

PROPOSED GROUP DISCUSSION ON KIMBERLITES AND RELATED ROCKS OF INDIA

The Geological Society of India is proposing to hold a Group Discussion on *Kimberlites and Related Rocks of India* in the month of November, 2005. Through this background note, we would like to reach out to all active workers for their response.

Diamonds and the rocks that host them are known in India since four millennia. The outstanding physical properties of diamonds and the ways and means of enhancing their beauty were first recognised here. Diamond industry, during its peak period in 17th Century AD employed thousands of workers. The primary source of diamonds was also identified for the first time during the 13th Century AD at Majhgawan, near Panna in Central India, though the name kimberlite was given to the diamond bearing rock much later after the discovery of diamondiferous pipes in South Africa. Besides Majhgawan, diamond bearing primary rocks were located at Wajrakarur in south India. From its position of importance in the knowledge about diamonds and their host rocks, mining and processing, cutting and polishing, India gradually lost its preeminent position. Indian participation in successive international kimberlite conferences has been insignificant. Literature on kimberlites and diamonds has greatly reduced. Contributions from Indian scientist have been negligible.

Against this back drop, it is heartening to note a renewed interest by the national and multinational agencies in the search for diamondiferous kimberlites and related rocks. This resurgence has fructified in identification of a number of new kimberlite provinces in central India and locating new kimberlite bodies in the earlier known provinces of South India.

The renewed interest in kimberlite exploration stems from the four major related developments: (1) the five Archaean cratonic segments in India viz. Dharwar, Bastar, Aravalli, Bundelkhand and Singhbhum cratons have low heat flow, and are bordered by linear mobile belts or continental rift margins with elevated heat flow regimes and are deeply dissected by lineament zones – an environment favorable for the emplacement of kimberlite bodies; (2) almost all of the kimberlite bodies so far known in India have been dated at 1.1 to 1.2 billion years of age, similar to the global event that produced remarkably rich diamondiferous kimberlites and lamproites of South Africa (Premier Mine) and Australia (Argyle mine); (3) the kimberlites lie in an arc shaped zone (interpreted by

Hagerty as a plume track) including Brazil, the Central African Republic and Argyle in the reconstructed Mesoproterozoic supercontinent of Rodinia; (4) there have been great advances in the field of analytical geochemistry with vastly improved instruments for measuring major and trace elements in minerals. This has enabled the identification of mantle signatures, particularly those signatures which characterize the diamond stability field (known as the diamond window) in the minerals. Modern kimberlite exploration involves rapid reconnaissance surveys, stream sediment sampling of the identified block and separation of kimberlite indicator minerals and analyses of these minerals by electron probe micro analyser. These developments have quickened the tempo of kimberlite search.

In the Dharwar craton, along the banks of the river Krishna in earlier years, some of the world's largest and best diamonds were recovered. In Bundelkhand craton also, far away from the Majhgawan, large size alluvial gem diamonds have come to light. So far the search by several agencies for the primary sources of these large diamonds has not been unequivocally successful. What is it that is lacking in our exploration efforts?

Recent exploration activities by the Geological Survey of India and several State Departments of Mines and Geology have resulted in recognition of new pipe rocks. The Bastar Craton has emerged as the most promising region. The Aravalli craton is known to contain lamprophyres and lamproites, presumably of post-Delhi (~ 0.7 Ga) age. Similar rock types have been identified in Damodar valley coal fields.

Three most significant developments occurred in Dharwar Craton: (1) Two new kimberlite fields have been identified, one in Narayenpet and the other at Raichur. These have now been designated as the Narayenpet and the Raichur kimberlite fields. (2) New kimberlite clusters near Kalyandurga and Chigicherla areas within Wajrakarur kimberlite field have come to light. (3) The recent evaluation by BHP, Billiton indicates, a diamond grade of 45 cph in Chigicherla pipe which makes it one of the richest known in the country. This has prompted an intensification search for kimberlite bodies having large aerial extent.

The quick fix approach of naming a rock purely based on chemistry in recent times has made the science of petrography take a back seat. The situation is not very much different in kimberlite research. Of the sixty odd kimberlite/

lamproite bodies in the Dharwar craton, quite a few are fresh and are amenable for detailed petrographic studies. Yet, no attempt has been made in this direction. Known bodies are vaguely labelled as kimberlites, lamproites, intermediate varieties and transitional varieties. In the absence of fresh samples in the Bastar craton, pipes have been identified as kimberlites on the strength of chemistry of indicator minerals. The saucer shaped Tokapal intrusion was earlier identified as an ultramafic rock but is now being considered as kimberlite, though it does not exactly fit into the petrographic description of kimberlites. The case of the only diamond producing pipe rock at Majhgawan is not very different. It has been variously named as agglomeratic tuff, serpentine rock, ultramafic tuff, lamproite, kimberlite, intermediate between lamproite and kimberlite and also as orangeites. Since in several respects, these bodies do not conform to the well-founded definition of the archetypal kimberlite, the identity and nomenclature of such rocks is passing through a confused stage.

Recent resurgence in exploration and research activities on Indian kimberlite group of rocks has produced considerable new information which can be made use of in overcoming hurdles in exploration. The Geological Society of India has identified the study of Indian kimberlites as an area of prime importance and therefore intends to have a group discussion involving all active workers at Bangalore during the month of November 2005. This group discussion would be a prelude to a peer reviewed

volume on "Kimberlites and Related Rocks of India". It is proposed to involve all geoscientists who are deeply interested in this area of study. Efforts will be made to invite experts from abroad (South Africa, Australia, Canada and Russia) who are deeply involved in kimberlite exploration and research.

It is one of the avowed objective of the Geological Society of India to provide a forum for the governmental organizations, academia and private entrepreneurs to interact and share information on ongoing research, state-of-art technologies in exploration and for synthesis of newly generated data. Society will therefore approach governmental organizations (Department of Science and Technology, University Grants Commission, Geological Survey of India, National Mineral Development Corporation, National Geophysical Research Institute, Indian Space Research Organisation and Andhra Pradesh, Jharkhand and Madhya Pradesh Mineral Development Corporations) and non-governmental agencies (Rio-Tinto, Dee Beers, BHP, Billiton and MSPIL) and Universities and IITs etc. for sponsorship and active participation in the proposed group discussion.

Those interested in participating in the Group Discussion may contact the undersigned for further details.

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Hon. Secretary

TECHNOLOGY UPDATE IN MINING AND MINERAL INDUSTRIES

The above international seminar was organized by the Mining Engineers Association of India in association with the Department of Mines and Geology, Government of Karnataka, Bangalore in J.N. Tata Auditorium, Indian Institute of Science, Bangalore, from 16 to 17 October 2004. About 300 delegates including some foreign participants took part in the seminar. In all 44 papers were accepted, out of which 23 were presented in six technical session as follows:

- 1) Latest trends in exploration methodology and resource assessment.
- 2) Technology update in mining and mine mechanization, ferrous, non-ferrous minerals, coal, lignite and dimensional stones.

- 3) Technology update in mineral beneficiation.
- 4) Management and utilisation of waste and effluents.
- 5) Information technology update in mining and allied industries.
- 6) Update on mining environment, safety and health.

Keynote addresses were delivered before each session, which included Innovations in mining technology and mine mechanization; Eco-friendly coal mining in SCCL; Technology update in mineral beneficiation; Mining waste pollution control and utilization technologies; Scope of IT applications in the Mineral industry; and Mining environment policy issues in India.

Some of the important aspects of the seminar are summarized here.