissic Complex in close proximity to the ancient supracrustals into which the pegmatites have intruded in areas around Mysore. The Allapatna granite (AG) represents one such stock-like body (7 km x 3 km) on the eastern flank of Nagamangala schist belt. It shows crude foliation trending NE-SW and good development of pegmatites and apophyses apparently representing the late stage phenomena. On the basis of field, petrographic, mineralogical and geochemical studies including REE, the fertile nature of AG and its possible genetic link to the rare metal pegmatites of the area has been established. It represents an 'S' type granite with distinct peraluminous character manifested by the presence of muscovite, biotite, normative corundum and higher $^{87}\text{Sr}/^{86}\text{Sr}$ ratio (0.726 ± 0.01). Evaluation of the chemical data on the granites and the pegmatitic border facies rocks as well as pegmatitic mineral separates such as feldspar and muscovites suggests a parental status to the fertile granites. The associated RM bearing pegmatites thus represent the residual fluids of the fertile granites as a consequence of fractionation under volatile-rich condition.

Regional geological and geotectonic considerations based on previous studies and the present study has led to the conclusion that the AG was derived from the partial melting of an undepleted source akin to south Kanara gneiss and metapelites. When compared with available age data on fertile granites which have been considered parental to pegmatites elsewhere in India, the present Rb-Sr isochron age (2480 ± 81 m.y.) data on AG appears to be the oldest. Such an age for the RM bearing granite-pegmatite system from southern Karnataka is comparable with those reported occurrences of similar LCT type pegmatites from other shield areas such as Canada and Australia.